



How Beads come Together

Late Iron Age glass beads as past possessions
and present sources



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Contents:

1. Introduction.....	1
1.1. Aim	2
1.2. Research questions	2
1.3. Research history	2
1.4. Definitions	4
1.5. Material.....	5
1.6. The materialities of glass	5
1.6.1 The value in a material.....	5
1.6.2 Recipe for glass.....	6
1.7 Method.....	6
1.7.1 Identifying the technique of the bead body.....	7
1.7.2. Categorizing size.....	9
1.7.3. Shaping	9
1.7.4. Color of the bead body.....	10
1.7.5. Decorations	11
1.7.6. Deterioration of decoration.	12
2. Analysis part 1 – Context and Inspection.....	13
2.1. Townsend Farm Road (KTFM 04)	13
2.1.1. Skeleton 67.....	14
2.1.2. Skeleton 70.....	16
2.1.3. Skeleton 73.....	17
2.2. RAÄ 16, the burial field of Söderby in Lovö, Sweden.	18
2.2.1. A15.....	18
2.2.2. A20.....	20
2.2.3. A21.....	21
2.2.4. A36.....	24
2.3. Summary table of Analysis part 1	25
3. Analysis part 2 - Grouping	26
3.1. Townsend Farm Road (KTFM 04)	26
3.1.1. Clear core	26
3.1.2. Broken and Repaired	27
3.1.2. Skeleton 67	27
3.1.3. Skeleton 70	32
3.1.4. Skeleton 73.....	35
3.2. Raä 16, the burial field of Söderby in Lovö, Sweden.....	36

3.2.1. The Red barrels	36
3.2.2. A15	37
3.2.3. A20	40
3.2.4. A21	42
3.2.5. A36	50
4. Discussion	51
4.1. Acquisition.....	51
4.1.1. How homogenous / heterogeneous are bead collections in graves.....	51
4.1.2. Is there evidence that beads were made or acquired for burial? Conversely, is there evidence of curation of beads over long periods?.....	53
4.1.3. How were beads collected into the assemblages found in the graves? In particular, were beads acquired individually, or as small groups, or as whole collections?.....	53
4.1.4. What can we say about the criteria by which beads were selected for inclusion in a collection?.....	54
4.2. Display.....	54
4.2.1. What can we tell about how the collections were displayed as worn groups when no documenting plan is available?	54
4.3. Wear.....	57
4.3.1. How useful are use-wear patterns for understanding the composition of bead collections?	57
4.3.2. To what extent can we see that beads which were buried together had been worn together?.....	58
5. Conclusions.....	59
6. Summary	60
References	60

Cover picture: Collage with photographs of the beads in the study.

All Images are unless otherwise stated by the author. Dimensions for all beads are included in the catalogue and therefore not all images featured throughout the work will have the scale marked.

Abstract: This study aims to demonstrate the potential for understanding first millennium glass beads not as individual representatives of types, but as collections of objects brought together and curated by owners. It uses the author's experience as a skilled bead maker to investigate processes of bead production and mechanics of bead collection current in Scandinavia and Anglo-Saxon England in the period of 6th to 9th century AD. In the study the bead collections of seven graves are examined from the perspective of their production techniques, materials, and damage from wear and cremation. The results point to beads being acquired in different numbers and often worn for long periods of time before being buried.

1. Introduction

This is a study of how beads come together into the assemblages we can see in the burials of the later Iron Age.

The studies of beads are usually done by typologies based primarily on the beads appearance. This is problematic since some bead makers in prehistory are literally using different techniques to create a similar look as beads made in another place and time. This makes it critical to understand the process of bead making when creating typologies of beads. If a type definition is primarily based on motif and ignores the techniques used to create it, it is likely to attain a focus on fashion in bead trade rather than origin of the objects themselves. (Brugmann 2004:18)

If we accept that objects have material agency and the theory that identity is formed and articulated by making, using and interacting with things (Tilley 2006:61), then all things have a story of relationships, a biography that can be narrated by characteristics and wear it has collected during its life. Understanding that every excavated bead has entered the earth with an individual biography means that it is possible to look to the context of its life to help understand its potential meaning. (Knox 2017:115)

Large groups of beads worn on the upper body were an important part of the female-gendered dress in Northern Europe of the later Iron Age. Arranged around the neck or on the chest with brooches and other accessories they and must have created a colorful display of wealth.

Beads that have been collected, carried and buried together are split up in museums and archives. This has made the context of the collection as a subject of research something that is hard to access. Instead of studying the beads as collections of items belonging together, they are divided into groups of similar appearance and studied as representative types.

If you study a bead primarily as a representative of a type, you separate the bead from its original use and actually rather study the bead as a typological tool for chronology and not as an object that has had a life, and meaning for one or more persons. This perspective also makes unique beads, which cannot be defined as a type, less interesting for research. This is not logical for one of the largest groups of finds in prehistorical northern Europe.

Beads as types and the technologies for making them is well studied, but how these types interact to create a collection is a less examined area. We cannot study motivation or thoughts of people in prehistory but we can study the results of their choices. (Renfrew 1985:12)

I would like to study glass beads primarily as individuals and their relationships in bigger assemblages. Beads are often found as personal collections but it seems to be a lot of discussion and little research into how these assemblages came together.

Were these beads purchased in groups or as individuals? Were they gifts or symbols? I think to reflect upon these questions you need to closely examine the beads in the assemblages and figure out if they are related to each other; are they made from similar glass or by similar technique? I would like to propose that there are discernable relationships between beads that are not linked to their type but can tie them together into families born in the same workshop or at least in the same tradition. This is the first clue to understanding if the beads were obtained as groups or individuals.

1.1. Aim

This study aims to explore the potential of what we can learn from considering bead collections as groups. In particular, I will investigate ways in which it is possible to study how bead groups were assembled – how they were brought together as groups. I will consider several aspects of bead collections, including appearance, display, and wear, but above all I will focus on the different processes of bead making. Each bead typically provides the trained eye with considerable evidence about the processes of its manufacture. I aim to make these traces visible to the archaeological eye, showing the significance of the information that can be drawn from understanding the techniques by which beads were made.

1.2. Research questions

My overall questions are:

How were beads collected into the assemblages found in the graves? In particular, were beads acquired individually, as small groups, or as whole collections or necklaces?

What can be told about how the collections were displayed as worn groups when no documenting plan is available?

What can we say about the criteria by which beads were selected for inclusion in a collection?

To approach those questions I will try to answer a number of detailed questions about the acquisition, display and wearing of bead collections. First, I will investigate how Homogenous/heterogeneous the bead collections in individual graves are. The beads will be analyzed and grouped based on characteristics that can indicate a shared origin, some of these characteristics are appearance, manufacturing techniques, materials, wear and dimensions.

I will also investigate what can be told about how the collections were displayed as worn groups? Ideally this is done from plans and photos, especially useful in inhumation burials. In practice a lot of excavations lack these; but the assemblage can still tell us quite a lot about how the collection was displayed, even in cremations. This will be based on characteristics such as; length of the collection and compatibility with other dress items. Size, some beads are not possible to string together, they are so small they would fit into the perforation of the larger beads, and their own perforation is so small, that a string of that size would not support the larger beads. Wear, some of the beads shows wear to a point that they fit into each other. Finally, cremation damage patterns in the beads of the grave.

Another question in this study is how useful use-wear patterns are for understanding the composition of bead collections? To what extent can we recognize that beads which were buried together had been worn together? Might some of them have been acquired for burial or where they kept and worn for long periods?

1.3. Research history

Glass beads are a common find in graves throughout the first millennium in northern Europe as in many other areas. They survive for long periods of time in the earth and require minimal care in conservation. This makes them ideal objects for research and as such they have been studied quite extensively the last 40 years. By contrast, until the 1970s, beads in Scandinavia had almost been neglected (Jacobsson 2016), when Callmer carried out his seminal typology of the Scandinavian beads in 1977, followed by Guido working with the Anglo-Saxon material in 1978. Several significant typological studies of bead have been published since. In 2004 Burgmann published an extensive study of the beads from Anglo-Saxon graves and in 2015 Mannion covered the beads from Early Medieval Ireland.

The study of beads has grown to be more than typologies. In 1976 Lundström published her first work on the techniques of bead making in a booklet called “Bead Making in Scandinavia

in the early Middle Ages”; this was followed by several articles by Callmer during the 1990s and Sode in 2004.

The last decade there have been several studies into scientific analysis of archeological glass, beginning with the massive work “*Modern methods for analyzing archaeological and historical glass*”, (2013) edited by Janssens at the University of Antwerp. The chemical composition is a fingerprint of the glass (Janssens 2013:312). However, in the period of this study, the reuse and recycling of glass is customary. Glass is imported as pre-made material and used in secondary glass working. (Callmer & Henderson 1991:144) This makes provenance by chemical composition delicate and limited. (Janssens 2013:312). Chemical composition should not be considered the only possible future for the provenance of beads.

In this work there is an interest in the mechanics of bead collecting. Most studies that approach this subject have done so from a symbolic or religious perspective. There are studies that beads may have been used as mnemonic devices in storytelling during the 3rd century AD (Fernstål 2007: 274) or part of an age based gender identity. (Théeden 2008).

There are also studies that suggest that certain types of beads had a defined place in the male-gendered costume. (O’Sullivan 2015:75f) Callmer has noted that there is remarkably little research done into the composition of bead assemblages; he believes that this is mainly due to the fact that most beads in Scandinavia are from cremation graves and that in inhumations the documentation of the beads location is often lacking. (Callmer 2003: 38) So to approach the mechanics of collection from a material perspective, the beads must be examined as related individuals. There is more new knowledge to be gained from studying the processes used in bead making to understand the relationships between beads that have ended up together in a grave.

Studying the biographies of objects, especially how they have been owned, used and how their meaning may have changed over time has been a prominent strand in archaeological research in recent decades. One significant article about this approach is “The cultural biography of objects” by Gosden and Marshall (1999). The earliest stages of the biographies of artefacts, the processes of their production, have typically not been as strongly emphasized in such studies. However, work on a number of materials, especially within the frame of experimental archaeology, has shown the strength of including the social and practical organisation of production in the narrative of an object’s biography. This is demonstrated by Fontijn (2002).

In this study I will be using an artisanal perspective (Botwid 2016:67), adding testimony of concrete practical knowledge about this material. I was trained as a bead maker at Kosta Boda glassworks in Sweden when I was 20 years old and have taught several practical classes both in Sweden and the US. This has taught me to spot characteristics of different techniques and different people in bead making, a skill that seems to be rare in modern society.

The processes of bead making are less studied than other materials. Perhaps since glass is a material that has up until modern times been an exclusive craft learned and practiced by a few. Most villages need a blacksmith, only the rich, churches and castles, need a glassblower. Bead making as a craft has been a dying trade since colonial times. This makes it a craft where it has probably been troublesome to find contemporary crafters, used to the motion and characteristics of glass; forcing experimental archeology to begin from scarce expertise.

If we can identify relationships between beads, we could connect them to each other and to a workshop. This can tell if the beads are likely to be local or imported, but also the diversity in the assemblages could tell if the beads are acquired as individuals, groups or some of each.

Are they of the same age when they are buried? Are they purchased for burial or are they old and out of fashion? Have they had long journeys behind them? Where they born out of the white sands of the Nile or made from the tesserae of roman villas? Have they been carried with love from one generation to the next? Are the collections varied in such a way that there is room for personal taste?

1.4. Definitions

It is my intention to use a language common to the contemporary bead making community. This seems effective since there is a well-established international language of bead making.

Annealing, the process of letting the glass cool slowly, giving the molecules time to align in a good way and stabilizing the glass.

Bead string, In Swedish we would differentiate between necklaces and beads worn between brooches resting on the chest. In this paper both will be discussed and I have chosen to differentiate between them in this way since English does not seem to differentiate the two.

Mandrel, a mandrel is a metal rod around which glass is wound to create a bead. The mandrel is removed and leaves a perforation. Modern mandrels are usually rods of steel with a round cross section, but the archeological mandrels found have had handles and are slightly conical to easier remove the bead. Mandrels or part of mandrels have been found at Paviken, Helgö (Lundström 1976:8) and Ribe (Sode 2004:fig.3)

Marver, a Marver is a tool used for marvering; the act of shaping a bead with pressure. It can either be a flat surface or a hand tool.

Murrine, a murrine (common pluralization murrini) is a name for patterns made in a glass cane. The pattern is revealed in the cross section that is created when the cane is cut into slices. Murrini is used when making mosaic beads. Millefiori (literally “thousand flowers”) is a category of Murrini that has floral patterns.

Rake, a tool with a point or an edge used for raking. Raking is a term for manipulating glass by dragging a tool through or on top of the glass; usually over a décor already made with stringer. Modern rakes are often made from Tungsten.

Stringer, stringer is a thin glass cane used to decorate beads. Stringer is used to make trailed décor. In modern times, the word stringer is usually applied to cane with a diameter of two millimeter or smaller, however, the trail can be thicker since it floats out when applied.

Twisted stringer. Twisted stringer (Fig.1) is a rod made from two or more colors that has been drawn while twisted, like a candy cane. If made from opaque glass they look like a yarn spun from different colors, if made from one transparent and one opaque color they can look like a serpentine.

COE, Coefficient of heat expansion. This is very important term when working with glass. It is a measurement of how much a batch of glass will expand when heated and shrink when cooled. If glass with different COE is mixed, they will expand differently when molten and mixed, and then shrink to different degrees when cooled. This will cause stress that will make the beads break during cooling or soon thereafter. Ancient glassworkers must have been aware of this. The simplest way to measure COE is to pull rods of glass from the batches one wants to test, and then heat them in an oven and watch if they expand in the same way.



Fig.1. close-up of twisted stringers from a modern workshop.

1.5. Material

The material in this study is assemblages of glass beads from two different sites. The first site is land at Townsend Farm Road close to St Margaret's at Cliffe in Kent located in southern Britain. This site is represented by three graves dated to the 6th and 7th centuries, containing a total of 119 beads. The second site is a burial field at Söderby on Lovö, an island in Lake Mälaren in central Sweden. This site is represented by four graves, dated to the 8th and 9th century containing a total of 324 beads.

The sites have been chosen since they are geographically and culturally separate but connected by sea trade at the time. Beads are made both locally and traded over large distances in time and space. Having two sites could open possibilities to see both different and similar types of beads.

These sites also have separate but similar cultural context where beads is part of a widespread and persistent pattern in bead wearing that create personal collections following the individual into the grave. Will the assemblages have clear similarities or differences in material or techniques?

In these graves there has been opportunity to study each bead as an individual in an assemblage. The graves at Townsend were burials cut into limestone, so the beads are in good condition and the assemblage is undamaged. In the case of Lovö, some of the assemblages have undergone cremation and show different degrees of damage or distortion from heat.

1.6. The materialities of glass

Glass is a liquid, frozen at a point in history. It deteriorates very slowly and retains its color and qualities in a way that cannot be said to be true for any other material except for some of the more precious metals.

Glass can be shaped in a few different ways, sometimes different techniques can be used to achieve similar results and these choices are not always obvious. I think that studies of the different techniques in bead making can provide deeper insights into the archeological studies of beads than have previously been conducted.

1.6.1 The value in a material

Perhaps one of the great advantages and obstacles of beads as an archeological material is their generally good condition. The fact that they are well preserved and similar to beads of our own time makes us believe that we understand them. They do not hide secrets under the surface as for example things hidden under years of metal oxide.

Do we understand the value of glass? To modern humans, glass is a common material; we meet it every day. It is used in our windows, in items used for drinking and cooking, eyeglasses and most of our lightbulbs. To us, glass is commonplace but in the first millennium of northern Europe, glass was still highly praised. As a material it shares qualities with precious stones and metals. Similar to a metal it can be worked, melted down and reused if broken. Similar to a precious stone it can be brightly colored and translucent, letting light shine through its body without ever losing color or oxidizing. There are Mesopotamian recipes for glass, written in cuneiform and they refer to glass as 'artificial lapis lazuli' (Janssens 2013:49). Glass was a quite common in the roman era. When the roman commercial system broke down, the raw glass produced in the Near East, key to all glass production of the period was no longer exported to Western Europe. (Janssens 2013:388). Glass became rare and the everyday objects disappear. For the people of Western Europe in the 6th and 7th

century, glass must have seemed like a material of a time passed. However, glass did come back. Callmer notes that at Åhus in the 8th century, the glass production worked from different kinds of prefabricated materials; blue transparent glass struck from glass cakes; tesserae that in some cases still have mortar sticking to them and the last group being Murrini rods. (Callmer & Henderson 1991:145f) Where the imported glass comes from is still unclear, but the blue glass cakes may be an import from Byzantium. (Callmer 1990:21)

1.6.2 Recipe for glass.

Glass is a material that most of us encounter everyday of our lives, however, most people have a very slim knowledge of what glass is, or how many different kinds of glass exist in the world. Beads of opacified glass have for example often been met with doubt to their material, called “glass paste” or in Swedish “glas-fluss”. This is because in modern times, translucency is by many believed to be a main feature of glass. (Brugmann 2004:1) Ancient glass however is not naturally transparent, but need to be decolored by adding substances to the recipe that neutralize the effects of impurities. (Janssens 2013:50) Chemical analysis of opaque glass beads leaves little doubt about their material. Brugmann 2004:1)

Glass has no standard recipe, the content, even in modern times varies depending of the intended use. To present it simple, glass is made from three main components, Vitrifiers, Fluxes and Stabilizers. The biggest part of the glass is some kind of vitrifier, normally silica from sand, however crushed quartz has also been used as a vitrifier in prehistory. Fluxes is a collective term for different kinds of components that lowers the melting temperature of silica and makes the glass mixture easier to fuse. Examples fluxes are for example Soda and Natron; they were historically derived from Egyptian natron, sodium plant ash and potash plant ash. The flux lowers the melting temperature; however, it makes the glass more susceptible to deterioration from humidity and carbon dioxide. The last group, the stabilizers, makes glass more water resistant. Examples of this are alumina and alkaline-earth oxides, mostly introduced into the glass from impurities in the sand, such as feldspar and clay, or by non-purified ashes. (Janssens 2013:28ff)

The last few decades, the advancements of scientific methods for the analysis of glass have moved forward tremendously. Glass has been made from different recipes in different times and places. The recipe needs to change depending on the material available and the different kind of impurities those materials carry. This makes the chemical composition into a fingerprint of the glass (Janssens 2013:312), however, in the period that will be studied here, the reuse and recycling of glass is not only commonplace, it is norm. Glass is imported as material and used in secondary glass working. (Callmer & Henderson 1991:144, Lundström 1976) This makes provenance by chemical composition delicate and limited. (Janssens 2013:312) and should not be considered the only possible future for the provenance of beads.

To produce a strongly colored glass of a specific color, glass-makers had to add a colorant to the batch, For instance copper (turquoise, green), cobalt (blue) or manganese (purple and violet when associated with Cobalt) oxides as natural minerals or synthetic products.

1.7 Method

The beads in the graves chosen for examination have been documented by photos and microscope photos of them. They have been measured along the mandrel and their equator; also the perforation left by the mandrel has been measured on both sides. Distinctive marks on the beads have been noted in the catalogue. No laboratory analysis such as chemical composition has been made in this study.

A main premise of this study is the idea that crafters will make choices based on preferences deriving from pre-requisites such as culture, material and available tools. These choices can be identified and used to relate the beads to each other.

The beads in this study will be categorized into groups according to techniques used in their making. Knowing if the beads in assemblages come from the same place will open up knowledge about how they were acquired.

The categories used will be explained in this chapter; each grave will then be examined and categorized in Analysis 1, then each group in the collections will be discussed in Analysis 2.

1.7.1 Identifying the technique of the bead body.

There is different ways to build the body of the bead. In this study there are three categories. The wound and the drawn are most common, and then we have examples of the mosaics.

To be able to differentiate between the types is useful to any archeologist since it can be done with your own eyes in the field and says some essential things about the item. For example, there is so far no evidence for the use of the blown-drawn technique in Scandinavia (Callmer 2003:40) so the simple elongated shape of a bubble could tell you if the bead might have been made locally or if it is an import from the Mediterranean. The wound beads on the other hand are common and impossible to place only from the technique of their body.

The beads with murrini patterns are more complex. Beads of this type is made in Scandinavia, for example in Ribe and Åhus, but it seems that the mosaic rod itself was imported as a premade material (Callmer & Henderson 1991:146)

To see the difference between these different types of production is simple when you understand how the three are made and know that glass has a texture. How this texture is aligned tell if the bead was wound, drawn or made from mosaic pieces.

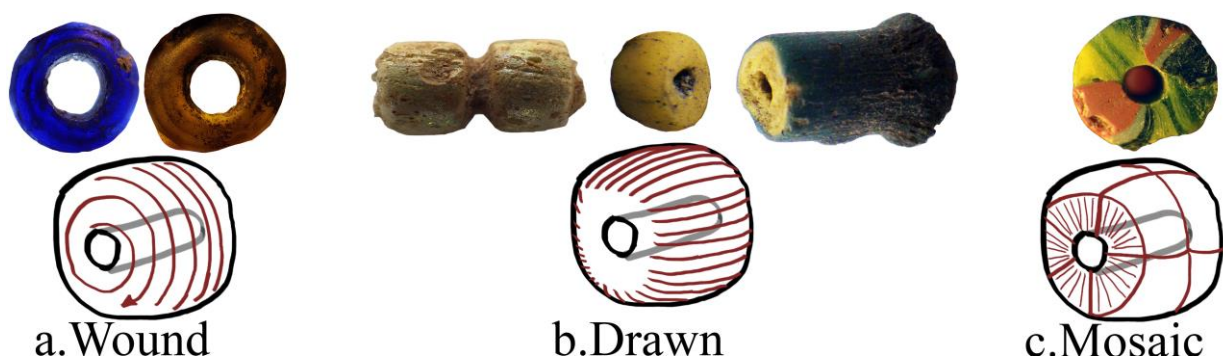


Fig.2 examples and structure of: a.Wound beads b. Drawn beads and c. Mosaic beads

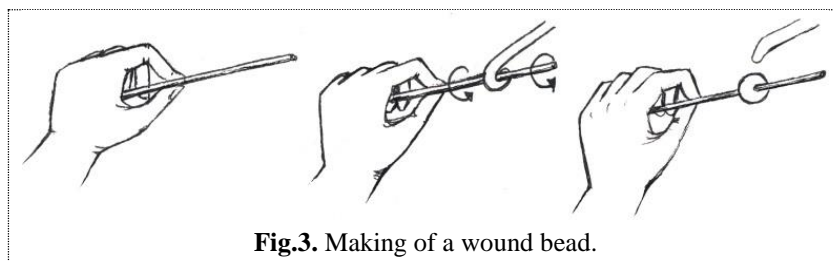
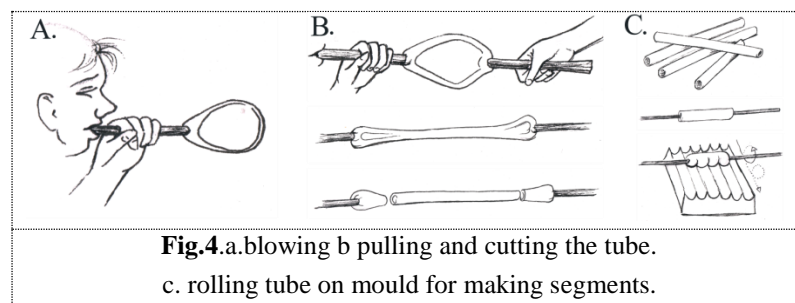


Fig.3. Making of a wound bead.

Wound beads (Fig.2.a) are the most common. Their structure is spiraling around the mandrel. It is made by winding molten glass around the mandrel (Fig.3). The mandrel is then removed and leaves the perforation of the bead. This process has been described by Callmer (1990:21) and Sode (2004:89).

Drawn beads (Fig 2.b) have a structure aligned with the mandrel. They are made by blowing a bulb (Fig.4. A) that is drawn out into a tube (Fig.4.B). Beads are made either by chopping the tube into pieces or the tube can be placed on a mandrel, reheated and rolled over a mould to make segmented beads (Fig.4.C) as described by Sode (2004:98).



Mosaic and Murrini Beads are made from polychrome drawn rods that are chopped into mosaic disks as described by Callmer (1990:21). I have separated Mosaic beads (with a body built from a mosaic of murrini) and murrini beads (beads decorated with murrini). But for simplicity both will be discussed here. In this study there are both geometric Murrine, and Millefiori (a Murrine with a floral pattern)

Murrini are chips of polychrome glass. They are created by building large gathers of glass; in a way that their cross-section creates a pattern. The gather is then pulled out into a rod, retaining the same pattern but miniaturizing it. The rod is chopped into slices, creating small disks with the original pattern of the large gather on it.

Murrini can be applied in different ways. In this study we can observe two different techniques. In bead A21 XXIX, thin slices of murrini have been applied to a wound bead. This is the easier way to apply murrini.

In the beads of Townsend skeleton 67 the murrini beads are mosaics. The mosaic beads are built by fusing murrini into a sheet that is wound onto the mandrel without a bead body underneath and marvered smooth. If the bead is undamaged, this can be observed by shining a strong light onto the bead and looking into the hole. The murrini are rarely completely opaque and will let light through as can be seen in Fig.5.



