ARCHAEOLOGICAL INVESTIGATIONS ON THE SITES OF THE GLASSWORKS OF CENTRAL ESTONIA

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INTRODUCTION

The main glass-production area of the 18th century Estonia was located in the historic parishes of Kolga-Jaani, Põltsamaa, Kursi, and Äksi in Viljandi and Tartu counties. Here, in the neighbouring manors of Vana-Põltsamaa (Ger. *Schloss Oberpahlen*), Puurmani (Ger. *Schloss Talkhoff*), Kärevere (Ger. *Kerrafer*), and Laeva (Ger. *Laiwa*) seven glass-houses operated in the 1760s – 1780s (Fig. 1). In addition, a mirror-polishing workshop operated in Kamari and mirror-amalgamation workshop in Vana-Põltsamaa manor.

The earliest scholarly discussion on the industrial history of Central Estonia is written by Friedrich Amelung (1842–1909) who published an article in 1876 and a speech in 1892 (translation in Estonian published in 1999). The overall history of Estonian early industry is studied very little. The most comprehensive study so far is written by economic historian Otto Karma (1963). Very few scientific publications are written about glass production in the 18th century – in addition to glass-artist Maks Roosma's study (1969) only one article of popular science by geographer Endel Varep (1962). Glass production has been less appealing to researchers than the manufacturing of porcelain in Põltsamaa workshop, which operated in the territory of Vana-Põltsamaa manor in the years 1782–1800, and has been explored by several art historians (Keevallik 1972; 1975; Untera 2007).

Until now, archaeologists have paid no attention to the subject of glass production in Estonia. This is well indicated by the fact that only one of seven Central Estonian glassworks, Laashoone glass-house is listed as historic monument in the National Registry of Cultural Monuments (see http://register.muinas.ee). It has been formerly excavated for scientific purposes by M. Roosma and finds have reached the collections of Estonian History Museum (AM). In most cases, the exact location of glass-houses and their present condition were not known before the beginning of my field research.

Since 2010 I have studied the remains of glassworks in Central Estonia in order to find archaeological remains of the 18th century industrial boom. In addition to field surveys I started small-scale excavations on the site of Utsali glass-work in 2011 (Tvauri 2012). Andres Vindi, employee of the Department of Archaeology of Tartu University, and Allan Kima, director of Järvakandi Glass Museum participated in the field surveys of 2012.

I hereby introduce the data and finds collected in the fieldworks of 2010–2012 (excavations and field surveys). Interpretation and analysis of the material with the help of written sources is yet to be done in the future. Finds are held in the archaeology collections of Tartu University (TÜ) and Järvakandi Glass Museum (JKM). Next to M. Roosma's excavated material deposited in AM further finds gathered from the site of Laashoone glass-house are kept in Meleski Glass Museum, a private collection owned by Ville Dreving.

GLASSHOUSES OF THE VANA-PÕLTSAMAA MANOR

Utsali

The Utsali glass-house is located in the southern part of