Fig.5. bead 67 100

Murrini are usually made by a group of people working together and is quite interesting since not all workshops are able to do them, and the ones who do it will usually do certain types of patterns in certain colors. They are complex to produce and generally more lucrative the bigger gather you can make. The bigger the gather, the more chips you can get out of the pull. The mosaic rods and chips were traded historically both for bead making and for inclusions in gold smithing. Callmer notes murrini rods as a prefabricated material in the glass working at Åhus (Callmer & Henderson 1991:146). And another example is the checkerboard murrini chips mounted with the garnets in the Sutton hoo purse lid. Murrini are still today made and traded as a material between workshops; so they are not necessarily made in the same workshop that ends up using them.



Fig.6. Modern murrine

I did believe that Murrini would be an area that had clear typologies already, but that does not seem to be the case. I think it would be a fertile ground for research. The cutting of murrini is still today a craft that create large amounts of scrap when the disks break in undesirable ways. There should be sites out there with thousands of murrini broken in cutting. This does not prove the manufacture of murrini, since the trade with murrini would probably be with uncut rods, but it would be a good indicator of sites where murrini was cut and used either for glass working or jewelry making.

1.7.2. Categorizing size.

When categorizing size I have used diameter since Callmer (1977:35) did. It seems a good way to determine size of the beads. Some beads are very long, but they are often segmented and did not look gigantic when worn. Some beads have been categorized as undetermined; they are very fragmented or distorted from cremation and the measurement does not reflect the beads original size. All measurement of the individual objects is recorded in the catalogue.

1.7.3. Shaping

There are many shapes of beads but in this categorization I will keep it simple and concentrate on the type of shaping the bead maker have used when making the bead.

The categories are as follows:

Natural: In the category natural, beads are placed where the shape have not been manipulated by a shaping tool. In the case of the wound beads the natural shape is determined by the force of gravity and surface tension of the glass in cooperation with the movement of the bead maker revolving the mandrel, preventing the glass to droop.

For the drawn beads the natural shape is a cut tube that can be long or short.

The mosaic beads do not fit into this category since they are marvered in the production process.

Marvered: Marvering is the act of shaping hot glass by pushing it into a shape, usually with a tool or by rolling it on a flat surface. This creates angles that the glass would not naturally assume. Marvering can be hard to distinguish from cold work in deteriorated glass. The only way to be sure is when a bead is of good condition and you can see the sharpness of the angle. Marvering is done in hot glass and the glass will retain its surface tension, preventing truly sharp angles.

The most distinctive type of marvering is when the walls of the bead are flattened and thinner than the surface tension of the glass would make them. Soda lime glass has a preference (because of surface tension) for becoming about 4 mm thick. This can be easily proven by melting a piece of glass in an oven. If being less than 4 mm it will retract towards its center, if thicker, it will float out over a greater surface.

Ribbed: beads that have vertical groves (along the mandrel) made by some sort of tool or by being rolled over a mould. Melon shaped beads is one example of ribbing.

Segmented: Segmented beads have grooves crossing the mandrel. This can be done with a tool or by being rolled over a mould. Segmented beads often appear as several beads stuck together in a row. They are sometimes broken into singles. This is done both in the life of the beads and in the ground. They are usually recognizable from the ring shaped break around their perforation.

Undetermined: In this category beads are placed if they have deteriorated by melting or fragmentation to a point where they are no longer classifiable.

1.7.4. Color of the bead body

Colors are actually quite a complex question since they are subjective. In this study I have tried to keep the different categories of color to a simple and understandable level.

The color is determined from the body of the bead and if the body is obscured, for example by being completely covered in decorations, or if it is clearly made from several colors, it has been categorized as undetermined and will be discussed further in Analysis 2.

Translucency – one of the first categories of glass coloring is if the color is opaque (O) or translucent (T). Translucent being that you can shine through it with a light source. Some of the categories of color have been marked with an O or T, separating the opaque and the translucent. This is partly since some colors are very dominated by one or the other. Certain colors, like red, do not appear regularly in translucent until much later in history.

Clear/Uncolored (T): In this study, beads that are very light colored translucent have been called clear or uncolored. Glass is not naturally clear. Usually it will be tinted and/or opacified by impurities in the raw materials. To make it clear, ingredients are added to reduce these impurities (Janssens 2013). That is the reason that a tint of color in a translucent bead will not be enough to classify it into a color category.

Light (O): In this category have been placed opaque beads that are very light in color, white or very light blue.

Yellow (O) The yellow is distinctive and usually bright.

Brick Red (O) In this category have been placed an opaque pale (almost pinkish) red that is distinctive from the other red beads of this study.

Red (O): All the red beads in this study are opaque. I have decided not to distinguish between red and orange. This is since red and orange glass has a tendency to change color in certain conditions. The two colors are often mixed and the difference in nuance might simply be a difference in heat or oxygen levels during the process of making them.

Purple (T) Purple is a rare color of glass but is occasionally seen, usually as a translucent colored by manganese. In this study only one bead is included in this category but for further information about the color I would recommend the chapter in Janssen concerning the coloring of glass.

Blue (T) In this category have been placed beads in different hues of blue, particularly grades of cobalt. It would have been beneficial to this study to limit the color “Blue” to beads that are clear cobalt and separate the nuances of cobalt blue from the more “turquoise-blue” that is made with copper, but this was not done originally.

Teal (T) Teal is a color between blue and green and in this case it is used for nuances that go between the two. The choice to use teal and not turquoise was decided because teal is a wider term. Many of these beads have probably been colored with copper, and copper can create colors from turquoise (T) to dark green (O) in a very varied and fluent spectrum.

Many of the Teal (T) has red discolorations that are an effect by reduction of copper as is discussed in group 15.3.

Green (O/T) Green comes in both opaque and translucent, but they are quite different and I decided to separate them by translucency.

Amber & Brown (T) This category is named since amber colored glass (that can be very light and translucent) will appear brown as pigmentation is increased in the material or by placing it in a deeper layer.

Black In this category is beads of such heavy pigmentation that they appear macroscopically black even in strong light. True black glass is still today very rare, and is usually simulated by a heavy pigmented translucent of blue or purple.

Undetermined: The undetermined category is quite wide; some are placed here since one cannot see the body of the bead since it has been covered by decoration. The mosaics are placed here since they are made from pieces and have no solid body color. A few beads have been placed in this category since they are deteriorated to a point where their original color is hard to determine.

1.7.5. Decorations

Glass can be decorated in many different ways and the way it is carried out can tell things about the tools and skill used by the maker. The choices for decoration show preferences that might be cultural or personal to the crafter. Some techniques are preferable to others depending on what kind of oven and other tools one have available. There are also different techniques that are used to simulate the look of another technique for different reasons. In some cases it is possible that the crafter did not have the knowledge or skill to carry out the original technique, in others it is more probable that a difference in the type of oven made certain techniques almost impossible to carry out.

In this categorization I have separated decorations into five categories.

The two first categories are monochrome stringers and polychrome stringers.

Stinger is a thin glass rod. It is made by heating glass and grabbing it either with a punty or small pliers and pulling it into a thin stick. The stringer can then be applied to a bead and creates trails of color. The stringer is always thinner than the trail it produces since it melts out when it is applied.

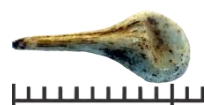


Fig. 7. Head of stringer,
Find F1659,
Up Adelsö sn.
Björkö RAÄ 118

If the stringer is pulled by pliers it usually gets a small lump at the end, called the head. An example of this has been found at a workshop at Birka. (Fig.7) (Råhlander 2014)

Stringer is a common type of decoration and has in some cases been used to simulate more advanced techniques, for example murrini (Birka grave 515) and the stacking of dots (Bakkegaard, Bornholm).

The category of monochrome stringer is the more common and the beads often have several monochrome stringers in different colors.

The polychromes are made up from two or more colors. They are either striped or twisted. This can be done simply for decoration but in some cases (especially with white) it might also be done to make the glass more fluent and easier to pull into an even rod.

Twisted stringer is drawn like a regular stringer but is twisted at the same time as they are drawn. They are always made from more than one color. They can be bichrome or polychrome. Twisted stringer has a Z-twist or an S-twist depending on the way it was wound. To make for example the herringbone patterns you need both.



Fig. 8. Close up of different stringers. The yellow (O) on the bottom and dot on top is monochrome and the white (O)/pale teal (T) is striped bichrome.

Detail of bead 70 15.



Fig.9. Twisted stringers, polychrome in red yellow and black. In S-twist, Z-twist and S-twist again. Applied next to each other, they create a herringbone pattern.

Detail of Bead 67 85.

Simple dots and stacked dots. Dotting is one of the first decorating technique most modern bead makers come to know. It is the act applying another color to the base bead to make a round dot. Eye beads are an example of Stacking, where dots of different colors have been stacked on top of each other.

Dotting is a technique whose complexity is very much determined by the tools and heat source one has available. Most modern bead makers work with a concentrated and well defined area of heat, this makes dotting very simple since the concentrated heat can be used to melt off the dotting rod. Pulling hot glass is like pulling sugar, it can become very long and thin as hairs, and the concentrated heat makes it possible to melt the rod off in a controlled way. This is not universally applicable to the historical setting. A good volcano-type oven can get a similar effect, but in the kind of oven shaped as a beehive, the heat would be much more dispersed and the dotting more advanced since one needs to find a hotspot or cut the rod off with a tool. This might be the reason that we in some cases (for example on Bornholm) see rings of stringer applied around a dot instead of stacking the dots on top of each other. Another reason could be that the individual is working in an ineffective or cold oven and the heating and marvering of stringer is quicker than the stacking and marvering of dots.

Mosaic beads and Murrini chips. Are discussed in chapter 1.7.1

1.7.6. Deterioration of decoration.

It is noteworthy that decorations may disappear in the period spent underground. There are two main reasons for this; the first being that some recipes of glass are more susceptible to humidity and carbon dioxide than others. The other being that the glasses might not have fused together enough and the decoration can simply break off; this could also be facilitated by slight COE incompatibilities.

However, missing material always leaves a scar, and in the case of deterioration there are usually minute traces of the decoration left behind in crevices of the glass.



Fig. 10. Close-up of stringer decoration deteriorated, Bead 70 59



Townsend 70
Bead 56

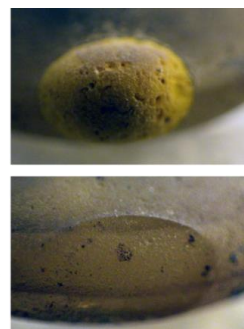


Fig. 11. Close-ups of dot and scar of broken dot from Bead 70 56.

2. Analysis part 1 – Context and Inspection

This chapter gives an overview of the beads and their background. It will present the context of the sites and graves, then systematically try to categorize the beads into techniques based upon the categories that has just been explained.

The techniques of all the graves are summarized in a table at the end of this Analysis.

The observations and groups will then be further examined and explained in Analysis part 2.

Please note that all the beads are presented with scale, measurement and notes in the catalogue.

2.1. Townsend Farm Road (KTFM 04)

These beads were unearthed during an archeological rescue excavation of land at Townsend Farm Road, St Margaret's at Cliffe, Kent. Site code KTFM 04. The excavation was conducted between the 20th and 26th of February 2004 by Pre-construct archaeology Ltd.

The site is situated about 1,1 km northwest of St Margaret's bay situated on the coastline of Great Britain at its closest point to France. In this excavation twelve inhumation burials were unearthed. Three of them had glass beads (Gaimster 2004). The documentation consists only of preliminary reports and no conservation or study has previously been carried out on these beads, kindly lent for study by Pre-construct archeology.

In the documentation there are field drawings with plans of the beads in situ, however, they are digitalized in poor quality and hard to read. In the cases where they have been used they are available in the catalogue. The graves of this excavation are documented by cuts and I will call them after the cut of the skeleton, since it is usually the one that has the most beads.



Fig.12. Glass beads of skeleton 67.

2.1.1. Skeleton 67 tentatively dated to final third of 6th century in the report. The skeleton was in poor condition with only fragments of the limbs remaining. In the grave were 127 beads of different materials mainly glass amber and amethyst. They were found around the neck and shoulder area together with two brooches made from copper alloy, one of them was particularly impressive with inlays that might be made from garnets and ivory. In the grave was also an item of worked bone, an iron band, two iron knives and three probable latchkeys, also made from iron. (Gaimster 2004)

Of the 127 registered beads in the grave, 63 were made of glass, 8 of these (110 and 154; 94 and 155; 96 and 115; 99 and 100) were actually halves of the same bead, leaving us with 59 beads. Of the 59 bead posts, a few were badly fragmented (especially 158, 173, 232, 243) but will still be counted as a bead in the counting of color and technique.

Condition is varied in this grave. Some beads are pristine, some are badly deteriorated and are broken. Beads 131, 158, 173, 232, 243 and 230 have most deteriorated and fragmented after burial. All the tube-shaped beads are broken; some may have been broken in the ground but some show signs of wear on their breakage - in particular 110 and 154 have been worn for

some time after breaking apart. Bead 91 shows significant wear to the extent that it has developed a wedge shape.

Size: The beads are of variable sizes, with diameters ranging from 2,5 to 16 mm and total width between 2 and 30 mm.

Colors: In this grave, the colors are complex to explain. Usually I would count them from the color of their body. That would be the main color that has then been decorated. In this case, several of the beads are not dominated by the color of their bead body. The second row (Fig.12) has had a surface made from another color, most probably a red in a nuance similar to the top row. It is very possible that bead 103 and 146 have had a similar surface, now gone. These 18 are undetermined. 3 beads (fragments 94&155, 96&115, 99&100) are mosaic applied on the mandrel; since they have no body they will be placed as undetermined, and 2 (85 and 126) are covered by twisted stringer and have no visible body color so they will also be placed as undetermined. 1 bead is deteriorated to undeterminable (199) this makes 24 beads of undetermined body color.

2 beads (109 and 187) are macroscopically opaque black. 16 beads (Fig 12. top row and 90, 122,133, 164) are Red, 2 beads are brick red (O) (91 and fragments 110 &154). 11 beads are different nuances of green (T) (131 173 190, 210 225 230 232,237, 242, 243 245

3 beads are clear/uncolored (177,231,236).

1 bead (158) is transparent blue in a pale cobalt hue.

Techniques: 44 of the beads are wound, Ten beads are blown-drawn (131, 177,199, 210, 225, 231, 236, 237, 245). 3 beads are mosaic (fragments 94&155, 96&115, 99&100).

2 posts of Fragments (173, 232, and 243) are so small they can't be determined.

Shape:

15 of the 59 had been marvered into shape. (85, 90, 91, 122, 128, 133, 164, 187, 190, 230, 242 and fragments 110 &154, 94 & 155, 96 & 115, 99 & 100).

5 of the beads were segmented (199 231 236). Beads 210 and 225 are undetermined.

3 fragments (173, 232 and 243) are in to poor condition to be determined.

Decoration: 13 of the beads are polychrome, 46 is monochrome (Fig.12. row two is included since they were monochrome in original condition).

10 of the beads have stringer decoration. 3 of these have polychrome stringer (85, 91, and 128); of them, 2 are made with twisted stringer (85 and 128)

7 of the beads had monochrome stringer; 5 of those had yellow stringers and two had monochrome stringers of different colors. Bead no.187 has stringer in a light (white or light blue), yellow and red. The bead made up of fragments 110 & 154 has stringer in a lighter red than the body, and on top of them a light blue. Two of the stringer beads (133 and fragments 110 & 154) have been raked after the stringer was applied.



Fig.13. Glass beads of skeleton 70.

2.1.2. Skeleton 70 tentatively dated to 7th century in the report. The skeleton was in good condition. In the grave were fifty-nine beads of different materials. Near the skull was found what could be a possible earring and possibly an iron pendant. At the left hand side of the pelvis was an iron object, possibly a knife. (Gaimster 2004)

Condition: Most of the beads are in good condition. 1 was organic in origin, possibly a fossil, 5 was amethyst, and 52 were glass. The non-glass beads have been excluded. The small beads does not show signs of wear, they still have fold marks from being marvered. Bead 59 has had a stringer decoration that has mouldered and left a scar. Bead 31 has deep marks of wear.

Size: The beads is of very variable sizes, with diameters ranging from 7 to 20,5 mm and total width between and 4,4-14,4 mm.

Colors: 11 (Fig.13: row one) are light in color. 16 (Fig.13. row two and three) is Green (O). 18 are Red. 1 is brick red (15). 4 are blue (31, 41, 46, 59). 1 bead is yellow and one is transparent brown.

Technique: All of the beads are wound.

Shape: Many of the beads (44 of the 52) have been marvered into shape. (Fig.13. Row 1-5 and bead 48)

Decoration: Most of the beads are monochrome (45 of 52). 8 beads are polychrome; 6 of these have monochrome stringer (15, 25, 41, 46, 59 and 77). 2 of them (56 and 15) have dots.



Fig.14. Beads from the grave of Townsend skeleton 73.

2.1.3. Skeleton 73 tentatively dated to 6th century in the report. The skeleton was in poor condition. In the grave were eight beads. Seven of the beads were found around the neck area. The last bead was found on the left side of the pelvis, along with the blade of an iron knife (L 115mm), an iron ring with a diameter of 55 mm, it was complete but in two pieces. There was also a metal object with trace of gilding that might have been a mount for fragment 148. (Gaimster 2004)

Condition: In the grave were 7 beads and one bead fragment. All of them were made from glass. The blue beads seem to be in quite good condition, a few have sides that are flattened either by cold work or wear. Bead 170 has a wedge shape, however, it seems to follow the structure of the glass and it might have had that shape since production. Fragment 148 is deteriorated and worn.

Size: Seven of the beads are very similar in shape and size. They are between 8,0 and 11,8 mm in diameter and 3,3-5,57 in width. Bead 148 has a diameter 20,7 mm and is 14,3 mm wide. All the beads have quite large holes and are made on mandrels between 3,8-5,6 mm in diameter.

Color: Seven of the beads were transparent blue, in different hues of cobalt, some very brilliant and some quite pale. The fragment is categorized as Undetermined since it is covered by a herringbone pattern made of twisted stringers of yellow, red and black. The colors have probably been similar to the twisted stringers in grave 67.

Technique: All of the beads are wound.

Seven of the beads are monochrome and not marvered. Bead fragment 148 is made with a twisted stringer décor and has been marvered into shape.

Shapes: The seven blue beads have a natural shape. The bead fragment has been marvered.

Decoration: The seven blue beads are undecorated. Bead fragment 148 is decorated with a deteriorated twisted stringer décor in a herringbone pattern, covering the entire surface.

2.2. RAÄ 16, the burial field of Söderby in Lovö, Sweden.

The Lovö project started in 1958 and was conducted as research and teaching excavations by the Stockholm University. This site, called RAÄ 16 Söderby on the island of Lovö was dug from 1978 to 1987. The site contains 28 cremation burials and is dated to the period between 550 and 850 AD. All the burials are cremation graves.

In the report about Söderby, the beads have been categorized in different ways. In grave A 15, A20, A21 all the beads are registered as one find number. In A36 they have been divided to three find numbers according to color. To avoid confusion, I chose to use roman numerals to separate the beads into individuals.



Fig.15. Beads from Lovö A15

2.2.1. A15

Dated to first half of 8th century based upon the beads (Petré 1999:118). Burial of an individual osteologically determined to be between 35 and 64 years of age. The individual also had a dog about the size of a spitz and at least parts of a goat. (Petré 1999:102).

In the grave were 32 glass beads, fragments of a bronze-tread spiral bead, a fragment of bronze sheet and 23 rivets. (Petré 1999:25).

Condition: The beads have gone through a cremation. 6 (IV,V,VI, VIII, XVI, XXIV) was fragments that did not fit together and will be counted as an individual. 2 (XXXI, XXXII) of the beads have cooked and expanded, hence no measurements will be used from them.

There is a difference in the heat deterioration. It could be that they were differently placed on the pyre.

Size: The beads are of very variable sizes, with diameters ranging from 8,3 to 15,5 mm and length between 3,9 and 16,9 mm (bead XXXI and XXXII excluded since they are distorted).

Colors: Of the 32 beads; 16 was opaque and 16 was translucent.

The opaque ones was red and orange, some was a mix of the two. They were all undecorated.

Of the 16 translucent, 5 (I-V) are blue. 2 (XII, XIII) are so light they will be counted as clear/uncolored. 1 bead (XVI) is categorized as amber or brown. 8 of the beads (VI-XI+XIV, XV) will be categorized as undetermined, some of them have a body of mixed glass, with different degrees of red opaque mixed into different hues of translucent blue or teal. They will be further examined in Analysis part 2.

Techniques: All of the beads are wound.

Shapes: All of the opaque seem to have been marvered into shape. 2 of the of the translucent have been ribbed with a straight tool (7-8)

Decoration: 19 are monochrome and 13 are polychrome (this includes the beads of mixed glass). 6 of the beads (1-6) are decorated. Beads 1-5 have stringer decoration that has been raked. Bead 4 and 6 are dotted, no 6 is stacked dots, yellow on top of red.

Beads no.1, 3, 5 are decorated with monochrome stringers in yellow and white. No 2 is decorated with monochrome stringers in red and white. No 4 is decorated monochrome stringers in in yellow, red and white and yellow dots.

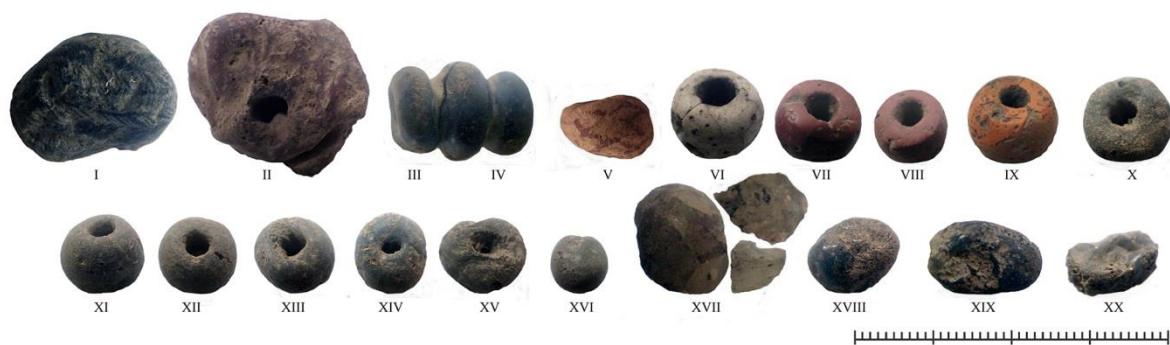


Fig.16. Beads from Lovö A 20

2.2.2. A20

Dated to 8th century based upon the beads (Petré 1999:118). Burial of an individual osteologically determined to be a woman between 18 and 44 years of age. She was buried with a dog of undetermined size. (Petré 1999:103). The documentation says that in the grave had 19 glass beads, 3 bead fragments, and also a small iron rod. (Petré 1999:30)

Condition: The beads in this grave are quite mangled from cremation. Some have been glued after excavation. 8 of the beads (I, II, V, XVI-XX) are much distorted, no measurements will be used from them, but they will be used in the color statistic. Bead XV is a bit flattened but its diameter was determined by the median of two diameter measurements.

Bead III and IV had not been glued and are listed in the original report as two beads, however they are two fragments of a segmented bead and will be counted as one in this study. In the grave was 19 beads, all made from glass.

Size: The beads are of variable sizes and several are distorted, cooked or flattened.

Colors: 4 of the beads (I, XVIII, XIX and the fragments III & IV) are blue (T), 4 of the beads (II, VII-IX) are Red or Orange (O). 2(V, VI) has been categorized as Light (O) and are more or less white. 1 (XVII) have been categorized as Clear/uncolored (T) since it is a very light colored translucent. 8 are categorized as undetermined (X-XVI and XX). They are greyish, the original report calls them “dove blue”. They are clearly distorted by heat and this has obscured their color. They seem to have originally been a translucent light blue. It is possible that they have originally been close to XVIII and XIX in color before cremation.

Techniques: All of the beads are wound.

Shape: Three seem to have been marvered into shape (VII-IX), one is segmented (fragments III & IV), one seem natural (VI) and 14 have melted in such a way that original shape cannot be clearly determined.

Decoration: 2 of the beads have stringer decoration. (I and V).

1 of these (I) has polychrome stringer. It is a twisted stringer in blue (T) and light (O). It has been applied as a herringbone pattern along the equator and as circles around the perforations.

1 of the beads had monochrome stringer (V).



Fig.17. Beads of Lovö A21

2.2.3. A21

Dated to 9th century from the beads and a silver coin made in the years 814/815. It is the youngest grave on the site (Petré 1999:118f). A 21 is a burial of an individual osteologically determined to be between 10 and 44 years old, possibly a woman. The grave show signs of being disturbed and opened.

In the grave was also a horse (the whole individual is represented) and three dogs, one the size of a German shepherd, and two small ones, comparable to a dachshund and a papillion. There are also remnants of livestock, bird and some other kind of small animal. (Petré 1999:103).

According to the report it had 262 beads (261 glass and one crystal), the largest assemblage at the site. In the cremation layer was also fragments of oval brooches (type P37), fragments of 3 types of bronze rings; a silver coin with a loop, and another loop without the coin; an undetermined bronze fragment; a lot of fragments and small objects of iron, such as nails and rivets. An iron needle, flint, fragments of a comb, ceramics and burnt barley and hazelnuts. The rivets are believed to have been part of a clinker built boat that has been burned. In the report it is speculated to be both a double grave and a child's grave. (Petré 1999:125)

The reason it is thought to be a man's grave is because of a finding of flint for making fire, a red bead and chips of a risen stone that is now missing, attributes of a male grave.

Condition: The beads have gone through a cremation; some have exploded or fragmented (II-IX, XI-XIV, XVII, XXV, XXIX, XXXIV, LV, LVI, LVII, LXIV, LXV, and LXXII). Some have fused in situ (at least L, LI, LXXX, LXXXI, CLXV). Some have been glued after excavation, for example IX XVII and LXII. 4 beads (LXVI, LXVIII, LXXI, and fragments IV&V) were so distorted they will not be used for measurements.

In the grave were over two hundred beads. One of these was mountain crystal (fragment LVIII) and has been excluded. A few were fragments of the same original item (II&III, IV&V and VI,VII,VIII) these will be counted as a total of 3 beads. Some fragments did not seem to fit together; they will be counted as individuals. Three objects, L, LI, and CLXV are fused from several beads and those beads will be counted as individuals (L as 3, LI as 4, and CLXV as 3). In the end 236 beads or representatives of beads was identified.

154 (LXXX-CCXXXII) of the beads are a quite homogenous group (hereby called group 21.1) of blown drawn beads in blue or yellow. 85 was yellow, 69 was blue. From group 21.1, only 12(LXXX-LXXXIV, CLXVI, CLXV, CCXXX-CCXXXII), have been chosen to be photographed and measured as individuals. This is to give a sample of this group. The group will be counted as a diameter of 4,5 mm since this is the mean of the sample beads.

Size: The beads are of variable sizes, with diameters ranging from 4, 5 to 35 mm. A few of the blown drawn might have been smaller but was not individually measured.

Colors: 12 of the beads (XXV, LVII, LXVII, LXVIII, LXXI LXXII, LXXIII, LXXIV, LXXV, LXXVI, LXXVII, and LXXIX) are clear/uncolored. 2 beads (XXXIV, LI(1)) have been categorized as Lights (O). 85 are Yellow (O) they are the entire blown drawn group. 2 beads (XXXIII, CCXXXV) are Red or Orange (O). 1 bead (XX) is Purple (T). 87 of the beads are Blue (T). 69 of those are of the blown drawn group, the other 18 are: XXVII, XXIX, XXX, XXXI, L(2), LI(1), LII, LIII, LIV, LV, LVI, LXI, LXII, LXIII, LXIV, LXV, and LXVI. 24 of the beads are Teal (T) (I, II&III, IV&V, VI&VII&VIII, IX, XI, XII, XIII, XIV, XVI, XVIII, XIX. XXI, XXII,XXIII, XXXII, XLIII, XLIV, XLV, XLVI, XLVII, LI(2) CCXXXIV) 4 of the beads (XXXV, XXXVI, XLIX, and L (1)) are Green (O). 6 of the beads (XV, XXIV, XXVIII, XLVIII, LXIX, and LXX) are Green (T). 6 of the beads (XXXVI, XXXVIII, XXXIX, XL, XLI, and XLII) are Amber or Brown (T). 3 beads (X, LIX, and LX) are macroscopically Black. 4 Beads have been categorized as Undetermined: XVII, XXVI, LXXI, and CCXXXIII.

Techniques: 154 have already been determined to be blown drawn of a homogenous group; however, there are 11 more blown drawn beads (XXVIII, LXVII, LXVIII, and LXXII-LXXIX). This makes 165 blown drawn. 1 Bead (LXXI) is so distorted its technique will be categorized as undetermined. The rest of the assemblage (70 beads) has been determined to have been wound.

Shapes: For this grave I decided to discuss the shapes in two parts, first the shapes of the blown drawn and then the shapes of the wound. Object LXXI will still be categorized as

undetermined (it is most probably the melted remains of a segmented silver foil, judging by its color).

Of the drawn beads, 10 are segmented (LXVII, LXVIII, LXXII-LXXIX). 1 (XXVIII) is actually the end piece of the blowing tube. That shape will be categorized as natural. The group of 154 blues and yellows will be counted as natural in this statistic. They will be discussed further in analysis part 2.

Of the wound beads, 13 have been determined to be natural (IX, X, XV, XXIII, XXIV, XXV, LII, LIII, LIV, LVII, LXX, CCXXXIII, and the fragmented bead VI-VIII). 13 have been determined as ribbed, (I, XXXVII-XLVIII). 19 is marvered (II&III, IV&V, XI, XII, XIII, XIV, XVI, XXVI, XXVII, XXIX, XXX, XXXI, XXXII, XXXIII, XXXIV, XXXV, LXIII, LXIV, LXV). It is worth noting that 4 of those were still or had clear trace of having been Cuboctahedral (XXVII, LXIII, LXIV, LXV). 25 of the wound beads were categorized as shape undetermined. Most of them because they are distorted and show no clear clues to either case. (XVII, XVIII, XIX, XX, XXI, XXII, XXXVI, XLIX, L (3), LI (4), LV, LVI, LIX, LX, LXI, LXII, LXVI, LXIX, CCXXXIV, CCXXXV) (please note that object LXXI has already been categorized as undetermined making this group a total of 26)

Decoration: 219 of the beads were monochrome, 2 beads (XXVIII, XXXII) were undecorated but polychrome. 15 beads were decorated. 9 of the beads have monochrome stringer. Four of them had simple dots (X, XV, XVI, and XIX). Bead LXI had stacked dots in red (O) and yellow (O). One bead (XXIX) had Murrini.

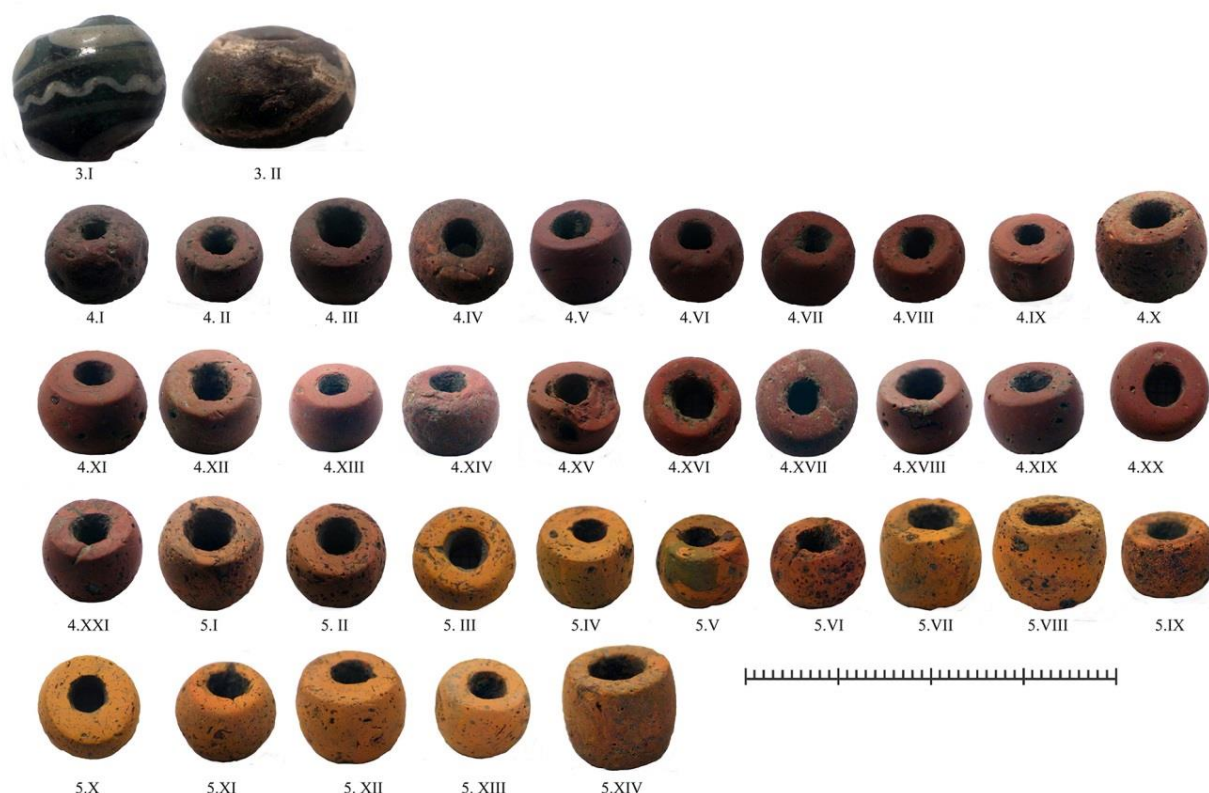


Fig.18. Beads of Lovö A36

2.2.4. A36

Dated to the second half of 7th century. (Petré 1999:114) Burial of an individual osteologically determined to be between 10 and 44 years old and a dog of undetermined size. (Petré 1999:104) In the grave were an iron knife, some iron nails and fragments. Two beads made from wound bronze tread and 37 glass beads. There were also fragments of a comb and fragmented bead spreaders of bone or horn (Petré 1999:39). The bead spreaders must have had at least 4 holes each (Petré 1999:88).

In the grave were 39 beads, 2 made from bronze thread and 37 made from glass. The glass beads had been categorized into three different find numbers (no.3-5) in the catalogue. I have separated these categories into individuals by adding a Roman numeral.

Condition: The beads have gone through a cremation. 1 of the beads (3.II) have melted and been distorted hence no measurements will be used from it.

Size: The beads is of similar size, with diameters ranging from 9,4 to 14,5 mm and length between 5,9 and 11,7 mm (bead 3.II excluded).

Colors: 35 of the beads were Red or Orange (O). 2 of the beads were Teal (T).

Techniques: All of the beads are wound.

Shapes: 35 have been marvered into shape, possibly in a mould. (All the opaque ones) 1 seems natural (3.I) and one is undetermined since it is distorted (3.II).

Decoration: 2 of the beads have stringer decoration (3.I-II). They both have the same type of light polychrome stringer. It is made from an opaque white mixed with a translucent light blue. This is most clearly visible on 3.II because of a difference in deterioration, but can also be observed on 3.I with a microscope.

2.3. Summary table of Analysis part 1

Table. 1. Summary of Techniques								
		Townsend (KTFM 04)			RAÄ 16 Söderby, Lovö sn			
		67	70	73	A15	A20	A21	A36
Total amount of glass beads:		59	52	8	32	19	236	37
Technique	Wound	44	52	8	32	19	70	37
	Drawn	10	-	-	-	-	165	-
	Mosaic	3	-	-	-	-	-	-
	Undetermined	2	-	-	-	-	1	-
Size (Ø mm)	(<3 mm)	3	-	-	-	-	-	-
	(3-5 mm)	12	-	-	-	-	154	-
	(6-8 mm)	27	45	1	3	-	17	-
	(9-11 mm)	4	1	6	16	11	41	35
	(12-14 mm)	4	4	-	8	-	9	1
	(15-17 mm)	4	-	-	1	-	2	1
	(18-20 mm)	-	2	1	-	-	5	-
	(21-23 mm)	-	-	-	-	-	2	-
	(24-26mm)	-	-	-	-	-	-	-
	(27-29mm)	-	-	-	-	-	-	-
	(30mm and more)	-	-	-	-	-	2	-
	Undetermined	4	-	-	4	8	4	-
Shape	Natural	37	8	7	9	1	168	1
	Marvered	15	44	1	14	3	19	35
	Ribbed	-	-	-	2	-	13	-
	Segmented	4	-	-	-	1	10	-
	Undetermined	3	-	-	7	14	26	1
Color of Bead body	Clear/uncolored (T)	3	-	-	2	1	12	-
	Light (O)	-	11	-	-	3	2	-
	Yellow (O)	-	1	-	-	-	85	-
	Brick Red (O)	2	1	-	-	-	-	-
	Red & Orange (O)	16	18	-	16	4	2	35
	Purple (T)	-	-	-	-	-	1	-
	Blue (T)	1	4	7	5	4	87	-
	Teal (T)	-	-	-	-	-	24	2
	Green (O)	-	16	-	-	-	4	-
	Green (T)	11	-	-	-	-	6	-
	Amber & Brown (T)	-	1	-	1	-	6	-
	Black	2	-	-	-	-	3	-
	Undetermined	24	-	1	8	6	4	-
Complexity	Monochrome	46	45	7	19	17	221	35
	Polychrome	13	7	1	13	2	15	2
Decoration	Monochrome stringers	3	6	-	5	1	9	-
	Polychrome stringers	7	-	1	-	1	-	2
	Simple dots	-	1	-	1	-	4	-
	Stacked dots	-	1	-	1	-	1	-
	Mosaic/Murrini	3	-	-	-	-	1	-

3. Analysis part 2 - Grouping

Analysis 2: Here I'm making comparisons between my answers for different graves and discussing groups of beads in the different assemblages.

In this part of the analysis the assemblages will be divided into groups and/or individuals that will be further analyzed and discussed.

This analysis will be broken up into the two sites and the individual beads. The first part will discuss similarities or groups that can be seen in several of the graves on that site.

3.1. Townsend Farm Road (KTFM 04)

3.1.1. Clear core

In two of the three graves of Townsend a technique called “clear coring” can be observed. The concerned beads are grave 67 beads no 85, 99, 128, and grave 73 bead no 148. These beads are connected by this distinctive technique

In modern bead making, especially when working with borosilicate glass “clear coring” is a common expression. It means that one builds the base of the bead body in clear glass and then applies colored glass only on the surface. This is done for different reasons. In modern time it is mainly because the colored borosilicate is more expensive than the clear (often tenfold more expensive). But it is also used to give depth to dark color; that would appear black if applied in a deep layer.

In this study clear coring will be used as a term for a technique that uses a color of glass (not necessarily clear) not be visible on the surface, as a way to preserve glass, or potentially a way to stabilize the bead. In the Townsend material clear coring is done in cores of both beads and twisted stringer. In most observed cases it is done with clear glass. However, in bead 73 148 the base and half of the twisted stringers is made from an opaque greyish glass. This will still be called clear coring since it is the same technique (probably for the same reasons) but in another color (it looks like a glass that is reused or just of an unappealing color, probably of low value).



Fig 19. Examples of clear cored parts from Townsend. There is clear cored twisted stringer in Grave 67 beads 85 and 128 and Grave 73 bead 148. In Grave 67 bead 99 the clear core is in the red ends of a mosaic bead.

Why do clear coring? Using this technique is quite interesting since it is a method that saves certain types of glass at the expense of extra work. It was natural from past experiences, to think of it as a way to save a more expensive type of glass. This might be one reason, but having studied the large amounts of red beads from Lovö I get the impression that the red glass is a slow mover. It seems to have a heavy consistency that makes it necessary to marver it into a smooth shape. Clear coring a glass like that would make it more fluid to work with. A difference in consistency might also be an indication that it could have a different COE. If it does, clear coring would reduce the stress, by reducing the amount of incompatible glass. It cannot be proven without laboratory testing, but it is worth recording.



Fig. 20. Bead 148 from Townsend 73

Bead 73 148 is a bead of a type that seems quite common and it uses clear coring quite a lot. The base bead is made of a greyish glass that has not been visible when the bead was whole. The décor is made from twisted stringers that are applied to create a herringbone pattern. This demands stringer with both a Z-twist and an S-twist. The Z twist has been made with a clear core and the S with the same grey as the base bead.

These beads seem to have carried some form of value or significance, since we can identify

several examples of them that have been broken and reused. However, it might be that the reason they break is a COE incompatibility between the twisted stringers and the core.

3.1.2. Broken and Repaired

Bead 73 148 was kept after its breakage. It might have been mounted into a pendant after a long life as bead (it is very worn around the perforations) was ended by the break that made it unstringable.

In Brugmann (2004:fig 129) the same type of bead has been repaired. Brugmann describe its appearance as fused from two halves, that it seems technically impossible from a bead-making point of view, but is supported by a comparable bead from Bakkegaard on Bornholm. She interprets the beads as evidence of two types of decoration made by the same person at the same time. (Brugmann 2004:37).

I would interpret it as the opposite. The reheating of beads is unpopular among modern bead makers because it carries the risk of the bead shattering in an explosion of hot glass-shrapnel. However, if working with a historical oven, the bead can be reheated much slower, even inside a pot, removing the risk of being hit by flying glass. I would believe it was repaired by someone that did not have the skill to recreate the pattern on the new half. A bead excavated from a late seventh-century burial at Snekkebjerg on Bornholm¹ is supporting this since it is not only made with different patterns but also from different batches of cobalt glass.²

Even with less danger, mending beads are not easy. Copying a broken bead is usually a better option than trying to repair it. This indicate a value greater than simple production cost, the bead has either a sentimental value or is not possible for the repairing craftsman to reproduce.

3.1.2. Skeleton 67

The assemblage of this grave has been divided into 11 groups.

Group 67.1 has been connected into a group because they are homogenous in size; they are all opaque and may very well have looked very similar in their original state. The group contains 28 beads (28, 29, 129, 179, 180, 181, 189, 195, 198, 200, 204, 205, 208, 212, 219, 220, 221, 222, 223, 224, 226, 227, 228,233, 234, 235, 241, 244)

Group 67.2 are small and similar in color. Most of them are blown drawn. The group contains 15 beads (131, 173, 177, 190, 199, 210, 225, 230, 231, 232, 236, 237, 242, 243, 245).

¹ Bornholm museum, collection 3139, assemblage A36, item 55

² Thanks to Matthew Delvaux for showing me his photos from Bornholms Museum, Rønne, Denmark.

Group 67.3 are mosaic. The group contains 3 beads from 6 fragments (94&155 96&115 and 99&100)

Group 67.4 are of the same size, shape and made from twisted stringer of similar pattern and color. The group contains 2 beads (85, 128)

Group 67.5 are of similar size and cylindrical. The group contains 2 beads. (110&154 and 133)

Group 67.6 are truncated bicones similar in size and pattern. The group contains 3 beads (90, 122, 164).

Group 67.7 are of similar size, shape and material. The group contains 2 beads (103 and 146).

Group 67.8 is an individual bead fragment 158.

Group 67.9 is an individual bead, 109.

Group 67.10 is an individual bead, 187.

Group 67.11 is an individual bead, 91.



Fig. 21. Group 67.1

Group 67.1 is homogenous in size; they are opaque and may have looked very similar in their original state.

The beads of the second row are unusual: they are reminiscent of fajans, but the structure of the core seems to be wound glass. Possibly the surface layer is made of an incompatible glass and is flaking off.

These beads (244 excluded because of deterioration) range in length from 3,2-4,6 mm and diameter 5,7-7,2 mm. Their perforations are 2,5-3,3 mm (both sides included). The variation between them is hence less than one millimeter in mandrel and about 1,5 millimeters in length and diameter. Since mandrels of this period are conical the mandrel difference is more or less nonexistent and it is possible they were made on the same tool.

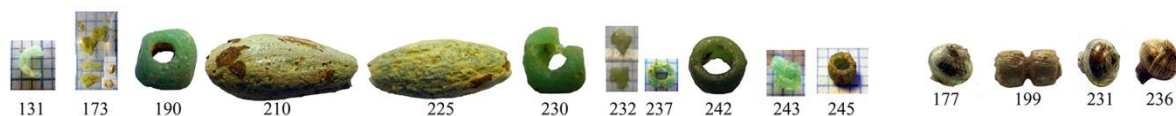


Fig. 22. Group 67.2

Group 67.2: the beads are small, so small in fact that many of them could fit inside the perforation of the larger beads in this assemblage. This makes it likely that they have not been strung up on the same string as the larger ones in this assemblage. This group is a quite unusual color. 12 of the 15 are certainly blown-drawn (the exceptions are bead 190, 230 and 242). The fact that they are blown drawn points to them being imported and in this particular case I would think there is a good chance they have been imported together. They may actually have been a ready-made necklace since some of the beads are so small and delicate they would be troublesome to sell as individuals as they would easily get lost in a market setting.

It is worth noting that 4 beads (177, 231 and 236) connect into a subgroup. They are made together, from the same material by rolling a blown tube on a ribbed mould. 177 and 131 fit together and the break is not worn or grinded. Those have probably broken in the ground.



Fig. 23. Group 67.3

Group 67.3 are mosaic beads, they are tubular with red ends. These are a common type of mosaic beads. They have a long period of production dated to extend from the 1th or possibly the 2th century up until the 10th. Red endcaps is most common but they can also be yellow, white, green or blue. (Lankton 2003:57) Callmer says they are most represented in his Bead period II (Callmer 1977: 90). BPII was originally dated to 820-845 (Callmer 1977: 77)

They are certainly imported and were probably expensive since their making is advanced and demands skilled workers and experience of different colorants.



Fig. 24. Group 67.4

Group 67.4 is made from twisted stringer of similar pattern and color. The group contains beads no: 85 and 128.

Bead 85 and 128 are truly similar. They are made with the same technique, color and in the same size. They are actually so similar in size, being measured as 15,04 mm and 15,03 mm, one must take into account the possibility they were shaped by marvering in a concave mould.

This would indicate that they are made in the same workshop. However, in this case their similarity goes beyond superficial similarities.

Twisted stringer is a rod that has a repetitive pattern derived from the pattern of the original lump of glass it was twisted from. Even in a rod of twisted stringer there will be distortion of the pattern that creates differences in proportion in the beginning and the end and also there would be a distinct difference if the person twisting it changed the speed of twisting or drawing in mid-process. The rod is also a liquid both in the process

Table. 2. Measurements of group 67.4

Bead no.	width (along the mandrel)	Ø (mm)	mandrel Ø	mandrel Ø
			first side (mm)	other side (mm)
85	16,34	15,04	5,28	6,07
128	16,59	15,03	5,01	6,77

of making the twisty and applying it. This will also distort the proportions a bit; hence the probability to find two pieces of twisted stringer with the same proportions is almost astronomical.

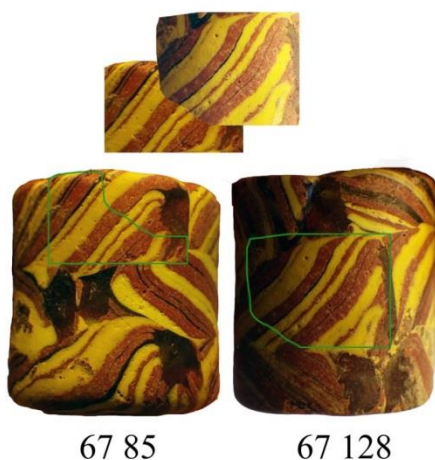


Fig.25. Bead 85 and 128 with striation comparison.

However, on each of 85 and 128, there is a section of the repetitive pattern that is so similar in proportions they must have been close to each other on the rod. (Fig.25) These two beads were probably made one right after the other, probably on the same day, from the same rod of twisted stringer.

These two could have been made on the same mandrel and are close enough to each other I would call them siblings. They were made together, worn together and buried together.

Group 67.5 has been connected into a group because they are tubular and of similar size. The group contains beads no: 110&154 and 133, a total of two beads, one made up of two fragments.



Fig. 26. Group 67.5

These beads (Fig 26: 133 and 110 &154) are both raked but with two different kinds of tools. Bead 133 has been raked with a pointed tool, and the two fragments, 110 and 154 have been raked with an edge similar to what you would use for ribbing.

In bead 133 the tool have been pulled all the way from one side to the other, trailing with it the stripes, in fragments 110&154 an edge have been placed to the surface and slightly pushed in and up, moving all the stripes a uniform distance at the same time.

These two shows a clear difference in experience, bead 110&154 is well executed.

Bead 133 on the other hand seem to be made by someone inexperienced with doing this kind of decoration since with every stripe the tool gets warmer, making it go smoother and deeper into the bead, until it gets stuck. Getting the tool loose probably created cracks or stress in the glass that in the end created the strange fragmentation that can be observed in this bead.

However, this bead is of a quite common type for Britain, possibly it is an early example. Most bead makers quickly learn to avoid getting their tools stuck in the glass, either by working very hot or cooling the tool and avoiding letting it get to deep into the glass.

Perhaps bead 133 was bought or even ordered to match bead 110&154 in size and shape to obtain symmetry.

Bead 110&154 seems to be an older bead; it has been worn broken for quite some time. This can be observed in Fig. 27. since the break is grinded down in such a way that the pattern does no longer match up if they are fitted together, this points to the bead being worn broken



Fig.27. bead 110&154.

In the top picture the pattern is aligned.



Fig. 28. Group 67.6

Group 67.6 are similar in size and pattern, they are truncated bicones.

These three beads are very similar and also share some characteristics with bead 67 133.

They are made of a red (O) glass with applied trails of yellow (O) stringer. They have been marvered. The yellow stringer is applied in two wave patterns that converge on the middle. This is a quite good way to apply stringer onto a slanted surface.

The group contains beads no: 90, 122, 164, a total of 3 beads.



Fig. 29. Group 67.7

Group 67.7 is of similar size, shape and material. Their Mandrel size is 3,3-3,9. They seem to have lost their entire surface and appear coarse. The sides are flat from wear or cold work.

These two are quite strange and might be of the same technique as group 1

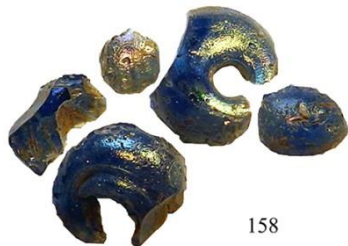


Fig. 30. Group 67.8

Group 67.8 is the fragmented 67 158. It is colored by cobalt and used to be quite large. It is badly fragmented but shows no sign of wear or grinding on the ends.

The iridescent effect is a result of deterioration of the glass, it is an effect created by the weathering and the migration of Calcium ions towards the surface. (Emami 2016:67). It is worth nothing that this bead shows clear folds in the glass. It does not seem to have been melted together completely. This makes it similar to group 70.5,

which is also cobalt that has not melted together completely with a faint iridescence.

Group 67.9 . This bead is similar to group 67.6 in size and color of the decoration. It might have given symmetry to them since they are an odd number. The difference between this and those, are that this beads body is made of a glass that is macroscopically black, and that this bead does not show signs of marvering. The stringer is completely melted into the body and has trace of a dark color in the yellow glass.

It has a natural shape and the stringer has melted out over the surface. In contrast to bead 158, the glass has melted into a homogenous bead.



109

Fig. 31. Group 67.9

Group 67.10 is an individual bead (67 187). This is a quite odd bead, as bead no 109 it is macroscopically black. It has a have decoration of several stringers that appear monochrome or possibly badly mixed. The shape has been marvered cubical.



187

Fig. 32. Group 67.10



Fig . 33. bead 67 187 from all sides.



91

Fig. 34. Group 67.11

Group 67.11 is an individual bead (67 91). It is very worn, with slightly concave sides. The angle is very shape and eats its way down into the bichrome stringer in such a way we can be certain that it was done to the cold bead; otherwise the stringer would be distorted.

The color is similar to the body color of Bead 110&154

Stringer and body color similar to 70.7.

3.1.3. Skeleton 70

The assemblage of this grave has been divided into 8 groups.

Group 70.1 of similar size, mandrel size and technique. The group contains 43 beads (8,10, 11, 13, 14, 16, 20, 21,22, 24, 26, 27, 32, 33, 34, 42, 43, 45,47, 49, 50, 51, 52, 53, 54, 55, 57, 58, 61, 62, 65, 67, 68, 69, 71, 72, 73, 74, 75, 82 78)

Group 70.2 are similar in size, materials and technique. The group contains 2 beads (25, 77).

Group 70.3 are similar in materials, size, and technique. The group contains 2 beads (41, 46)

Group 70.4 is an individual bead (56)

Group 70.5 is an individual bead (59)

Group 70.6 is an individual bead (48)

Group 70.7 is an individual bead (15)

Group 70.8 is an individual bead (31)



Fig. 35. Group 70.1

Group 70.1 are wound spiral beads. A type named from the spiral visible on one or both perforated sides. (Brugmann 2004:41) Brugmann says the spiral come from winding but it is more probably a result of marvering. Brugmann also notes that the type cover to many shapes and colors to have all been made at Helgö. I think this type-definition may be too wide to be useful since the fold is a symptom of a quite common shaping technique. It is notable that these three colors can be achieved with copper as a colorant.

Their perforations are slightly conical and differ in size between 3,2-4,4 mm (1,2 mm) so it is probable they have been done using the same mandrel.



Fig. 36. Group 70.2

Group 70.2 has been connected into a group because they are similar in size, materials and technique. The group contains beads no: 25 and 77, a total of 2 beads.

This type is described in Brugmann as “Koch 34 White” and very numerous but she remarks that this type is very large and need to be distinguished in more ways than color (Brugmann 2004:38)

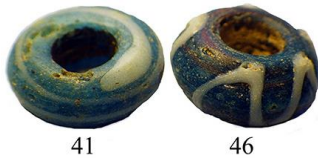


Fig. 37. Group 70.3

Group 70.3 has been connected into a group because they are similar in, material, technique, size (a difference of 0,1 mm in diameter and 0,01mm in length), mandrel size (a difference in 0,4mm). It is likely they have been made using the same mandrel.

These might once have been used as a pair, but 70 43 was according to the field drawings (unpublished) found alone in the waist area, indicating it might have been placed in a small bag at the waist. The placement of bead 70 46 is further discussed in group 70.8.

Group 70.4 is an individual bead (70 56).

This bead separates from the others in body color and shape and seems to have been worked in quite low heat, allowing the thin shape to be wound without melting down.



Fig. 38. Group 70.4



Fig. 39. Group 70.5

Group 70.5 is an individual bead, (70 59). 59 is colored with cobalt and seems to have been worked in quite low heat (similar to group 70.4), making the bead appear layered when held towards the light. The wound layers of glass have not quite melted together into a homogenous form. The bead has a slight iridescent effect from deterioration. As discussed in group 67.8.

The bead is deteriorated. Originally it had a light (O) stringer applied in a wave pattern similar to bead 46. They have probably looked quite similar originally. However, they are not what I would call “related”. They are made from different batches of glass and this result in the difference in deterioration.

They have both had a white stringer. 46 still have it but 59 have clear scars where the stringer used to be. The glass in that stringer must have been mixed in such a way that it was susceptible to deterioration. This means that the two beads are made from four different batches of glass, one for each color but they still create a similar appearance.



Fig. 40. Close-up of stringer scar in Bead 70 59.

One of them may well have been chosen by the collector because of this superficial similarity to the other. The placement of group 70.5 is further discussed in group 70.8.

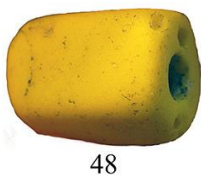


Fig. 41. Group 70.6

Group 70.6 is an individual bead (48), belonging to a type called Pentagonal cylinder beads found all over Anglo-Saxon England with larger concentrations in Kent and East Anglia. (Brugmann 2004:p 39)

Group 70.7. This bead is of a color combination typical for Merovingian and Frankish beads of 6th-7th century. (Mannion 2015: 32f) the execution of the techniques is a bit clumsy, some elements have been added in an illogical fashion, (an opaque stringer around the equator could have been made first, but have been made last, having to start and stop to not cross over the already stacked dots.) possibly indicating that someone is copying another bead.



Fig. 42. Group 70.7



31

Fig. 43. Group 70.8

Group 70.8 is an individual bead (31). It is a quite large cobalt blue bead with a natural shape. It has concave edges on both sides around the perforation. Many prehistoric beads show signs of grinding on their perforated sides. In some cases it might be hard to distinguish if this is made by wear, cold work (grinding or polishing as one would a stone) or in some cases, even marvering.

Cold working glass is time consuming and hard on whatever tool you choose to use. However it is sometimes quite necessary, especially when the bead maker is inexperienced there is a risk that the beads get sharp edges. Sharp edges can put the whole

collection at risk by cutting the strings uniting them. This is a problem solved by simply grinding away the sharp edge with a grindstone. This leaves a straight edge on the perforated side.

The edge we have in bead 31 is clearly concave, with well-defined edges. This tells us that it is not done in hot glass. Hot glass is a liquid and liquids will not conform to sharp angles easily and trying to marver inwards so close to the mandrel would not be a practical task.

Bead 31 is worn, and probably it was once placed in the center of a bead string. Bead 46 and 59 fits perfectly into the sockets made on each side. They on the other hand do not show the same strong signs of wear. Bead 46 show some signs of being worn, it has lost the peaks

of its stringer on the sides. This relates to how beads carry weight and shows a problem in determining age by wear.

It is clear that beads 46 and 59 have eaten their way into the sides of bead 31. This is explainable because of the weight being distributed downwards towards the center. This weight makes the bead in the center less inclined to move. It is locked down by the weight from both sides – making it move with neither. This will result in more wear since it is stationary and being grind by its neighbors. Bead 31 has been grind to a point where it has nice concave grooves that the beads on the sides fit perfectly into. They on the other hand are not at all affected in the same distinct way since they have the possibility to move with their neighbors.

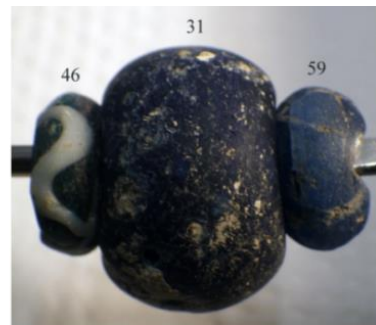


Fig. 44. Fitting of the smaller beads into bead 31.

3.1.4. Skeleton 73

The assemblage of this grave has been divided into 2 groups.

Group 73.1 has been connected into a group because they are of the same color, shape and mandrel size. The group contains 7 beads (165-171).

Group 73.2 is an individual bead fragment, 148.



Fig. 45. Group 73.1

Group 73.1 is similar in size and mandrel size. They are made with the same colorant (cobalt) in different concentrations, ranging from pale to deep. Their shape has not been marvered but they show signs of wear or grinding.

Their perforations differ from 3,8 to 5,9, a bit more than other groups in this study indicating that they were either not made using the same mandrel or that mandrel was unusually conical. It also tell they were not made on the same mandrel as bead 70 31 (having a mandrel size of 7,6-7,7mm)



Fig.46. Group 73.2

Group 73.2. The fragment is deteriorated. The yellow areas look as if they had sunk in, since they have moldered. The area around the perforation is worn flat, indicating it was used as part of a collection for a long time before the break. The bead itself is decorated with twisted stringer similar to group 67.4.

There is one clear difference between these groups and that is the shape, something that could indicate that if they were made in the same workshop, they were made with some distance in time. Group 67.4 seem to have been marvered in a mould, this one is marvered but not uniform, pointing to marvering with a handheld tool.

The bead was probably broken before burial and the fragment was recovered from the pelvis area. In the same area were also a small knife, an iron ring and a small metal object with trace of gilding that could have been a bead mount. (Gaimster:2004)

3.2. Raä 16, the burial field of Söderby in Lovö, Sweden.

3.2.1. The Red barrels. The graves from Lovö share one type of bead, the red or orange barrel. These beads are divided in groups 15.1, 20.2, 21.10, 36.1. but will be discussed here.

The beads that have retained their shape are all marvered to a barrel shape. Their ends are flattened. Possibly by marvering and then cold worked to enhance the feature. They rarely show much deterioration from heat, some are a bit chipped but that might be damage from use, burial or imperfections from manufacture.

These beads differ in color but could actually be the same material; some glass has a tendency to change in nuance from orange to dark red from variables such as temperature and oxygen levels.

When considering these beads one needs to look at their context. When Raä 16 was examined 41 areas was chosen, 12 was later excluded. 31 graves were excavated, 21 had beads; more than half of them have only red or orange bead/s. In 19 of 21 graves more than half of the assemblage is beads that are red or orange. The two graves that don't conform are A20 and A21. They are late burials, neighbors on the southern edge of the field. A20 dated to 8th century and A21 dated to 9th century. (Petré 1999:114)

There is a theory that one single red bead is an indicator of a male grave. However this cannot be confirmed in this site. Because of cremation the osteological determinations are few. Only two individuals are osteologically determined to be male (Petré 1999:123), neither of those had any beads.

One thing is certain, for one reason or another, the red or orange beads were very common in this area or family. Perhaps they are symbolic, or perhaps they are easily obtained.

Seven miles to the north is the island of Helgö where there was bead production, possibly for an extensive period of time since 2000 shards of glass vessels, dated to periods ranging from the Roman Iron Age to the Viking period have been found here (Lundström 1976:7). Lundström (1976:11) describes a billet of red glass found at Helgö as a possible material for bead making, and several pieces of red glass was categorized as bead making material in the report of the Helgö excavations (Lundström 1981:31). It is probable that scrap glass was imported to Helgö where copper oxide was added to opacify it and give a red color. Perhaps one could find marvering moulds in the about 300 kg (Lundström 1976:11) of crucible material from Helgö.

Brugmann notes the barrel type as one almost absent from Anglo-Saxon England, except for the area of Kent.

Table. 3. Beads in the Graves of Raä 16. Numbers from (Petré 1999:17)

Grave no.	Total amount of beads	Amount of Red or Orange (O)
1	1	1
2	25	15
5	9	5
6	3	3
7	31	31
15	31 ³	16
16	1	1
17	1	1
18	1	1
20	19	4
21	255 ⁴	2
22	54	45
24	1	1
27	64	37
32	1	1
34	1	1
36	37	35
38	28	28
39	42	24
40	1	1
41	67	44

³ This number is from the report, but in the drawings and box they are 32.

⁴ This number fluctuates in different pages in Petré, this is from page 17, in page 32 they are 261, however, I have counted them to be 236 glass beads that can be found and identified.

3.2.2. A15

The assemblage of this grave has been divided into 7 groups.

Group 15.1 has been connected into a group because they are of the same color. They are the same shape and size, except XXXI and XXXII that have probably been the same size and shape before deterioration. The group contains beads no: XVII-XXXII, a total of 16 beads.

Group 15.2 has been connected into a group because they have a similar color and decoration. The group contains beads no: I-V, a total of 5 beads.

Group 15.3 has been connected into a group because they share a red trace material that is mixed into their body. The group contains beads no: IX-XV, a total of 5 beads.

Group 15.4 has been connected into a group because they are of similar color and shape. The group contains beads no: VII-VIII.

Group 15.5 has been connected into a group because they are of similar color. The group contains beads no: XII and XIII.

Group 15.6 is an individual bead, bead no: VI

Group 15.7 is an individual bead, bead no: XVI



Fig. 47. Group 15.1

Group 15.1 are red barrels; this type of bead is discussed in chapter 3.2.1. Here are only notes about the individuals. Bead XXIX is filled with corroded iron, probably trace of an iron wire. The same can be seen in other graves on the site and in other beads of this study, for example in A21 bead 72.



Fig. 48. Group 15.2

Group 15.2 has been connected into a group because they have a similar color and decoration. The group contains beads no: I-V, a total of 5 beads.

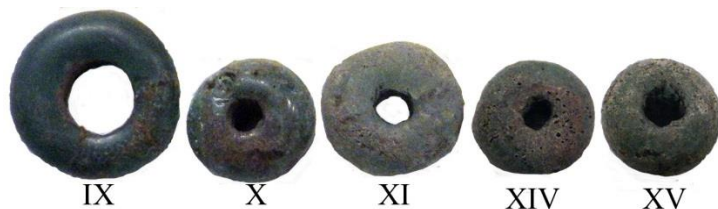


Fig. 49. Group 15.3

Group 15.3 are of different size and nuance, but they all have streaks of opaque red mixed into the otherwise monochrome body. (this is also shared with group 15.4 that are ribbed) This could be for different reasons. At first I

believed it might have been done deliberately or it might be a symptom of recycling glass that had red decorations. However, I have realized that probably is a symptom of the recipe of glass and the oven in which they were worked. These beads have probably been colored with copper. Modern soda-lime glass colored with copper will get red discolorations if handled in a reductive atmosphere.

I have illustrated this in Fig.50. by creating a bead of different colors that I suspect contain copper, then I have reduced one side, giving me the red discoloration.

This discoloration is not uncommon; however these beads show it to a great degree. Some could be a result of the cremation, but in most of them, the trace is encased inside the glass. It seems likely the collector chose them because they had the red discoloration. No matter why, it seems unlikely to be a coincidence that so many beads in the same assemblage, made with different nuances of glass, of different shape and done on different mandrels would have the same flaw by accident. Perhaps they were preferred by the collector.



Fig.50.
reduction
of glass
containing
copper



Fig. 51. Group 15.4

Group 15.4 is similar to group 15.3 in material and size; they also have the red discoloration, but because their shape is ribbed they are a group on their own.

Group 15.5 is two beads similar in color, size and shape. They are translucent with a tint of blue (especially XIII).

They are crackled in a quite interesting way similar to the effect one would achieve by dipping hot glass in water. This is not shared by the other beads in the assemblage and might be a symptom of the recipe of the glass.



Fig. 52. Group 15.5

The crackling is similar to group 21.11



Fig. 53. Group 15.6, surface and cross section.

Group 15.6 is Bead VI, a good example of color distortion by layering and the deterioration of those layers. The bead is deteriorated, its surface is tarnished and the red part of the decorations is mouldered. Macroscopically this bead looks like a dark blue but since it is fragmented, it is possible to see a cross section of the bead body.

The body of this bead is made in two layers.

This is described by Callmer as “core and coat”, something done when a valued color was not available. (Callmer 2003: 40) In the state of this bead, it doesn’t add much of an effect to the appearance. However, if this bead would not have deterioration of the surfaces of both

the original surface and the cross section, this bead may have had a quite different appearance. The blue is translucent and underneath is a clearly separate layer of glass made from a mix of the same blue transparent and a red opaque.

The two colors have not mixed and is a good and rare example of a technique called encasing, covering something with a layer of transparent glass.

This effect could be trace of recycling glass or copper discoloration, however, the colors of the two layers are distinct from each other and don't mix. That indicates a conscious decision.

Enchased beads can have a quite interesting look depending on the clarity of the top layer. In this case, the original state of the top layer of this bead is uncertain, however, it has been clearer than it is today - it has been through a cremation and over a thousand years in the ground.

What effect could this create? The simplest effect obtained by this layering is a difference in color. Red covered with a translucent blue will give a darker hue and possibly an appearance of purple, a color rare in glass of this period. It also creates depth since it creates an opaque bottom in a translucent bead.

This effect would not be visible on a bead with deteriorated surface that has not fragmented, so there might be more of them out there. This bead was probably made by someone with some experience and at a quite low heat. The concentric dots may have been pushed into the body of the bead with a non-heated tool; this can be seen on the cross-section since the dots have some depth and are not spread thin. This is an effective way to reduce worktime and create dots with good defined edges, since they do not spread out as they otherwise would.

I made an experimental bead mainly to illustrate the difference made by deterioration. The original have probably never been quite this translucent but it illustrates the difference

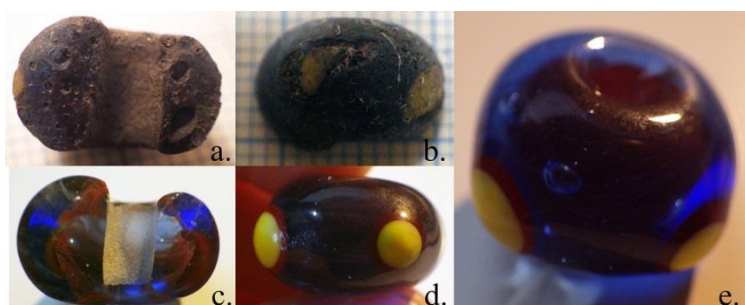


Fig.54. a. cross section bead A15 VI b. outside of the same. c. cross section of experimental bead illustrating the effect. d. outside of the same. e. overview showing depth effect in experimental bead.

between clear and unclear surface quite noticeably. The blue nuance of the experimental bead is also closer to the original than appears in the pictures, since we see deeper into the material, making the glass appear darker than it is because of the depth.



XVI
Fig. 55. Group 15.7

Group 15.7 is a bead fragment of transparent glass in amber or brown. The pigmentation is quite heavy.

The shape seems natural and has not been marvered.

It is an odd bead in this assemblage and one almost wonder if it could be a contamination brought with earth from an older grave. All of the beads in this grave were found in the cremation layer and none where placed in the urn itself so no conclusions can be drawn.

3.2.3. A20

The assemblage of this grave has been divided into 8 groups.

Group 20.1 are of a similar color and size. The group contains 8 beads (X-XVI and XX).

Group 20.2 are red barrels. The group contains 4 beads (II, VII, VIII, and IX).

Group 20.3 is a pair similar in color and size. (XVIII and XIX).

Group 20.4 is an individual bead made from fragments III and IV.

Group 20.5 is an individual bead fragment XVII.

Group 20.6 is an individual bead (V).

Group 20.7 is an individual bead (VI).

Group 20.8 is an individual bead (I).



Fig. 56. Group 20.1

Group 20.1 is a quite strange translucent bluish grey. Their translucency is quite vague and the glass appears “milky“. This coloring can quite possibly be an effect of the cremation. Their original color would be hard to deduce. It is possible that they have been a translucent light blue or teal.

There is a difference in heat deterioration here that is worth noting. Bead XVI has melted together into a spherical droplet, without any perforation. This is a natural behavior for glass heated until truly fluent. It will melt into a shape determined by gravity and surface tension. Bead XX on the other hand have been impacted by something when hot. It has been squished between two hard surfaces, forcing the glass to take an unnatural shape. Something heavy has dropped or been placed onto it. However, there is no clear indication of such an item in the grave. This is a cremation without an urn, so possibly they started packing the stones while the pyre was still quite warm.

If the cremation site was covered with stone and earth before completely burned out, the glowing embers would create a very oxygen deprived atmosphere that could possibly impact the glass in this way by reduction of the oxides that creates the color. This could be an interesting avenue for further study.



Fig. 57. Group 20.2

Group 20.2 are red barrels, discussed in chapter 3.2.1. Here are only notes about the individuals.

Bead II has cooked. It looks large but is light and have been a bit flattened.

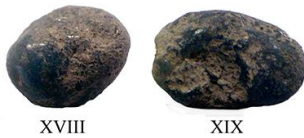


Fig. 58. Group 20.3

Group 20.3 are similar in color, size and deterioration.



Fig. 59. Group 20.4

Group 20.4 is a wound bead that has been segmented by marvering. The shape does not tell definitely if it is done by mould or hand tool but it looks to be the latter.

This bead has several similarities with some beads from Helgö (Raä 119:1). Some of them only share the shape but one share both shape and color (SHM26943 A54). It is dated to the vendel period.

Group 20.5 is the fragmented bead XVII.

This bead is similar to group 21.15 in size, color and fragmentation. The material is a transparent glass with a tint reminiscent of quarts.



Fig. 60. Group 20.5

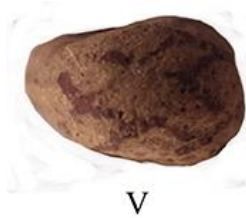


Fig. 61. Group 20.6

Group 20.6. Bead V is quite deteriorated but it can still be determined what it have looked like.

The body color is a white (O) with two parallel dark (O) lines going around the bead. On two sides the dark separate and give room for four red (O) stringers to form a raster, splitting the area into nine squares.

There are five similar beads at Lunda burial field RAÄ 27 A102 (Petré 1999:118) (Petré 1984: 355). They are also similar to a large group of beads found at Bakkegaard on Bornholm (mus.nr C 2584 - 86).

Group 20.7. Bead VI is a simple opaque white. It shows no sign of marvering, decoration or wear. It is a bit deteriorated and cracked from heat.



Fig. 62. Group 20.7



Fig. 63. Group 20.8

Group 20.8. Bead I is blue, with five twisted stringers, three of them create a herringbone pattern along the equator, the other two circulate the perforation on each side.

It seems to have been flattened. The hole can still be seen on both sides but the bead has been compressed

3.2.4. A21

The assemblage of this grave has been divided into 23 groups.

Group 21.1 are blown-drawn of similar size. The group contains 154 beads (LXXX-CCXXXII).

Group 21.2 are ribbed beads of similar size. The group contains 12 beads (XXXVII-XLVIII).

Group 21.3 are made from the same material. The group contains 11 beads (LXVII, LXVIII, LXXI-LXXIX).

Group 21.4 are fragmented beads with teal (T) body color. The group contains 8 beads (II&III, IV&V, VI&VII&VIII, XI-XIV, IX).

Group 21.5 are of similar size and probably colored with copper. The group contains 7 beads (XXI-XXIV, XXX, XXXI, and CCXXXIV).

Group 21.6 are of similar size and shape. The group contains 6 beads (XXVII, LV, LVI, LXIII-LXV).

Group 21.7 they are translucent beads of similar size and decorations. The group contains 5 beads (XV-XVIII, XIX).

Group 21.8 are of similar size and colored with cobalt. The group contains 5 beads (LII-LIV, LXII, and LXVI).

Group 21.9 are similar in size and color. The group contains 5 beads (XXXV, XXXVI, XLIX, LXIX, and LXX)

Group 21.10 is a pair of red barrels. The group contains 2 beads (XXXIII, CCXXXV)

Group 21.11 is a pair of similar material. The group contains beads XXVI and CCXXXIII

Group 21.12 is a pair of undecorated beads that are macroscopically black. The group contains 2 beads (LIX, LX).

Group 21.13 are objects fused from several beads. The group contains 2 objects (L, LI)

Group 21.14 is an individual bead, (XXVIII)

Group 21.15 is an individual bead (LVII)

Group 21.16 is an individual bead (XXV)

Group 21.17 is an individual bead (XXXII)

Group 21.18 is an individual bead (XX)

Group 21.19 is an individual bead (XXIX)

Group 21.20 is an individual bead (LXI)

Group 21.21 Is an individual bead (X)

Group 21.22 is an individual bead, (XXXIV)

Group 21.23 is an individual bead (I)



LXXX-CCXXXII

Fig. 64. Group 21.1

Group 21.1 are blown-drawn of similar size. They are made with the same technique and do not appear to be made as segments but have been chopped from tube. A few have melted together during the cremation.

It is notable that some of them have flat side and one rounded, this is probably from a process of polish by heat.

When the beads were sliced, their ends were sharp (as group 21.14). Sharp ends are prone to cutting strings, something that puts the whole collection at risk. To reduce the sharpness in the simplest way possible, the beads have been laid out individually with the hole in a vertical position. They have then

been carefully reheated to a point when the glass softens and the surface tension will give them rounded edges and a rounded top as the glass moves downwards. Since this is done by surface tension and gravity, it cannot be repeated on both sides.

If done perfectly the heat polish will not change the beads shape in any major way, but if the bead is heated a bit too much or too long it will slump down and get one very flat side. This process does sometimes result in the perforation melting together, resulting in the type of unperforated bead described by Lundström (1976:10). Unperforated beads of this technique have most probably been imported to Scandinavia because they were not carefully inspected. They should not alone be considered an indication of bead making even if they appear in large numbers.



Fig.65. the steps of heat polish on a flat surface, it begins with a newly cut, sharp edged bead. The heat and surface tension will at first round up the edges, then the glass will start to slump downwards.



Fig. 66. Group 21.2

Group 21.2 are ribbed beads of similar size but different nuances. Two of them have minute trace of gilding (XLVII, XLVIII) stuck in the grooves. How extensive this gilding has been is undeterminable.

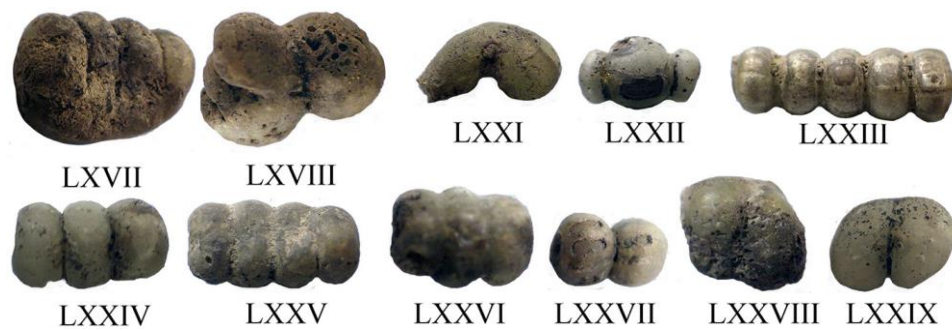


Fig. 67. Group 21.3

Group 21.3 are deteriorated. Most of them have probably been drawn and inlayed with metal foil as described by Sode. (2004:97) Bead LXXII has a fragment of iron wire inside. These beads are deteriorated and have been very reduced by oxygen deprivation. They can possibly have had a Gold look. But that is achieved by oxidation of the silver changing the color of clear glass to amber (T) this effect can be reversed if heated in a reductive atmosphere.



Fig. 68. Group 21.4

Group 21.4 are fragmented beads with Teal (T) body color and similar stringer decoration in red (O) yellow (O) and in once instance light (O).



Fig. 69. Group 21.5

Group 21.5 are of similar size and probably colored with copper. A few of them (XXX and XXXI) show signs of cold work or wear. In the case of XXX that has concave profile it is created by extensive wear. Several of these beads are melted and distorted in such a way that signs of wear would have been erased.

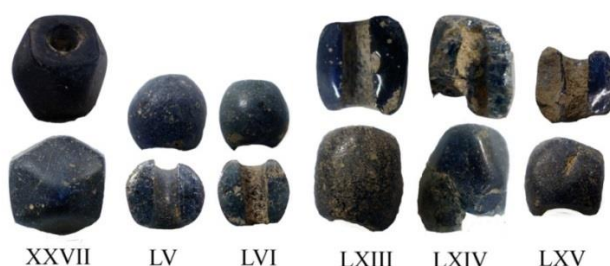


Fig. 70. Group 21.6

Group 21.6 are blue, some have teal glass mixed in. Only XXVII is fragmented. It is possible that bead LV and LXV has been the same bead, but have distorted by heat. Most of these still show trace of being marvered Cuboctahedral, LV and LVI does not but are similar in color, size and fragmentation. They measure 7,6 - 10.8

mm in length along the mandrel.

The cuboctahedral shape is common in this area during this period and is usually blue (T) but other colors do occur. Most are undecorated but some have decoration in the form of stringer, dots and faked murrini. The fake murrini is usually done with a dot or a circle of twisted stringer, sometimes with a dot or as in the bead of fig.71, a stringer cross over a circle of twisted stringer. That bead also has a double in Bakkegaard at Bornholm (mus.nr. C2584-86)

Guido described beads of this shape and stated that roman ones are blue glass, measuring about 6 by 4 millimeters; dating from the 3rd to the 6th century. She noted that similar beads made of blue (O) glass or terracotta also appear in Viking graves of ad 800-1000 and there should be no confusion between these and the roman ones (Guido 1978:99f). I have not yet observed any of this type made from blue (O) glass; however some appear macroscopically opaque.

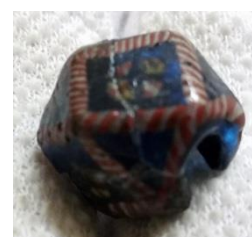


Fig.71. Bead from grave 54 at Raä 119:1

It is also notable that these may be imitating beads made from Lapis lazuli, a stone that can still be found in this traditional cut in the Middle East. In the very rich grave of Bj 965 from Birka, there are four beads made from lazuli cut in this manner (ocular inspections by the author, they are registered as glass). The simplest way to distinguish this is that the lazuli is truly opaque and have very sharp cut angles. The cut angles alone is not an indicator since some glass beads was cold worked, giving the same sharp angles. One example of this is a group of beads from Grötlingbo (Raä 54.1) on Gotland (SHM32623 Undernummer 25/63-67).



Fig. 72. Group 21.7. (and part of my thumb)

Group 21.7 all have a body of translucent green or teal, colors that could be created by copper. Their decorations are stringer or dots in red (O) or yellow (O). XVI have yellow (O) and Purple (T) dots.



Fig. 73. Group 21.8

Group 21.8 are of similar size and colored with cobalt, some of them have teal glass mixed into the body.



Fig. 74. Group 21.9

Group 21.9 has been connected into a group because are similar in size and color. The group contains beads XXXV, XXXVI, XLIX, LXIX, LXX

Group 21.10 are red barrels, Discussed in chapter 3.2.1.



XXXIII CCXXXV

Fig. 75. Group 21.10

Group 21.11 has been connected into a group because they are of similar material. The crackling is similar to group 15.5.



XXVI CCXXXIII

Fig. 76. Group 21.11

Group 21.12 has been connected into a group because they are macroscopically black and undecorated. The group contains beads no: LIX, LX



LIX LX

Fig. 77. Group 21.12

Group 21.13 has been connected into a group because they are fused. The group contains beads no: L, LI



L

LI

Fig. 78. Group 21.13

They are statically handled as 7 single beads



XXVIII

Fig. 79. Group 21.14

Group 21.14 is interesting. This item would probably have been considered refuse in the workshop where it was made, but it has probably been worn as a bead by the woman with whom it came to rest.

It is a piece of blown tube, actually the end piece that has been closest to the blower's mouth. (the other side would be the center of the bubble and not have a hole). It has just been chopped and not polished or finished in any way, indicating it was not intended to become a bead but ended up packed with finished beads and sold.

The yellow is of the same nuance as the chopped beads in 21.1 but this has an outer layer of dark green. Most probably it has been used to make green segmented beads. The nuance is quite dark, but layering it on top of the yellow will give a very nice green color.

One interesting thing about this object is that it was probably made in the same workshop that made group 21.1, however, no beads of this color combination was found in this grave, even though the collector seems to have liked the color. Perhaps, the green beads with yellow core were made for another market and not sold to the north.



LVII

Fig. 80. Group 21.15

Group 21.15 Is an individual bead, bead LVII

This bead is similar to group 20.5 in size, color and fragmentation. Graves 20 and 21 are dated to 8th and 9th century respectively but they are geographically close, neighbors on the burial field and might be related.



XXV

Fig. 81. Group 21.16

Group 21.16 Is an individual bead, bead XXV. It is fragmented into two halves and made from very clear glass with only a slight tint.



XXXII

Fig. 82. Group 21.17

Group 21.17 Is an individual bead (XXXII) fused from two pieces of glass, teal and cobalt, marvered smooth.



XX

Fig. 83. Group 21.18

Group 21.18 is the only bead in the study of the Purple (T) color. This is a rare color for glass of the period. In this study it only shows up in one other place, as a singular dot on bead 21 XVI.

This bead has no clear relations in this study, it might be made from the reuse of already colored glass, or imported as it is.



XXIX

Fig.84. Group 21.19

Group 21.19 is the only bead (XXIX) in this study that is decorated with murrini without being a mosaic bead.

The murrini are applied to the surface of a wound blue bead. In the cross-section we can see how thin this slice of murrini actually is.



LXI

Fig. 85. Group 21.20

Group 21.20 is deteriorated; it has been cobalt blue with several concentric circles in yellow red and blue. How many cannot be ascertained.



X

Fig. 86. Group 21.21

Group 21.21 is deteriorated but has had a decoration of red stringer and a larger yellow area. The pattern could be related to group 20.6 but that would have to be investigated further and compared to the material at Bornholm.



XXXIV

Fig. 87. Group 21.22

Group 21.22 is an individual bead (XXXIV) that has been marvered into shape. It is fragmented and has been glued after excavation.



Fig. 88. Group 21.23
from different sides.

Group 21.23 The first question to this object is: is this a bead? It does conform to the characteristics of a bead; it is a glass objects with a perforation that makes it possible to wear on the body.

However, this item has a quite strange shape and would relate strangely to hanging on the body. It is also only decorated with stringer on one side; telling us that it might have been made to be seen predominantly from that side. This separates it from the other beads in the grave. Another thing that separates it from the other large beads in this assembly is the fact it has not fractured.

The other large beads of this assemblage have fractured during cremation. Bead I have only been distorted, it has drooped downward and then met with something that has left an impression in its side. Bead I did not react the same way as the others to the heat. The logical reason for this is that they were not in the same place on the pyre.

In the Lovö material, some beads have trace of corroded iron or iron wires in the holes. It is possible that the large beads, with their large hole were threaded onto a metal wire or ring.

In grave A21, was a large number of rivets and metal fragments, trace of this hypothetical metal object can possibly be found among them.

A metal ring would have heated faster than the glass. Metal that is heated expand. It is possible that the expansion of the metal put stress onto the beads. It also transfers heat into the core of the beads, heating and expanding it. If the core was heated more rapidly than the outside it would lead to a violent and possibly explosive reaction when the core heats and expands faster than the surface.

Why did this not happen to Bead I? Probably it was not strung with the others, perhaps because it was not used as a bead.

The shape and decoration would appear strange if strung and it has slowly melted downwards, the outer edges drooping down from the center. This object could have been made to be a spindle whorl and was mounted on an organic material. It might have been placed further from the body and not in the central area of the pyre.



Fig. 89. Replica of a drop spindle, using a replica of Bead I. Note how the string rests in one of the notches on the beads edge.

3.2.5. A36

The assemblage of this grave has been divided into 2 groups.

Group 36.1 are red barrels. The group contains 35 beads (4.I-4.XX and 5.I-5.XIV)

Group 36.2 are of similar size, color and decoration. The group contains 2 beads (3.I and 3.2)



Fig. 90. Group 36.1

Group 36.1 are all red barrels, this type of bead discussed in chapter 3.2.1.



Fig. 91. Group 36.1

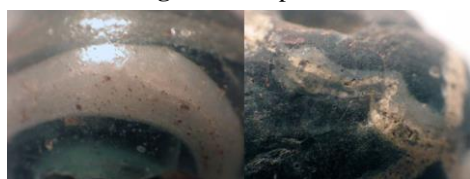


Fig.92. close-up of the stringers from 3.I and 3.II

Group 36.2 is interesting because the beads have probably been similar but is differently deteriorated by heat. 3.I seems completely unaffected, but 3.II has a badly deteriorated surface.

This was not a complete cremation, since the bead spreaders made from horn or bone, and a small textile fragment has survived. Perhaps bead 3.II had the bad luck of being in a hotspot of the pyre.

The bodies of the beads are made from glass of the same type, but appear different from deterioration, making bead 3.II less translucent. The stringers are made from a mix of white (O) and a clear/uncolored (T). This is easier to observe in the deteriorated bead.

This mix of glass seems to be very common for the white stringers and can also be seen in the British material, for example in group 67.11 and 70.7. It is possible that this mixing is not only done to enhance the decoration, perhaps the white glass is a slow mover that is easier to pull into rods if mixed with translucent.

It is worth noting that bead 3.I seem new, the edges of the perforation is uneven, sticking out a bit, being almost sharp in some areas.

Both of them have an opaque red discoloration; it is on the surface and most present in the most distorted areas of 3.II. This is an effect of the copper colorant as discussed in group 15.3.

4. Discussion

4.1. Acquisition

4.1.1. How homogenous / heterogeneous are bead collections in graves.

To further analyze the structure of the assemblages the groups of beads have been divided into four categories (Table. 4). The first being the primary group, the most numerous in the assemblage; the second being possible secondary groups of 4 beads or more; the third being pairs or triplets and the last category being single beads.

The proportions of these categories in the assemblages are examined in Table 5.

The collections are structured in a similar way. In all the assemblages' one group is dominant in numbers. In most of the assemblages, this group makes up half of the collection or more. There is also a statistical preference for pairs of beads. Single beads was not rare but did not make up a large part of the collections.

From the grouping done in Analysis part 2 it can be presumed that most beads in these groups were acquired from the same source.⁶ This indicates that beads were acquired in groups of varying sizes.

It is notable that this is reminiscent of how women of the Viking reenactment groups buy beads. They are restrained by the amount of money in their pocket but prefer buying pairs. If they feel they have made a lot of money that market, then they may decide to buy a large bead or group or have beads especially made. I will not suggest that collecting of beads in prehistory is this simple; however, the same mechanisms are at play. These women are building an identity by displaying assemblages of dress, ornaments and beads. In the relatively small subculture, there exists a shared idea of what an acceptable bead look like and what beads will look "cheap". This idea is not necessarily related to historical accuracy but is a set of rules by which these women collect. Similar rules, related to value and norm, in conjunction with symbolism and gifting did probably play a part in prehistory as it does today.

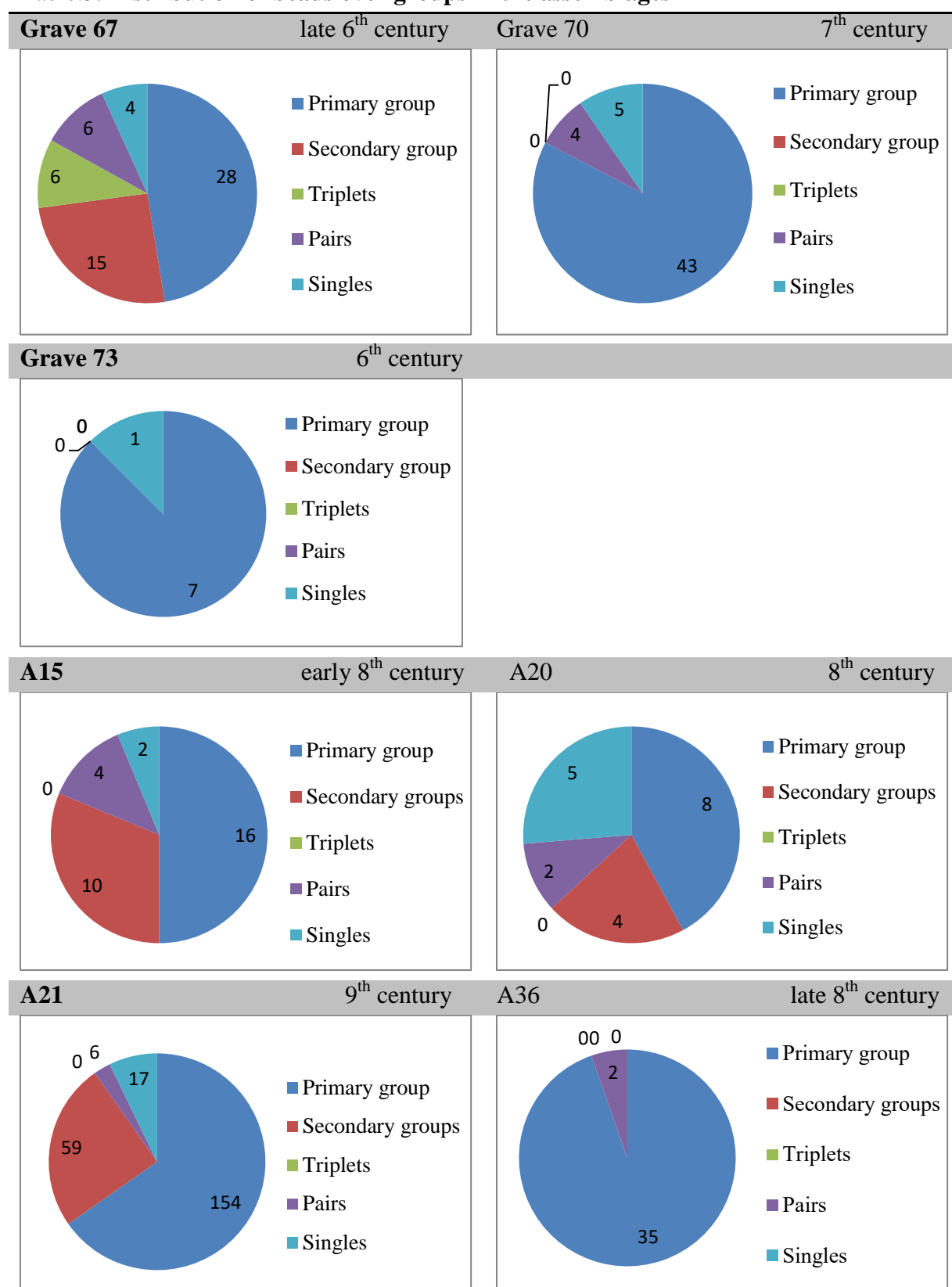
Table 4. Quantity of individual beads in bead groups

Grave no.	Total amount of beads	Primary group	Secondary group/s	Pairs or Triplets	Singles
67	59	67.1 (28)	67.2 (15)	67.3 (3)	67.8
				67.4 (2)	67.9
				67.5 (2)	67.10
				67.6 (3)	67.11
				67.7 (2)	
70	52	71.1 (43)		70.2 (2)	70.4
				70.3 (2)	70.5
					70.6
					70.7
					70.8
73	8	73.1 (7)			73.2
A15	32	15.1 (16)	15.2 (5)	15.4 (2)	15.6
			15.3 (5)	15.5 (2)	15.7
A20	19	20.1 (8)	20.2 (4)	20.3 (2)	20.4
					20.5
					20.6
					20.7
					20.8
A21	236	21.1 (154)	21.2 (12)	21.10 (2)	21.13
			21.3 (11)	21.11 (2)	(7) ⁵
			21.4 (8)	21.12 (2)	21.14
			21.5 (7)		21.15
			21.6 (6)		21.16
			21.7 (5)		21.17
			21.8 (5)		21.18
			21.9 (5)		21.19
					21.20
					21.21
A36	37	36.1 (35)		36.2 (2)	21.22
					21.23

⁵ 21.13 are two objects fused from a total of 7 individual beads.

⁶ group 67.5 is an exception; a pair acquired for superficial similarity, the other pairs like this are recorded as singles.

Table.5. Distribution of beads over groups in the assemblages



4.1.2. Is there evidence that beads were made or acquired for burial? Conversely, is there evidence of curation of beads over long periods?

No evidence that beads were made or acquired for burial could be found. A few seem to be rather new when buried but there is no way to prove they were acquired for the occasion. On the other hand, there is clear evidence of beads being kept and used for long periods as will be discussed in chapter 4.2. and 4.3.

One special example of curation is worth mentioning (discussed in chapter 3.1.2). In grave 73 the bead 148 has been kept, even though it is broken and can no longer be worn as a bead. It shows deep wear, indicating that it have been carried by someone for a long time before it broke. It was found in the waist area with a metal object that might have been a pendant with a bead mount so the fragment could be worn. Probably it was kept in a small bag containing various items, including dress accessories, occasionally found in this area of female Anglo-Saxon graves. (Knox 2017:115)

4.1.3. How were beads collected into the assemblages found in the graves? In particular, were beads acquired individually, or as small groups, or as whole collections?

In the graves examined during this study, it seems that the glass beads have been acquired in different ways. A large proportion (about half or more) of the beads are acquired from the same source. In the case of A21 they are blown drawn and hence imported from the Mediterranean. In the case of grave 70, the primary group is wound spiral beads, suggested to be imported from Helgö. As imports it is likely that these beads were acquired at the same time from a trader, but that cannot be proven. In the case of A15 and A36 the primary group may be a local production, possibly from Helgö. This indicates that bead groups were acquired both locally and as imports.

After the primary group, some graves have secondary groups of four or more beads acquired from the same source. In one grave there are sets of triplets. They were part of an asymmetrical assemblage worn on the chest, fastened with one brooch and looping down to the waist on the skeleton's right hand side (discussed in 4.2.). The last two groups are singles and pairs, these two groups together take up a rather consistent portion of the assemblages, but fluctuate in dominance.

In at least one case two beads (grave 67 beads 46 and 59) were acquired from different sources but were worn as a pair, possibly because of superficial similarity. In another case (group 67.4) the pair was made in the same workshop, close in time. It is probable to think that they were never separated but carried together from creation to burial.

There is only one case that seem to be a group acquired as a collection; that is the secondary group of grave 67 (67.2). This group was imported probably in the form of a necklace of very delicate beads.

The patterns point to beads being collected in different ways but not primarily as individuals but rather as groups and pairs. Singular beads are not rare, but do not make up a large proportion of the total assemblages.

Two of the graves from Lovö, A20 and A21, have beads that are almost identical. The graves are close to each other in time and placed next to each other on the fields' southern border (Petré 1999:15). Perhaps one inherited the other or maybe they bought those beads at the same time. A21 is a late grave, possibly the last woman buried at Söderby on Lovö. She probably belongs more to the Viking tradition than the Iron Age.

4.1.4. What can we say about the criteria by which beads were selected for inclusion in a collection?

In Lovö, a large proportion of the beads in the assemblages are of the same type, the red barrel. The reason for this may be beyond the grasp of this study. Perhaps the supply is limited, and the collections represent what was circulating, or women are creating collections with a certain norm. The assemblages of the British material are much more diverse, but also of an earlier date. Perhaps the amounts of red barrels is a symptom of the collapsed roman trade network or maybe there is a symbolism here, connected to a religion or mythology.

It is possible the origin of the red barrels could be found on the island of Helgö seven miles to the north. Possibly the moulds for marvering these beads could be found in the extensive amounts of moulds and crucible debris found there.

Some beads were acquired not as a pair but because they created a pair that appeared similar. (discussed in 4.2.1)

In A15 there is a preference for an effect of opaque red streaks created by reduction of copper. This effect was not necessarily intentional and is quite common in the beads of the period; however, the beads in A15 are quite extreme examples. They are of varying shape and size, made with different tools and in different nuances. Probably they are made at different time and places, and the reason they have been brought together is a preference by the collector for this effect.

4.2. Display

4.2.1. What can we tell about how the collections were displayed as worn groups when no documenting plan is available?

The best way to tell how a bead collection has been worn is excavation plans or photos; but in practice, a lot of excavations lack these. In the case of the Lovö material, the goods have been handled and manipulated in the journey (cremation) from a living context to a burial context, and the plans cannot tell us about the original position on the body. Nevertheless, I am going to show that one can actually ascertain quite a lot about how the collection was displayed even in a cremation burial. The clues that will be examined to how the collection was worn are: size, wear, length of the assemblage, compatibility with other dress accessories and cremation damage patterns.

Grave 67. This assemblage is documented with both a plan and a photo; however, both are poor quality. Despite this all but bead 90 of the larger beads could be identified in the drawings. The plan shows that this assemblage was not primarily worn around the neck. The larger beads were draped down from the right shoulder to the waist, terminating close to the right elbow. Several of the larger beads are located on the lower part of the string close to the waist; possibly they have been fastened there in some way.

This way to wear beads has been described by Rogers (2007:Fig. 5-49) as an example from Kent of how bead strings was fashioned in early Anglo-Saxon England. This is the only assemblage with groups of triplets, possibly because of the asymmetrical arrangement.

Most of the small beads are missing in the documentation. The ones that can be located in the plan are north of the edge of the photo, close to the head. This would support the possibility that the small beads have been concentrated to the uppermost part of the chest. The beads in this grave are of very varied size, making it unlikely that they have all been strung together on the same string. Many of the small beads of group 67.2 are imported since they are blown-drawn, a technique not practiced in Western Europe during this period. Several are so small

that transporting and selling them would be most effective if they were already strung up, otherwise the trader risks losing them. I have not tried to recreate the length of this assemblage since there was 64 beads not made of glass whose dimensions I do not have.

Grave 70

This grave is documented with a plan, but it is of poor quality. In it the beads are scattered. The grave does not have any brooches, perhaps these beads have been disturbed by grave robbers? It is worth noting that bead 41 is alone in the waist area. Bead 70 41 is of the same make as 70 46 that have been paired with the superficially similar 70 59. Perhaps bead 70 41 was not in use, having been replaced by bead 70 59 and then kept in a bag at the waist.

The beads are of variable sizes but may well have been strung together into two strings, since there are two large, possible focal beads. It is possible that these were two different collections, one mainly red/yellow and one blue/green with similar structure of one focal bead and at least one pair. The wear tells us that bead 70 31 have had a central position, shared with a superficially similar pair (70 46 and 70 59)

Length of the assemblage: the length of the glass beads are 60,6 cm, adding to that is 6,9 cm of beads of other materials makes a total length of 67,5 cm. This could be a long necklace or two strings of about 34 cm each.

Grave 73 The beads of this grave are divided into two assemblages. The beads of group 73.1 are documented by a plan showing their placement in relation to each other. They are concentrated in the neck area and are similar in shape and color.

Their ends are flattened by wear or cold work. This is strange since there should be no need for cold work and they do not carry much weight. It is possible that they have been part of a larger assemblage during their life. This collection is short, a total length of 2,9 cm, not enough to call a necklace. Perhaps they have been in a pouch around the neck or decorating some sort of string. They could possibly have decorated a beard.

Group 73.2 is a bead fragment that was probably mounted in a metal pendant and carried in a small bag in the waist area.



Fig.93. Beads in neck area of grave 73, plan drawn from field drawing with thanks to Pre-construct Archaeology Ltd

A15 and A 20

None of these graves have other dress objects and the beads do not differ too much in size.

Length of the assemblage in A15 is 24 cm without the excluded 15 IV, 15 XXXI and 15 XXXII. If 15 IV was symmetrical it would have been ca 16,8 mm. Beads 15 XXXI and 15 XXXII was probably red barrels, the mean of them in this assemblage is 7,9mm. This would give a total length of 27,2 cm.

The length of the assemblage in A20 is 27,9 cm, bead 20 II excluded since it was distorted. It may have been a Red barrel, like others in the grave, the mean of those is 6,7 mm. If we add that we have a total length of 28,5cm.

The cremation damage of A20 includes beads violently flattened and others with color heavily reduced by an oxygen deprived atmosphere; these phenomena points to the grave possibly being covered by rocks before the pyre had burned out.

A21

Size: The beads are of varying size and perforation. They have probably not all been strung together. Some beads have fused with their neighbors, in those cases; they are of similar size and technique.

Wear: the signs of wear in this assemblage are few, and may have been removed from many of the beads by distortion during cremation. There are however, some very clear wear marks on 21 XXX and 21 XXXI indicating that they have been worn for a long time.

Length of the assemblage: The length of this assemblage is hard to determine, but it would add up to something longer than a necklace. This collection is so large the woman carrying it would be restrained by concern for it. If she wants to move quickly one can imagine her hands hugging her chest to prevent the beads from striking each other or breaking the strings. Perhaps it indicates the kind of wealth that diminishes the need for labor.

Other finds: The grave had fragments of a pair of oval brooches and probably the beads have been strung between these as in the standard set of female jewelry of the period described by Callmer (2006:190). They are however, so many that it is plausible that they have been separated into several rows of bead strings.

Cremation damage patterns: All of the big beads except bead I have exploded. In this burial field, there are several beads that have corroded iron in their perforation. It has been theorized that this may be from small iron tubes used to separate the beads (Petré 1999:121). However, in bead 21 LXXII, there is a small iron wire still rattling around inside the fractured bead (Fig.94). It is not a leap to believe that metal wire have been used to string the beads. This may also explain that beads on this site have fused in situ, since the string did not burn.



Fig. 94. Iron wire inside bead 21 LXXII

Metal is a conductor of heat and glass is an isolator. The metal inside the beads would have heated up, possibly expanded (something that itself could crack the beads) and heated the beads from the inside. When glass is heated it expands and if it expands from the inside, the bead will explode. So why did this not happen to bead 1? As discussed in group 21.23 bead I was probably not worn as a bead. It was part of a spinning whorl and hence not strung onto the metal wire. It was not heated from the inside and did not explode.

A36

Size: The beads in this grave are quite uniform in size and may well have been strung together.

Wear: the beads in A36 have no clear indications of wear. Bead one actually appears brand new. The edges of the perforation is uneven shows no sign of being worn down, creating an almost sharp edge in some places. The red barrels are so uniform around the perforation they may have been cold worked or marvered flat.

Length of the assemblage: The total length of the glass beads are 27,6 cm. The length of the two spiral wound bronze beads from the grave is unknown but in the report they seem to be about the same size as the average red ones, so I will count them as 2 x 7 mm. We add 1,4 cm for the bronze beads (Petré 1999:88), giving us 29 cm. There are bead spreaders in this grave. They are damaged but have had at least four holes each. Split into two rows the bead string would be about 14,5 cm; if split into the four rows that is the minimal amount of holes in the bead spreaders it would amount to only about 7,25 cm. This is quite interesting; the grave has no brooches or other fasteners so how was the spreaders used? Even if only parted into two rows, the assemblage would be quite short to be worn the standard fashion of the period described by Callmer (2006:190).

It is possible that items and beads from this assemblage were removed prior to burial. However, in the other assemblages there are no spreaders or accessories but the length is similar (A15 27,2 cm & A20 28,5cm). It is possible that all three have been worn as a single row of beads on the chest.

Other finds: In this grave there are bead spreaders of bone but no fasteners or brooches. Inside some of the beads there is trace of corroded iron. There are several other finds of corroded iron inside the beads on this site so it seems that among the women of Lovö it was common to string the beads onto a metal wire.

Cremation damage patterns: no clear conclusion could be deduced from fire damage. It was probably not a complete cremation since the bead spreaders, large fragments of a comb and even some textile fragments survived.

In conclusion this research has shown there are things that can be said even when no plan is available. The length and groups of the assemblage in conjunction with other dress accessories can give some indication of the way the assemblage was displayed. Size can sometimes indicate if the collection is worn as one group or several.

Wear points to some of the beads to have been worn together for long periods. In some cases so long that they created sockets in their neighbor to rest in. In one case the sockets are so deep and defined that they can be paired with the bead that made them. However, this phenomenon is concentrated to beads that carry weight, the beads at the lowest point of the string.

Cremation damage was a surprisingly fruitful avenue of study. In A21, all but one of the large beads has exploded. The unexploded bead was not used as a bead but as a spindle whorl. Its survival is due to the fact it was not strung onto metal and not as central in the pyre as the beads. In A20, the beads may also indicate something about funerary practice. The grave has no urn and some of the beads have been forcefully flattened and seem to have been exposed to an oxygen deprived atmosphere in their fluent state. This may indicate that the pyre was covered when still glowing.

4.3. Wear

4.3.1. How useful are use-wear patterns for understanding the composition of bead collections?

Most of the observations of wear are from the British material since it is better preserved. It is likely that we would observe more wear on the Lovö material if it had not been cremated.

When beginning this study I believed wear would be an indicator of age; that if one bead in an assemblage was heavily worn, and the others not, it would point to that bead being older.

However, the question of wear is more complex than it might seem at first. Different kind of use will result in different kind of wear even in beads worn together for a similar period of time. Wear has several variables, the most important being the placement and weight bearing of particular beads as discussed in group 70.8.

There is a possibility that different recipes of glass would handle wear differently and for that one would have to do an elemental analysis of the beads. No such analysis could be made for this study but some conclusions can be made from previous research in this field.

The British beads are dated to the 6th and 7th centuries. They are most probably done from glass produced in the Near East. From the late first century BC and 700 years onward there was a preference for a certain composition of glass. It was produced as a material in the Near East and shipped far and wide for production of items. This glass generally has an alumina

content that is near 2.5%, Calcium oxide 6-9%. Potassium and magnesium oxides are less than 2%. The proportions of silica and sodium oxide fluctuate somewhat, but the sodium is usually within the range 14 to 18%. (Janssens 2013:70). This can be compared to the composition of contemporary, commercial soda-lime bottle glass : 71,5% silica, alumina 2,0% magnesium oxide 2,0%, calcium 10% sodium 13,2% (Janssens 2013:36). So the beads from the 6th century should have characteristics quite similar to modern soda-lime glass.

The beads from Lovö might have a more varied composition since most of them are later in period and the trading routes have changed from the roman period. Their composition might be closer to the composition of a bead fragment from Helgö that was analyzed by the Glass research institute in Växjö in 1981 It is quite similar to the roman recipe. It is also worth noting that the calcium content was 6,5% and the main difference being that in the Helgö glass there was a lower alumina content and an addition of 15% lead oxide. (Lundström 1981:6). However, in an analysis of four glass objects (beads and bead making refuse) from Birka, the lead is not present and the composition is again close to the one discussed in Janssens (2013). In 3 (2 beads and one piece of stinger) of the four objects studied from Birka, magnesium and potassium are 2% or less. Alumina was measured to 3-15%, calcium 6-7%, Sodium 4-19%. (Råhländer 2014:27). Most data about glass from the 9th and 10th centuries indicate that roman glass was recycled and mixed with a new composition of glass where the sodium is derived from wood-ash. This composition increased the calcium content, and raised the melting temperature. Roman glass contains 6-8 % calcium, and the wood-ash glass commonly contains 14-18%, (Janssens 2013:71). A possible explanation for the steady calcium content may be that the glass from Helgö was recycled from old vessels (Lundström 1976:7) made from roman glass, and the glass of Birka, came by boat from Byzantium.

The differences in recipes in the area and period make it impossible to draw any conclusions about the composition of the Lovö beads and their characteristics.

However, the clearest example of wear in this study is group 70.8 were smaller beads have eaten their way into the focal bead (70 31) that probably had a central position on the string. If this glass is of roman origin and share characteristic with modern soda lime glass, the wear could be compared to the wear seen on the beads of our time. In the reenacting community there are beads that have been worn in a similar manner as the beads in the assemblages. Some of them have been in use for at least 20 years, but only on special occasions. They show small amounts of similar wear. No bead I have seen from the modern era can compete in wear, with the ones in the studied material.

In conclusion: it might seem logical that a bead with more wear is older than one with less. However, this research has shown that is not necessarily true, limiting the potential for study of wear patterns.

Wear tells more about the **organization** of the beads than about how long they have been worn. The weight of the assemblage is always distributed downwards, resting onto the lowest hanging bead resulting in deeper wear.

The wear does tell us that the beads have been **worn a lot**; if they were only for special occasions, it would probably take several generations to acquire the amounts of wear common in the studied beads. That would be improbable seeing that there are discernable fashions of beads in this period, indicating that the collections were part of a dress worn regularly

4.3.2. To what extent can we see that beads which were buried together had been worn together?

There was originally hope that wear patterns would be a valuable tool to answer this question. Nonetheless, as explained in chapter 4.3.1. beads were worn together for considerable periods.

In the case of the beads in group 70.8 it is obvious that they must have been worn together for a long time for the smaller beads to create the sockets in bead 70 31 where they have rested.

In the case of the two bead fragments in Group 67.5 (67 110 and 67 154) they have clearly been worn for a long time after they broke, grinding the broken area smooth and creating a surface that fit together but displaces the original pattern.

In some other cases it cannot be proven, but is reasonable. Group 67.4 show signs of wear and was made together at the same point in time. They might never have been separated during their life. It is probable that they have been made together, acquired together, used together, and in the end, buried together.

There is also the case of group 67.11. It is the most worn in grave 67. It has been ground down through the stringers so you can see their cross-section on the perforated sides of the bead. It seems to have been between two beads of its own size or larger with slightly convex sides. It is worth noting that the bead of group 67.11 does not have much in common with the rest of the assemblage. It might be an older bead, acquired as a gift or inheritance.

From the Lovö material the observations of wear are scarcer. The beads have been cremated and a large amount of them (the red barrels) may well have been cold worked to have flat ends. In some of the more well-preserved beads, wear can still be seen. In Lovö A21 bead XXX there is distinctive concave wear marks and on A21 XXXI, LII, LIII and LIV the ends are flattened, in these cases it could be cold work, but it seems more likely to be wear by the shape of the bead.

5. Conclusions

The beads in the study were acquired in groups of varying size. Some beads have been bought at the same time and worn as a pair; other beads have been acquired because of superficial similarity to ones already in the collector's possession. One group of beads may have been brought together because of the collector's preference for opaque red discoloration caused by copper as a colorant exposed to a reductive atmosphere. In one case a group of beads was probably acquired as a pre-strung imported necklace. A few beads may have been heirlooms and the curation of a worn and broken bead speaks to it carrying some significance, as do previous finds of mended beads. A further avenue for research would be a system for the relative labor, skill and material values for different techniques and further research into the customs of mending, reusing and curating broken and unusable beads.

The collections are all structured in similar ways. In all of the assemblages one group was dominant in numbers. In most of the assemblages, this group makes up half of the collection or more. In some cases these beads are imports, in others they may be of local production. There is a preference for pairs of beads. Single beads were not rare but did not make up a large part of the collections. In Lovö one type dominates in number the red barrels, whose origin may be sought at the production site on the nearby island of Helgö.

The length of three of the four assemblages from Lovö could be determined. They were between 27 and 29cm. The beads from Lovö have been strung onto metal wires. This would keep them safe in life but in cremation increase both the risk of fracture and fusing of the beads in situ. Cremation damage patterns in glass are an interesting avenue for further study. There are indications in this study that some beads have been exposed to an oxygen deprived atmosphere, in some cases possibly from being buried with still glowing embers. In one case cremation damage patterns could tell that an object was not part of the worn collection.

Wear-patterns are not useful for determining the relative age of beads but can aid in understanding the beads' placement on the string. It also almost certainly indicates that the beads were part of a costume that was worn frequently for considerable periods.

6. Summary

This study of glass bead assemblages of the 6th to 9th century focuses on clues left from production, use and cremation. The beads have been studied as part of a process of collecting and curating of beads by owners. The author's experience as a bead maker has been used to investigate the mechanics of bead collection, in Scandinavia and Anglo-Saxon England in the period of 6th to 9th century AD, by relating the beads into groups of a possible shared origin.

In the study bead collections from seven graves are examined from the perspective of their production techniques, materials, and damage from wear and cremation. The results point to beads being acquired in different numbers and often worn for long periods of time before being buried.

It was concluded that wear-patterns cannot be used to deduce the relative age of the different beads, but do tell about the organization of the worn display. Cremation damage proved to be a possible avenue of further research. The heating of glass in cremation can induce different processes, such as fragmentation, distortion and color changes from variables in atmosphere and heating. These changes could indicate for example if a burial was covered when still burning, or if it has been rapidly cooled.

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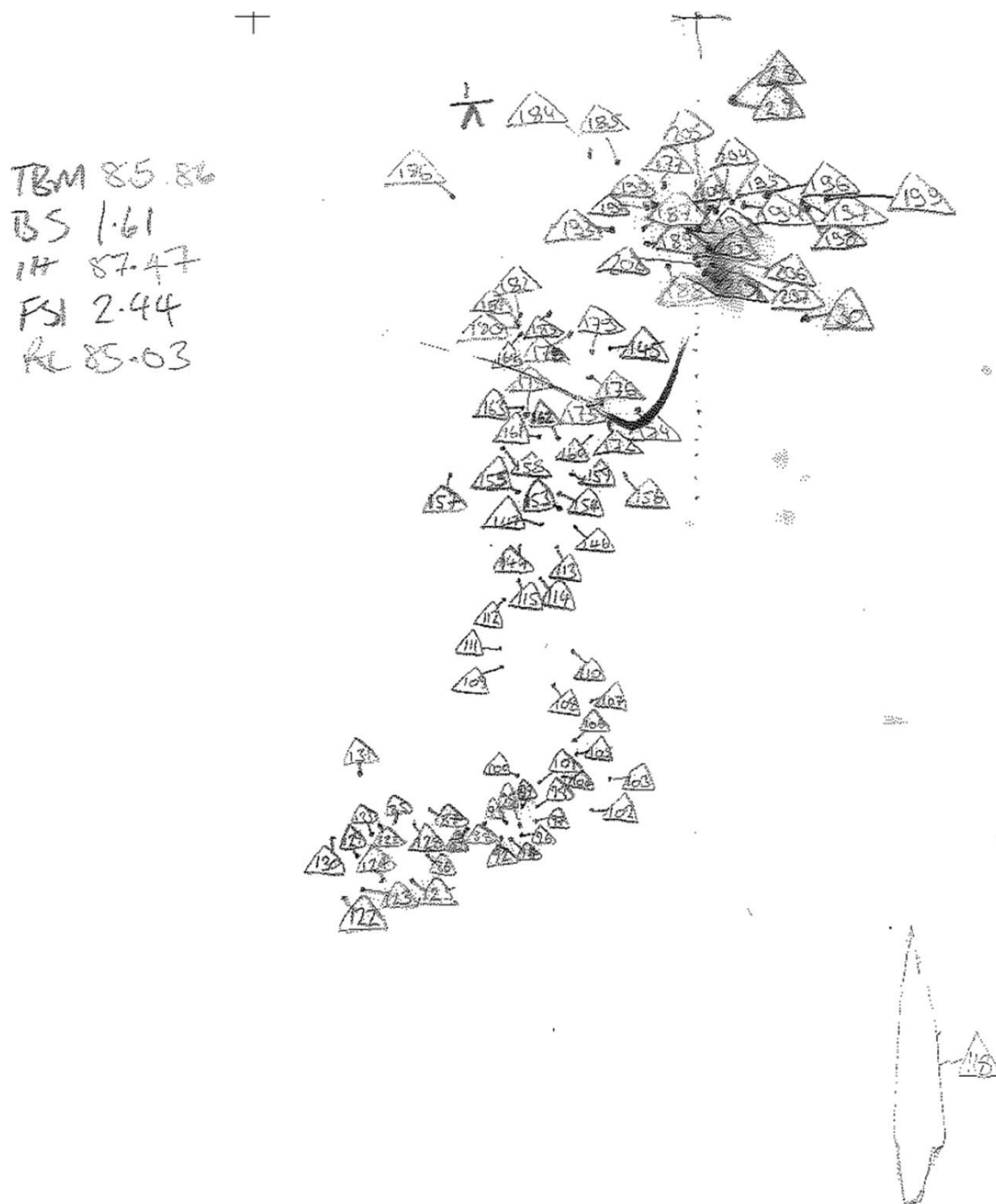
Catalogue

Content

Land at Townsend Farm Road, St Margaret's at Cliffe, Kent (KTFM04).....	2
The grave of skeleton 67.	2
The grave of skeleton 70	17
The grave of skeleton 73	29
The Burial Field at Söderby	31
Lovö Grave A15	31
Lovö Grave A20	38
Lovö Grave A21	42
Lovö Grave A36	65

Land at Townsend Farm Road, St Margaret's at Cliffe, Kent (KTFM04)




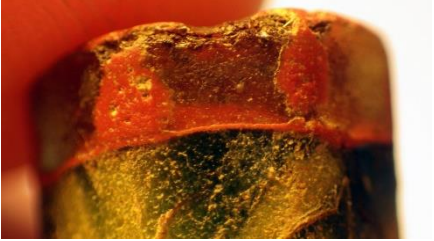

The grave of skeleton 67.












Detail of field drawing from grave 67 of Pre-Archeology Ltd






Item no.		Length (along the	Ø (mm)	mandrel Ø First side	mandrel Ø other side	Notes
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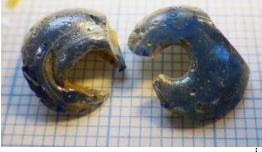
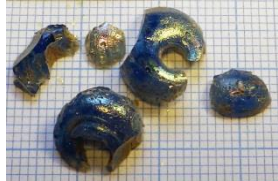





		mandre l)		(mm)	(mm)	
28		3,49	6,22	2,86	3,01	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated, lost entire surface
29		3,92	6,27	2,67	2,82	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.
85		16,34	15,04	5,28	6,07	Technique: Wound Shape: Marvered, possibly in mould. Color: Undetermined (completely covered.) Decoration: Twisted stringer in Red (O), Yellow (O) and Macroscopically black. Condition: good.
90		10,39	15,26	3,65	4,26	Technique: Wound Shape: Marvered, truncated bicone Color: Red (O) Decoration: Twisted stringer in Yellow (O) consisting of two wave patterns contacting along the equator. Condition: good.
91		7,15 X 4,34	12,54	2,45	3,38	Technique: Wound Shape: Marvered Color: Brick Red (O) Decoration: bichrome banded stringer stringer in light (O) and clear uncolored (T) with bluish tint. Condition: heavily worn. 







						Similar bicrome banded stringer as in bead 15 from skeleton 70.
94		15,09	8,36	2,72 (breakside)	2,99	Fits with 155 length together: 29,66 Technique: Mosaic. Shape: Marvered Color: Undetermined (Mosaic) Decoration: mosaic with red caps. Condition: good, no wear on ends
96		6,17	8,13	2,43	2,53	Fits with 115 Technique: Mosaic. Shape: Marvered Color: Undetermined (Mosaic) Decoration: mosaic with red caps. Condition: good, no wear on fracture.
99		14,42	8,26	2,27	3,08	 The red caps are deteriorated down to a clearcore, with a very clear and non-tinted core color.
100		16,04	8,52	2,55 (at break)	2,92	Fits with 99 total length 29,61 Technique: Mosaic. Shape: Marvered Color: Undetermined (Mosaic) Decoration: mosaic with red caps. Condition: Fits with 99, pattern matching up. Slightly worn fracture but shows no deterioration of the endcaps.








103		4,98	13,24	3,85	3,90	Technique: Wound Shape: marvered? Color: undetermined Decoration: none Condition: Worn/deteriorated Similar to 146, both worn, missing the entire original surface.
109		6,65	16,12	4,69	5,86	Technique: Wound Shape: Natural Color: Macroscopically black., looks opaque. Decoration: Stringer in Yellow (O) in wave pattern. Condition: Good
110		14,6	10,12		4,34-5,78	 Total length with no.154 is 23,29 mm Technique: Wound Shape: marvered Color: Brick red (O) Decoration: stringer in red (O) and light(O) with a blue tint. Condition: Worn and also worn after the break
115		15,39	8,43		1,96-2,37 (brotty ta)	Fits together with 96 Technique: Mosaic. Shape: Marvered Color: Undetermined (Mosaic) Decoration: mosaic with red caps. Condition: good, no wear on fracture endcaps. Notes: found very far apart, not strung next to each other when buried.
122		11,09	14,8		3,52-4,52	Technique: Wound Shape: Marvered, truncated bicone Color: Red (O) Decoration: Twisted stringer in Yellow (O) consisting of two wave patterns contacting along








						the equator. Condition: good.
128		16,59	15,03		5,01-6,77	<p>Technique: Wound Shape: Marvered, possibly in mould. Color: Undetermined (completely covered.) Decoration: Twisted stringer in Red (O), Yellow (O) and Macroscopically black. Condition: good.</p>  <p>Close-up of the ends of twisted stringer. The inside clearly visible. They are probably cut and not melted off. Could point to a need for an apprentice since one hand hold the mandrel and one the twisted stringer, someone need to hold the scissors? Could one do this by holding on to the end of twisty with teeth? May sound strange but I have seen a bead maker break stringer with teeth to get rid of lump at the end without putting down the mandrel.</p>
131		na	ca2		ca 2	<p>Technique: Drawn Shape: Natural Color: Green (T) Decoration: none Condition: Deteriorated</p> <p>Unlisted in preliminary report? This fragment was not measured by caliper but ruler since it seemed fragile.</p>







133		26,36	11,28	4,68	5,89	<p>Technique: Wound</p> <p>Shape: Marvered</p> <p>Color: Red (O)</p> <p>Decoration: Yellow (O) stringer that have been raked.</p> <p>Condition: fragmented on one side, probably due to stress in the glass created when raking with a metal tool.</p>
146		4,95	10,47	3,39	3,58	<p>Technique: Wound</p> <p>Shape: marvered?</p> <p>Color: undetermined</p> <p>Decoration: none</p> <p>Condition: Worn/deteriorated</p> <p>Similar to 103, both worn, missing the entire original surface.</p>
154		10,56	10,63	3,69	4,58	<p>Technique: Wound</p> <p>Shape: marvered</p> <p>Color: Brick red (O)</p> <p>Decoration: stringer in red (O) and light(O) with a blue tint.</p> <p>Condition: fragmented (fits with 110) worn and also worn after the break</p>
155		16,52	8,74	2,57 (brottyta)	2,61	<p>Fits with 96</p> <p>Technique: Mosaic.</p> <p>Shape: Marvered</p> <p>Color: Undetermined (Mosaic)</p> <p>Decoration: mosaic with red caps.</p> <p>Condition: good.</p> <p>Notes: Incorporates the only Millefiori type of murrini in this study, a blue flower with red and yellow center.</p> 
156						Originally listed as bead in preliminary report, but are listed



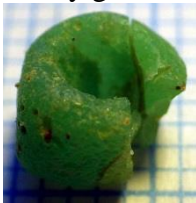

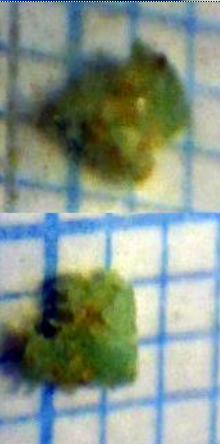
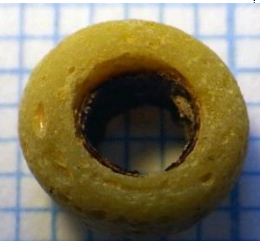
						double, and in reality being a clump of copper and metal wire
158		na	na	3,34	4,01	<p>Technique: Wound Shape: Natural Color: Blue (T) cobalt, pale. Decoration: none Condition: Fragmented and deteriorated, with iridescence and alkali migration.</p> 
164		13,22	14,01	2,97	4,34	<p>Technique: Wound Shape: Marvered, truncated bicone Color: Red (O) Decoration: Twisted stringer in Yellow (O) consisting of two wave patterns contacting along the equator. Condition: good.</p>
173		na	na		na	<p>Technique: Undetermined Shape: Undetermined Color: Green (T)? Decoration: none Condition: Deteriorated. Fragments of light green glass. These fragment was not measured since they seemed fragile.</p>
177		3,37	4,17		1,44	made together with 231 
179		3,94	6,48	2,80	2,82	<p>Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated, lost part of surface</p>




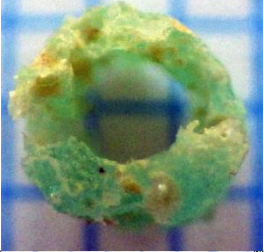



180		3,44	6,34	2,79	2,80	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
181		3,33	6,13	2,50	2,52	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
183		7,57	12,27	2,87	3,00	Was excluded since it is amber.
187		12,73	10,07	4,17	4,99	Technique: Wound Shape: Marvered into a rectangular shape Color: Macroscopically black., looks opaque. Decoration: Stringer in Light (O) over layered by stringer in Yellow (O), over layered with stringer in Red (O). Condition: Good
189		4,13	6,63	2,99	3,08	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
190		4,27	6,59	2,12	2,18	Technique: Wound Shape: Marvered Color: Green (T) Decoration: none Condition: good, made from very bubbly glass.
191						Excluded fragment of small green glass bead determined to be too fragile to handle.

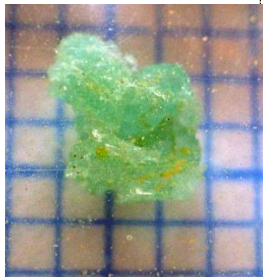

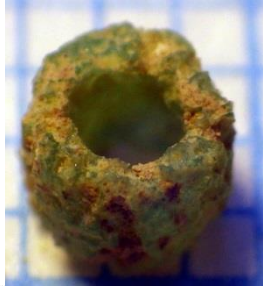
195		4,63	6,61	3,02	3,03	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
198	 	3,56	6,26	3,11	3,12	Technique: Wound Shape: Natural Color: Red (O) with dark streaks. Decoration: none Condition: good.
199		5,88	3,29	0,86	1,04	Technique: Drawn Shape: segmented Color: Undetermined. Seem opaque, but this might be deterioration and weathering. Decoration: none Condition: Deteriorated, with much iridescence and alkali migration.
200		4,01	7,00.	2,75	2,77	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
204		3,27	6,60.	2,92	2,93	Technique: Wound Shape: Natural Color: Red (O) with dark streaks. Decoration: none Condition: good.
205		3,41	6,63	3,10	3,13	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good, perforation from mandrel a bit uneven, might have been removed hot from mandrel.

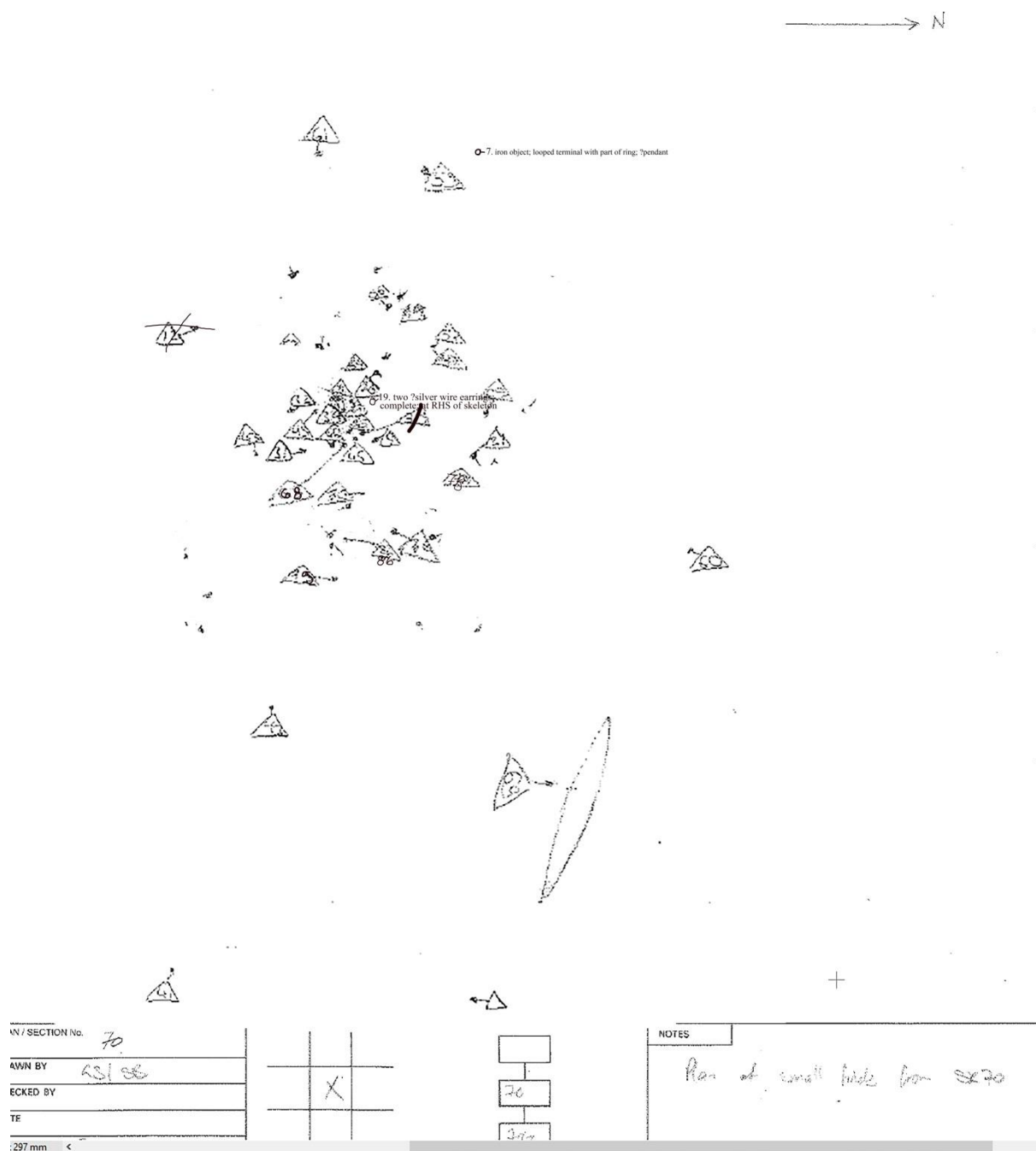
208		3,49	6,66	2,82	3,02	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: layer of some sort covering part of the surface, possible alkali migration?
210		12,96	5,16	1,14	1,46	Technique: Drawn Shape: Undetermined Color: Green (T)? seem opaque, but this might be deterioration and weathering. Decoration: none Condition: Deteriorated, with signs of iridescence and alkali migration.
212		3,37	6,35	2,86	3,01	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.
219	 	4,62	6,23	2,87	3,12	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated.
220		3,62	6,84	2,51	2,52	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
221		3,98	5,99	2,57	2,79	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.

222		3,82	6,72	2,97	3,13	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: layer of some sort covering part of the surface, possible alkali migration?
223		4,01	5,99	2,92	2,94	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.
224		3,53	6,01	2,67	2,81	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated, lost much of surface
225		13,94	5,14	1,32	1,72	Technique: Drawn Shape: Undetermined Color: Green (T)? seem opaque, but this might be deterioration and weathering. Decoration: none Condition: Deteriorated, with signs of iridescence and alkali migration.
226		3,77	6,15	2,71	2,88	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
227		3,44	6,48	2,74	2,77	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.

228		3,74	6,39	2,92	2,95	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated, lost much of surface.
230		4,75	6,79	1,74	2,44	Technique: Wound Shape: Marvered rectangular Color: Green (T) Decoration: none Condition: good, made from very bubbly glass. 
231		3,77	4,36		1,41	ser ut att vara från samma tillverkning som 177 men passar ej ihop
232		na	na			Technique: Undetermined Shape: Undetermined Color: Green (T) Decoration: none Condition: Deteriorated.
233		3,75	5,72	2,97	3,07	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated, lost entire surface, except for inside the perforation.





234		3,96	6,51	3,00	3,04	Technique: Wound Shape: Natural Color: Undetermined. Decoration: none Condition: Deteriorated
235		4,04	6,92	3,19	3,31	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.
236		4,74	3,91	1,16		hör ej ihop med de andra segmenten
237		ca2	ca2,5	ca1		Technique: Drawn Shape: Natural Color: Green (T) Decoration: none Condition: Deteriorated. This fragment was not measured since it seemed fragile.
241		3,42	5,92	2,73	2,78	Technique: Wound Shape: Natural Color: Red (O) Decoration: none Condition: good.
242		3,34	5,63	2,59	2,90	Technique: Wound Shape: marevered, thin walls Color: Green (T) Decoration: none Condition: good 







243		na	na	na	na	<p>Technique: Undetermined</p> <p>Shape: Undetermined</p> <p>Color: Green (T)</p> <p>Decoration: none</p> <p>Condition: Deteriorated. fragment similar to 237.</p> <p>This fragment was not measured since it seemed fragile.</p>
244		3,51	5,57	3,23	3,27	<p>Technique: Wound</p> <p>Shape: Natural</p> <p>Color: Undetermined.</p> <p>Decoration: none</p> <p>Condition: Deteriorated, lost entire surface, just a core left.</p>
245		2,01	2,65		Ca 1,2	<p>Technique: drawn</p> <p>Shape: Natural (not marvered thin since this can be achieved when drawing.)</p> <p>Color: Green (T)</p> <p>Decoration: none</p> <p>Condition: Deteriorated.</p> <p>This bead was not measured by caliper but ruler since it seemed fragile.</p>














Detail of field drawing of grave 70 of Pre-Archeology Ltd







The grave of skeleton 70







Item no.		Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
8		5,34	7,55	3,53	3,66	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
9		8,73	6,45 - 8,84	1,62	1,64	This bead was listed as glass, but is made from an undetermined material: It seems to have an organic structure and be worked into a shape imitating the teeth of a cowrie shell. The teeth actually transect the layers of the organic material, which points to them being filed into the material. It is very similar to the two beads in Burgmann fig.167. (that also has the same type of amethysts as the ones in this grave).
10		5,21	7,95	3,80	3,92	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
69 11		5,29	7,65	3,68	3,78	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good







13		5,22	7,76	4,06	4,10	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
14		5,29	7,58	3,71	3,85	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
15		14,26	19,05	6,17	6,71	Technique: Wound Shape: Marvered Color: Red (O) or possibly brick red. Decoration: Stringer, yellow (O) and bichrome of Light (O) and clear/uncolored (T). Dots, Teal. Condition: Good Similar bichrome banded stringer as in bead 91 from skeleton 67.
16		4,68	7,15	3,76	3,90	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
20		4,41	7,95	4,08	4,21	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good.
21		5,43	7,76	3,66	3,74	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good







22		5,45	7,77	3,77	3,91	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
23		17,73	8,01 X 12,25	2,12	2,18	ametyst
24		5,68	7,65	3,62	3,65	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
69 25		7,02	8,58	3,08	3,15	Technique: Wound Shape: natural Color: Red (O) Decoration: Stringer, white Condition: Good
26		5,24	7,03	3,49	3,83	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
27		5,07	7,61	3,52	3,81	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
28						This item is listen in the report as a bead but has not been found. It might be a clerical error.



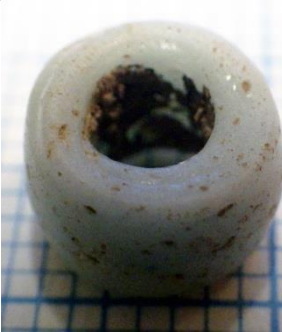


29						This item is listen in the report as a bead but has not been found. It might be a clerical error.
31		14,33	20,56	7,69	7,76	Technique: Wound Shape: Natural Color: Blue (T) strong cobalt. Decoration: none Condition: Good but very worn, as can be seen on the concave grooves around the perforation.
32		5,51	7,63	3,52	3,59	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
33		5,26	7,77	3,51	3,99	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
34		4,94	7,31	3,77	3,81	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
70 41		5,13	12,45	4,80	5,20	Technique: Wound Shape: Natural Color: Blue (T) Decoration: white stringer Condition: Good

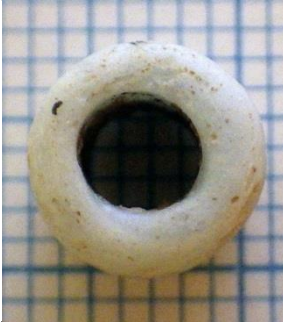




70 42		5,94	7,98	3,83	4,15	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
43		5,61	7,44	3,69	3,92	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
70 44		5,56	7,75	3,76	3,91	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good  Same glass mix as with skeleton 67 However, bigger mandrel than any of those, and bigger in size! Different person with different personal tools?? Replaced tools?
70 45		4,92	7,32	3,69	3,71	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
70 46		5,12	12,51	4,98	5,26	Technique: Wound Shape: Natural Color: Blue (T) Decoration: white stringer Condition: Good, with red copper discoloration. fits with 31






70 47		4,79	7,57	3,72	4,34	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
69 48		9,33	7,25	2,71	3,07	Technique: Wound Shape: Marvered Color: Yellow (O) Decoration: none Condition: Good
69 49		5,55	7,86	3,46	3,73	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
50		5,34	7,48	3,70	3,74	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
51		5,62	7,69	3,72	4,03	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
52		5,04	7,76 X 8,18	4,15	4,44	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good, perforation of one side oval, have been loosened from the mandrel when still hot.



						
53		4,85	7,96	3,96	4,01	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
54		5,77	7,48	3,55	3,81	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
55		5,98	7,99	3,45	3,69	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
69 56		4,78	13,74	5,46	5,55	Technique: Wound Shape: Natural Color: Amber & Brown (T) Decoration: Dots, yellow (O) Condition: have had another yellow (O) dot that has broken off, otherwise good.
57		5,12	7,29	3,48	3,63	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good

58		5,34	7,19	3,46	3,65	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good
59		7,03	12,51	5,27	5,52	 Technique: Wound Shape: natural Color: Blue (T) Decoration: scarred by a stringer that has deteriorated, seems to have been light (O) Condition: Deteriorated and slight iridescence. It is scarred from a stringer that has deteriorated, no clear sign of wear but have eaten itself into bead 31 and fits in one of its sockets.
61		5,57	7,41	3,55	3,73	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good 
62		5,35	7,41	3,35	3,45	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good

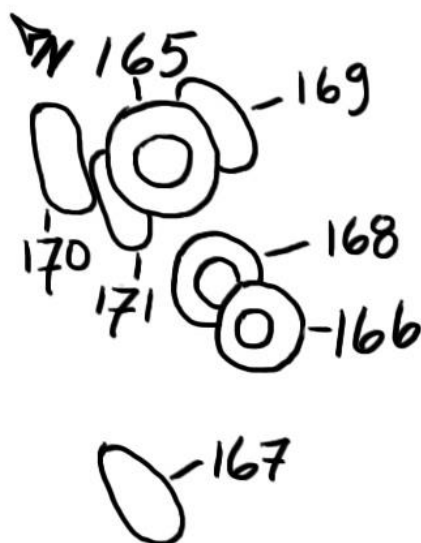
63		9,95	7,45 X 13,03	1,50	1,56	Amethyst
64		5,36	7,85	3,85	3,89	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
65		5,46	7,61	3,48	3,88	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
66		13,83	7,29 X 13,19	1,42	1,67	Amethyst
67		5,42	7,04	3,44	3,65	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good

68		5,14	7,17	3,42	3,52	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
69		5,39	8,1	3,58	3,88	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
70		12,2	6,77 X 9,53	1,54	1,61	Amethyst
71		6,01	7,39	3,22	3,49	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good Perforation is oval on one side, it is possible the bead was removed from the mandrel still hot.
72		5,24	7,9	3,87	3,99	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good



73		5,25	7,66	3,54	3,64	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
74		5,73	8,09	3,3	3,4	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
75		5,09	7,9	3,68	3,78	Technique: Wound Shape: Marvered Color: Light (O) Decoration: none Condition: Good
76		7,03	10,62	1,53	1,56	Amethyst
77		6,73	9,69	3,10	3,33	Technique: Wound Shape: Natural Color: Red (O) Decoration: stringer in Light (O) Condition: Good

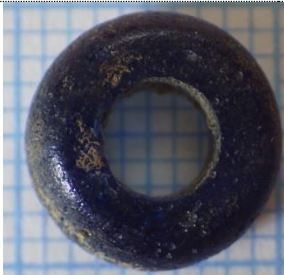
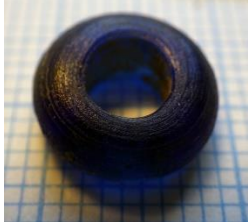
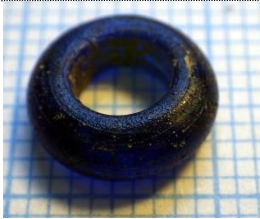
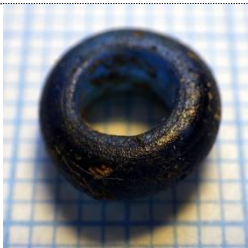
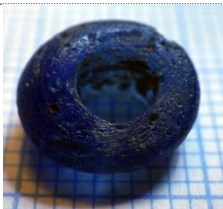
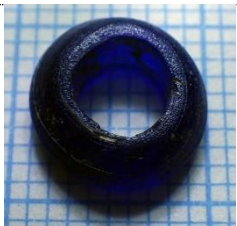
78		5,5	7,61	3,28	3,53	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: Good
82		5,59	7,36	3,59	3,76	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: Good

The grave of skeleton 73



Drawing after detail of field drawing of grave 73 of Pre-Archeology Ltd




Item no.		Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
148		14,3	20,73	4,42	5,64	Technique: Wound Shape: Marvered Color: Undetermined (completely covered.) Decoration: Twisted stringer in Red (O), Yellow (O) and Macroscopically black. Condition: mouldered Notes: every other of the twisted stringers are clear core, the bead core is made from a greenish grey opaque.
165		5,57	11,88	5,43	5,94	Technique: Wound Shape: Natural Color: Blue (cobalt, a bit pale.) Decoration: none Condition: good





166		3,88	9,64	3,90	4,09	Technique: Wound Shape: Natural Color: Blue (cobalt, a bit pale/greyish.) Decoration: none Condition: worn.
167		4,10	10,01	4,32	4,62	Technique: Wound Shape: Natural Color: Blue (cobalt, heavy pigmentation.) Decoration: none Condition: signs of wear
168		3,43	9,25	4,59	4,71	Technique: Wound Shape: Natural Color: Blue (cobalt, heavy pigmentation.) Decoration: none Condition: signs of wear
169		3,36	8,00	3,95	4,03	Technique: Wound Shape: Natural Color: Blue (cobalt, pale) Decoration: none Condition: good
170		5,39	10,04	3,83	4,38	Technique: Wound Shape: Natural Color: Blue (cobalt, pale) Decoration: none Condition: wedge shape but follows the structure of the glass, worn, but have probably had a bit of a wedge shape since creation.
171		3,48	9,06	4,49	4,62	Technique: Wound Shape: Natural Color: Blue (cobalt, heavy pigmentation.) Decoration: none Condition: good





The Burial Field at Söderby





The Beads from Söderby was not registered as individuals and have no individual find number. They are registered either as one find for all beads or as a few groups, because of this they have been given a suffix with a roman numeral to differentiate them within their number.






Lovö Grave A15






Item no.		Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
I		16,92	13,95	4,49	6,16	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stringer in Ligth (O) and yellow (O) that have been raked. Condition: distorted by heat.
II		16,78	18,70 x 11,10 (14,9)	na	na	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stringer in Ligth (O) and Red (O) that have been raked. Condition: distorted by heat, flattened and cracked. The diameter (14,9) is determined by the mean of the two measurements since the bead is flattened.
III		13,59	15,51	3,65	4,83 x 6,22	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stringer in Ligth (O) and Yellow (O) that have been raked.





						Condition: fragmented, probably by heat.
IV		8,83	14,52	na	na	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stringer in Ligth (O) and Red (O) that have been raked. Along the equator a line of yellow dots. Condition: fragmented, probably by heat.
V		13,92	na	na	na	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stringer in Ligth (O) and Yellow (O) that have been raked. Condition: fragmented and deteriorated Width of fragment 11,53
VI		7,93	12,14	2,97	3,68	Technique: Wound Shape: Natural Color: Blue (T)(possibly cobalt but might be mixed with copper.) Decoration: stacked dots, yellow (O) on top of red (O) Condition: fragmented and deteriorated.
VII		6,72	10,51	2,85	3,99	Technique: Wound Shape: Ribbed Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none




						Condition: Good. Trace of opaque red discoloration from copper reduction.
VIII		6,68	10,07	na	na	Technique: Wound Shape: Ribbed Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none Condition: fragmented and deteriorated. Trace of opaque red discoloration from copper reduction.
IX		3,92	12,48	5,09	5,11	Technique: Wound Shape: Natural Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none Condition: Good. Trace of opaque red discoloration from copper reduction.
X		5,93	9,11	2,05	2,35	Technique: Wound Shape: Natural Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none Condition: Good. Trace of opaque red discoloration from copper reduction.
XI		6,36	9,51	2,27	2,97	Technique: Wound Shape: Natural Color: Undetermined (T) classified as teal. Decoration: none Condition: Distorted by heat

XII		6,91	10,19	2,40.	2,85	Technique: Wound Shape: Ribbed Color: Clear/uncolored(T) Decoration: none Condition: Good, but with crackelure
XIII		6,54	9,20.	2,93	2,51	Technique: Wound Shape: Ribbed Color: Clear/uncolored(T) Decoration: none Condition: The glass has cracked like crackelure, could it have been cooled quickly with water?
XIV		4,15	8,35	2,03	1,64	Technique: Wound Shape: Natural Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none Condition: the glass have cooked. Trace of opaque red discoloration from copper reduction.
XV		5,78	8,37	2,58	3,19	Technique: Wound Shape: Natural Color: Undetermined (T) was later determined to be colored by copper and should probably been classified as teal. Decoration: none Condition: the glass have cooked. Trace of opaque red discoloration from copper reduction.

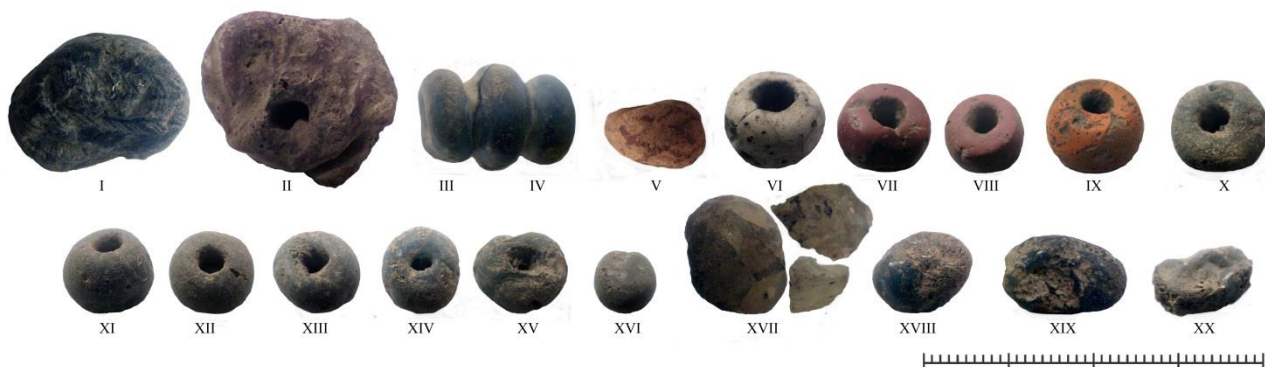
XVI		6,65	na	na	na	Technique: Wound Shape: Natural Color: amber/brown (T) Decoration: none Condition: fragmented Width of fragment 6,81
XVI I		7,37	9,71	3,25	3,92	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XVI II		8,34	8,49	2,91	2,94	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XIX		6,40.	9,45	3,16	3,53	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XX		6,91	10,00 .	3,11	3,76	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

XXI		7,39	11,08	3,99	4,17	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XXI I		8,34	10,50 .	3,69	3,79	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XXI II		6,61	11,70 .	3,34	3,47	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XXI V		8,82	12,15	4,37	5,04	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XX V		8,53	11,23	4,41	4,77	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.







XX VI		8,36	11,43	4,02	3,58	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XX VII		7,42	11,01	na	na	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XX VIII		8,73	12,01	3,88	4,81	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XXI X		10,67	12,19	na	na	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear. Condition: The hole is plugged by a corroded iron core.






XX X		7,57	11,73	3,81	4,28	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
XX XI		15,41	15,2	na	na	Melted into a lump
XX XII		9,36	20,79	na	na	Melted into a lump







Lovö Grave A20








Item no.	Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
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I		15,35	21,83	4,93x5,96	na	<p>Most probably the focal bead.</p> <p>It's a cobalt blue with five lines of twisted stringer (white around cobalt). The three in the middle create a herringbone pattern. The other two circle the holes.</p> <p>It is molten and have slumped together in a way that has flattened it quite a bit and closed up the hole on one side</p>
II		21,74	na	na	na	<p>This is a bead that has cooked to a barely recognizable state. It was originally opaque brick red with white decor, possibly a thick stringer.</p>
III		9,66	8,53 x 10,49	5,06x2,65	3,81	<p>Bead III and IV is actually two halves of the same bead. Together they measure 14,11mm.</p> <p>They are cobalt and both fragmented and a bit molten.</p>
IV		10,25	9,80	na	na	<p>fragment of III</p> 
V		8,26	11,79	2,99 x 1,69	2,96 x 0,83	<p>Badly molten and deteriorated bead.</p> <p>Beige or white with stringer decor in red and a dark, possibly black.</p> <p>The red is applied on two sides in a criss-cross pattern, creating a tic-tack-toe board. The dark color is applied as</p>


						parallel bands on the two other sides and framing around the red pattern. 
VI		7,59	11,89	3,8	4,44	Technique: Wound Shape: Natural Color: Light (O) Decoration: none Condition: cracked and a bit deteriorated
VII		7,11	10,99	3,31	3,68	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
VIII		6,32	9,19	3,24	3,04	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
IX		6,83	11,46	3,37	3,69	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.



X		5,65	11,54	3,69	2,22	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XI		8,04	10,35 x 9,34	2,52 x 3,35	4,45	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XII		6,45	10,09	2,87	3,72	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XIII		6,94	9,51	2,52	2,83	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XIV		7,08	9,11	2,17	2,99	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XV		7,52	8,83 x 10,46 (9,64)	3,10 X 2,03	1,76	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat. The diameter (9,64) is determined by the mean of the two measurements since the bead is flattened.







XVI		5,16	7,76	na	na	Technique: Wound Shape: Natural Color: Undetermined Decoration: none Condition: deteriorated and distorted by heat.
XVI I		10,53	14,30 .	2,94	2,48	Technique: Wound Shape: Natural Color: Clear/uncolored (T) Decoration: none Condition: very fragmented. Only the biggest fragment was measured.
XVI II		4,63	8,36 x 11,48	na	na	Technique: Undetermined Shape: undetermined Color: Blue (T) Decoration: none Condition: Melted into a lump without a hole.
XIX		5,41	10,57 x 14,15	na	na	Technique: Undetermined Shape: undetermined Color: Blue (T) Decoration: none Condition: Melted into a lump without a hole.
XX		6,93	11,65	na	na	Technique: Undetermined Shape: undetermined Color: Undetermined Decoration: none Condition: Melted into a lump without a hole.






Lövö Grave A21













Item no.		Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
I		13,59	30,66	7,69 X 3,61	7,07 X 2,19	Big melonbead with a big hole, and decoration only on one side. Might have been a spindle whorl, Technique: wound Shape: Ribbed Color: Teal (T) Decoration: Monochrome stringers in yellow and red, applied before ribbing on one side only Condition: it has melted






						downwards and is the only big bead in this grave that has not exploded, that might be because it was not strung as the others. They might have been on a metal wire that led the heat into their center and led to their demise..
II		14,77	19,83	7,90 ca	na	<p>No II and III are the same bead and their diametre will be counted from fragment III since it is in the better condition.</p> <p>Technique: wound Shape: Marvered Color: Teal (T) Decoration: Monochrome stringers in yellow and red that has been raked. Condition: possibly distorted from heat and then fragmented. Fragment II is in worse condition than fragment III.</p>
III		15,13	21,29	7,72	8,67	<p>No II and III are the same bead and their diametre will be counted from fragment III since it is in the better condition.</p> <p>Technique: wound Shape: Marvered Color: Teal (T) Decoration: Monochrome stringers in yellow and red that has been raked. Condition: possibly distorted from heat and then fragmented. Fragment II is in worse condition than fragment III.</p>





IV		15,75	18,91	ca 5,90.	na	Technique: wound Shape: Marvered Color: Teal (T) Decoration: Monochrome stringers in white and red. Condition: Fragmented, Fragment V also quite distorted by melting. The white stringer has deteriorated and left a groove.
V		17,81	13,53	na		
VI		14,28	21,37	7,45	6,13	 Fragments VI, VII, VIII Together they have a diameter of ca 35 mm. gemensam mandreldia, bättre hål 6,63-6,97
VII		51,03	19,92	7,11	5,83	Fragment of the same bead as VIII Technique: wound Shape: Marvered Color: Teal (T) Decoration: Monochrome stringer in yellow that has been raked. Condition: Fragmented, some heat distortion, especially fragment VIII

VIII		15,45	13,61	na	na	<p>Fragment of the same bead as VII</p> <p>Technique: wound</p> <p>Shape: Marvered</p> <p>Color: Teal (T)</p> <p>Decoration: Monochrome stringer in yellow that has been raked.</p> <p>Condition: Fragmented, some heat distortion, especially fragment VIII</p>
IX		8,60.	20,58	6,37	6,35	<p>Technique: wound</p> <p>Shape: Natural</p> <p>Color: Teal (T)</p> <p>Decoration: Monochrome stringer in red applied in wave.</p> <p>Condition: Fragmented, glued after excavation.</p> 
X		9,52	18,08	6,89	7,45	<p>Technique: wound</p> <p>Shape: Natural</p> <p>Color: Black</p> <p>Decoration: Yellow dots and Monochrome stringers in red</p> <p>Condition: quite deteriorated, especially the decorations.</p> 







XI		7,56	19,06	7,28	7,26	Technique: wound Shape: Marvered Color: Teal (T) Decoration: none Condition: Good but fragmented.
XII		8,07	19,93	6,98	6,72	Technique: wound Shape: Marvered Color: Teal (T) Decoration: none Condition: Good but fragmented.
XIII		8,58	16,79	na	na	Technique: wound Shape: Marvered Color: Teal (T) Decoration: none Condition: Good but fragmented.
XIV		7,84	19,13	na	na	Technique: wound Shape: Marvered Color: Teal (T) Decoration: none Condition: Good but fragmented.







XV		7,26	12,94	5,64	5,72	Technique: wound Shape: Natural Color: Green (T) Decoration: yellow dots Condition: Deteriorated
XVI		8,68	13,99	3,61	4,52	Technique: wound Shape: marvered Color: Teal (T) Decoration: yellow (O) and purple (T) dots Condition: Cracked, might be glued after excavation.
XVII		9,79	16,54	3,70 X 6,55	5,04	Technique: wound Shape: undetermined Color: undetermined, but might have been a Green (O) Decoration: monochrome yellow stringer Condition: quite deteriorated and distorted by heat, fragmented and glued.
XVIII	 	7,59	13,10 .	3,34 X 5,16	5,9	Technique: wound Shape: undetermined Color: Teal (T) Decoration: dark red stringer that is raked Condition: quite deteriorated and a bit distorted by heat.
XIX		7,89	12,03	2,50.	2,15	Technique: wound Shape: undetermined Color: Teal (T) Decoration: yellow dots Condition: quite deteriorated in the surface and dots.








XX		8,42	12,83	4,92 X 2,78	4,87 X 1,47	<p>Technique: wound Shape: undetermined Color: Purple (T) Decoration: Monochrome yellow stringer that has been raked. Condition: Melted and distorted. Seem to have folded over some kind of object, possibly a brooch or something else, made from metal and with angles.</p> 
XXI		6,76	11,69	na	na	<p>Technique: wound Shape: undetermined Color: Teal (T) Decoration: none Condition: Melted and pushed together.</p>
XXII		6,03	10,26 x 11,97 (11,11)	3,64	4,36	<p>The diameter (11,11) is determined by the mean of the two measurements since the bead is flattened.</p> <p>Technique: wound Shape: undetermined Color: Teal (T) Decoration: none Condition: Melted and distorted</p>
XXIII		6,02	10,24	1,71	2,49	<p>Technique: wound Shape: natural Color: Teal (T) quite pale in color. Decoration: none Condition: quite good</p>





XXIV		6,30.	9,19	2,77	3,16	Technique: wound Shape: natural Color: Green (T) quite heavy in pigments. Decoration: none Condition: good.
XXV		4,49	9,67	1,34	1,39	Technique: wound Shape: natural Color: clear/uncolored (T) a very clear with blue tint. Decoration: none Condition: possibly distorted from heat and then fragmented.
XXVI		4,78	8,66	2,70.	2,79	Technique: wound Shape: marvered (?) Color: Undetermined. Decoration: none Condition: Craquelured. Very similar to CCXXXIII and to Lovö A20 Beads X-XVI and XX, and this makes it very possible that it has changed color from heat. It might have been teal or blue originally.
XXVI I		10,83	10,18	2,67	3,37	Technique: wound Shape: marvered, Cuboctahedral Color: Blue (T) Strong cobalt Decoration: none Condition: Good.







XXVI II		11,91	9,04	1,81	1,99	<p>Technique: Blown drawn</p> <p>Shape: Natural, end piece of blowing tube</p> <p>Color: Green (T), it has a yellow core, but this would not have been visible when worn.</p> <p>Decoration: none</p> <p>Condition: Good.</p> 
XXIX		7,27	9,97	3,24	3,83	<p>Technique: Wound</p> <p>Shape: Marvered</p> <p>Color: Blue</p> <p>Decoration: Sun murrine in blue, red and white.</p> <p>Condition: fragmented (chipped).</p> 
XXX		7,09	12,12	5,63	5,65	<p>Technique: Wounds</p> <p>Shape: Marvered (?)</p> <p>Color: Blue (T), with trace of red discoloration.</p> <p>Decoration: none</p> <p>Condition: good but have clear and crisp, concave edges from wear.</p>







XXXI		7,19	10,43	4,05	4,51	Technique: Wounds Shape: Marvered (?) Color: Blue (T), with no trace of red discoloration. Decoration: none Condition: Good condition, straight angled edges from cold work or wear.
XXXI I		5,92	8,42	2,81	3,15	Technique: Wound Shape: Marvered (?) Color: Teal (T), with a patch of blue (covering ¼ of the body) that has trace of red discoloration. Decoration: none Condition: good but have clear and crisp, concave edges from wear.
XXXI II		6,24	9,77	3,97	4,21	Technique: Wound Shape: Marvered Color: Red (O) Decoration: none Condition: straight edges can be from cold work, marvering or wear.
XXXI V		11,64	8,23	2,46	na	Technique: Wound Shape: Marvered Color: Light (O) yellow tint. Decoration: none Condition: Fragmented
XXX V		6,24	7,98	2,62	3,41	Technique: Wound Shape: Marvered Color: Green (O) Decoration: none Condition: straight edges can be from cold work, marvering or wear.
XXX VI		5,62	6,54 X 8,11 (7,32)	1,46	1,72	The diameter (7,32) is determined by the mean of the two measurements since the bead is distorted. Technique: Wound Shape: Undetermined Color: Green (O) Decoration: none







						Condition: melted and distorted
XXX VII		9,22	11,52	3,72	4,11	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: good
XXX VIII		8,62	11,16	3,92	4,08	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: on side is good, one side is badly damaged and distorted by heat.
XXXI X		7,14	9,89	3,95	4,31	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: good
XL		8,61	11,22	3,55	4,03	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: surface is deteriorated
XLI		8,13	10,88	3,36	3,62	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: good
XLII		8,53	10,95	3,98	4,29	Technique: Wound Shape: Ribbed Color: Amber and Brown (T) Decoration: none Condition: good





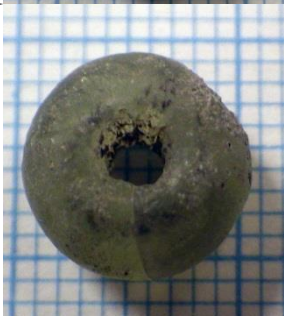
XLIII		7,38	12,04	2,90,	3,59	Technique: Wound Shape: Ribbed Color: Teal (T) very pale teal Decoration: none Condition: surface is deteriorated
XLIV		8,09	9,85	3,65	3,81	Technique: Wound Shape: Ribbed Color: Teal (T) pale teal Decoration: none Condition: surface is deteriorated
XLV		8,69	11,52	3,08	4,04	Technique: Wound Shape: Ribbed Color: Teal (T) quite blue, almost an aqua. Decoration: none Condition: good
XLVI		7,29	8,96	2,90,	3,47	Technique: Wound Shape: Ribbed Color: Teal (T) pale teal Decoration: none Condition: good
XLVII		6,63	10,57	2,87	3,52	Technique: Wound Shape: Ribbed Color: Teal (T) quite green in hue. Decoration: Trace of gilding Condition: good 
XLVII I		7,59	8,37	3,13	3,66	Technique: Wound Shape: Ribbed Color: Green (T) Decoration: Trace of gilding Condition: good





						
XLIX		4,87	10,58	3,37	3,76	<p>Technique: Wound Shape: undetermined Color: Green (O) Decoration: none Condition: very melted</p>
L		6,31	26,61 x 12,86	na		<p>Technique: 3 Wound beads that have fused Shape: Undetermined. Color: Green (O), Blue (T), Blue (T) Decoration: none Condition: Fused and melted.</p> <p>The green bead has a width Of 5,07 and dia 9,81 mandre dia 2,92 The blue bead has a width Of 5,23 dia 10,42</p> <p>The second blue bead will be counted as measuring the same as the first, since its too distorted to measure.</p>
LI		27,65	11,93	na	na	<p>Technique: 4 Wound beads that have fused Shape: Undetermined. Color: Teal (T), Light (O), Teal (T), Blue (T) Decoration: none Condition: Fused in situ.</p> <p>The where not individually measured and will be counted as four beads of 10 mm in diameter.</p>





LII		6,37	9,26	2,63	3,03	Technique: Wound Shape: Natural Color: Blue (T) Decoration: none Condition: The angle between the flat edge and the side is so sharp that it is either cold work or wear.
LIII		7,09	9,47	3,11	3,77	Technique: Wound Shape: Natural Color: Blue (T) Decoration: none Condition: The angle between the flat edge and the side is so sharp that it is either cold work or wear.
LIV		7,36	9,78	4,17	4,55	Technique: Wound Shape: Natural Color: Blue (T) Decoration: none Condition: The angle between the flat edge and the side is so sharp that it is either cold work or wear.
LV		7,88	8,81	1,91	2,70,	Technique: Wound Shape: undetermined Color: Blue (T) Decoration: none Condition: Fragmented down the middle, does not fit LVI in size or color. 
LVI		7,63	7,93	2,92	2,27	Technique: Wound Shape: undetermined Color: Blue (T) Decoration: none Condition: Fragmented down the middle, does not fit LV in size or color.





						
LVII		10,67	22,05 ca	ca 7,6		Technique: Wound Shape: Natural Color: Clear/uncolored (T) with green tint. Decoration: none Condition: badly fragmented and seem to be glued after excavation.
LVIII		10,56x7,65	2,55			This turned out to be a fragment of mountain crystal and will not be used in this study.
LIX		7,25	11,30 ,	3,68	4,11	Technique: Wound Shape: undetermined Color: Macroscopically black (seem truly opaque) Decoration: none Condition: good.
LX		10,01	12,31	na	na	Technique: Wound Shape: undetermined Color: Macroscopically black (seem truly opaque) Decoration: none Condition: very melted.
LXI		7,88	11,64	3,59	3,61	Technique: Wound Shape: undetermined Color: Blue (T) Decoration: stacked dots, seem to be yellow, then red, then yellow, then red than yellow. (a yellow dot with two concentric red circles in it.) Condition: Badly






						deteriorated, cooked and distorted
LXII		9,48	12,54	4,33	1,89	Technique: Wound Shape: undetermined Color: Blue (T) Decoration: none. Condition: melted and distorted.
LXIII		9,09	8,46	3,25	3,81	Technique: Wound Shape: marvered, still trace of being Cuboctahedral Color: Blue (T) Strong cobalt Decoration: none Condition: Fragmented down the middle, slightly melted. 
LXIV		11,23	9,53	na	na	Technique: Wound Shape: marvered, Cuboctahedral Color: Blue (T) cobalt Decoration: none Condition: Fragmented and glued.
LXV		8,58	9,09	2,32	3,08	Technique: Wound Shape: marvered, trace of being Cuboctahedral Color: Blue (T) cobalt Decoration: none Condition: Fragmented down the middle. 





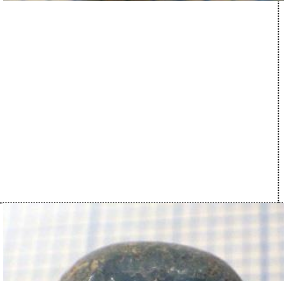
LXVI		6,56	8,17	na	na	Technique: Wound (?) Shape: undetermined Color: Blue (T) Decoration: none Condition: Melted to lump
LXVII		16,10,	12,52 x 8,61 (10,5 6)	na	na	The diameter (10,56) is determined by the mean of the two measurements since the bead is flattened. Technique: Blown drawn. Shape: Segmented. Color: clear/uncolored Decoration: silver foil. Condition: melted and distorted.
LXVII I		10,57	10,32 x 16,73	na	na	Distorted in such a way it will not be used for measurements. Technique: Blown drawn. Shape: Several beads, one of them segmented silver foil. Color: clear/uncolored Decoration: silver foil. Condition: melted, distorted and fused by the cremation.
LXIX		7,13	11,90 ,	na	na	Technique: Wound Shape: Undetermined. Color: Green (T) pale. Decoration: None. Condition: melted and distorted.
LXX		5,82	9,63	2,4	2,61	Technique: Wound Shape: Natural Color: Green (T) a bit pale. Decoration: None. Condition: good.


LXXI		7,30,	13,77	na	na	<p>Technique: Undetermined Shape: Undetermined Color: undetermined. Decoration: undetermined Condition: Lump.</p> <p>This lump seems to be the melted remains of a blown drawn silver foil, it has the kind of color the other silver foils have turned in this cremation, but since this cannot be certain, it will not be determined..</p>
LXXII		11,08	7,36	1,92	1,20,	<p>Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: fragmented in two pieces. With an iron wire still inside. It also seems to be glued in the segment that is not broken.</p> 
LXXII I		19,39	6,76	0,85	1,24	<p>Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T). Decoration: silver foil Condition: Good.</p>

LXXI V		12,93	7,83	1,23	0,96	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: Good but the color is deteriorated by heat.
LXX V		15,81	8,09	na	na	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: melted and deteriorated by the cremation.
LXX VI		12,16	8,86	1,29	1,71	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: melted and deteriorated by the cremation.
LXX VII		10,54	7,11	1,33	1,39	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: Good but the color is deteriorated by heat and some of the outer layer is missing.

LXX VIII		11,23	9,12	na	na	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: melted and deteriorated by the cremation.
LXXI X		10,19	8,03	na	na	Technique: Blown drawn. Shape: Segmented. Color: clear/ uncolored (T), this was probably a quite clear silver foil but has deteriorated by the cremation. Decoration: silver foil Condition: melted and deteriorated by the cremation.
LXX X		11,45	5,31	na	na	Technique: Blown drawn. Shape: probably fused in situ from 4 beads rather than segmented. Color: yellow Decoration: none Condition: melted and fused.
LXX XI		9,60,	4,46	na	na	Technique: Blown drawn. Shape: probably fused in situ from 3 beads rather than segmented since they are of very varied width. Color: yellow Decoration: none Condition: these might be segmented, but seems more likely to be fused during cremation


LXX XII		6,94	5,68	na	na	Technique: Blown drawn. Shape: probably fused in situ from 2 beads rather than segmented. Color: yellow Decoration: none Condition: seems fused, quite dirty.
LXX XIII		6,23	5,99	na	na	Technique: Blown drawn. Shape: probably fused in situ from 2 beads. Color: yellow Decoration: none Condition: good.
LXX XIV		4,62	4,35	na	na	Technique: Blown drawn. Shape: probably fused in situ from 2 beads. Color: yellow Decoration: none Condition: good.
CLXV		10,83	6,75			Technique: Blown drawn. Shape: fused in situ from 3 beads. Color: 1 yellow, 2 blue Decoration: none Condition: cooked and fused
CLXV I		6,79	3,32	0,82	0,64	Technique: Blown drawn. Shape: Segmented, note the uniformity in diameter in both the tops of the beads and the area in between. Made on a mould. Color: blue Decoration: none Condition: good.




CCX XX		2,66	4,77	0,86	1,06	Technique: Blown drawn. Shape: single, cut and heat polished. Color: yellow Decoration: none Condition: good.
CCX XXI		2,50,	4,26	1,09	1,13	Technique: Blown drawn. Shape: single, cut and heat polished. Color: blue Decoration: none Condition: good.
CCX XXII		3,59	5,19	na	na	Technique: Blown drawn. Shape: single, cut and heat polished. Color: blue (T) cobalt Decoration: none Condition: bit melted.
CCX XXIII		6,11	9,10,	3,82	3,84	Technique: wound Shape: natural (?) Color: Undetermined. Decoration: none Condition: Craquelured. Very similar to XXVI and to Lovö A20 Beads X-XXVI and XX, and this makes it very possible that it has changed color from heat. It might have been teal or blue originally.
CCX XXIV		9,39	9,72	na	na	Technique: wound Shape: Undetermined Color: Teal (T) Decoration: none Condition: badly distorted by heat






CCX XXV		7,77	11,39	3,25	3,62	Technique: wound Shape: undetermined Color: Red (O) Decoration: none Condition: quite good. Angle between edge and side is visible but not sharp, might be marvering, wear or cold work.
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Lövö Grave A36













Item no.		Length (along the mandrel)	Ø (mm)	mandrel Ø first side (mm)	mandrel Ø other side (mm)	Notes
3.I		11,75	14,59	3,69	4,51	Technique: Wound Shape: Natural. Color: Teal (T) with red discoloration from reduction of copper. Decoration: bichrome stringer in Ligth (O) and Clear/uncolored (T) of the same type as in 3.II but in that case it has deteriorated by fire.






						Condition: Very good condition, with minimal signs of wear. Sharp edge on part of the perforation.
3.II		11,34	14,09 x 19,04 (16,5 6)	3.85	7,06x1 ,71	The diameter (16,56) is determined by the mean of the two measurements since the bead is flattened. Technique: Wound Shape: Natural. Color: Teal (T) with red discoloration from reduction of copper. Decoration: bichrome stringer in Ligth (O) and Clear/uncolored (T) of the same type as in 3.I but in this case it has deteriorated by fire. Condition: Deteriorated by heat and flattened.
4.I		6,92	10,29	2,67	2,84	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear. Possible fire deterioration.
4.II		5,80.	9,43	3,28	3,11	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.






4.III		8,16	11,24	4,45	4,76	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.IV		7,80.	10,99	3,78	3,22	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.V		7,31	10,27	3,58	3,41	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.VI		7,21	10,04	3,49	2,90.	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.VII		6,39	10,33	2,78	2,80.	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.




4.VIII		6,22	9,61	2,39	3,20.	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.IX		6,61	9,97	3,09	3,51	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.X		8,44	11,43	3,28	3,88	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XI		6,25	9,92	2,61	3,15	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XII		5,91	9,95	3,71	3,74	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

4.XIII		6,23	9,66	2,83	3,02	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XIV		7,47	9,78	2,47	2,32	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear. Possibly deterioration from heat.
4.XV		6,31	10,21	3,52	3,55	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XVI		7,62	10,09	3,33	3,78	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XVI 1		6,83	10,35	3,23	3,02	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

4.XVI II		7,57	10,44	4,29	3,61	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XIX		6,39	10,76	3,55	3,62	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XX		7,22	10,23	3,73	3,92	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
4.XXI		7,54	10,36	3,47	3,81	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.I		9,10.	10,74	3,44	4,13	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

5.II		7,45	10,62	3,47	3,84	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.III		7,37	10,71	3,53	3,75	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.IV		6,91	10,27	2,70.	3,34	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.V		6,53	10,05	3,07	3,19	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.VI		7,83	10,40	3,32	3,93	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

5.VII		8,14	11,05	4,17	4,20.	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.VIII		8,19	10,94	4,05	4,19	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.IX		7,08	10,71	3,68	3,36	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.X		7,37	10,51	3,38	3,53	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.XI		7,68	10,87	3,79	4,33	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.

5.XII		7,56	10,41	3,03	3,42	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.XIII		7,32	10,38	3,51	3,57	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.
5.XIV		8,01	10,63	4,91	4,77	Technique: Wound Shape: Marvered to a barrel shape. Color: Red (O) Decoration: none Condition: straight edges on the perforated side can be from coldwork, marvering or wear.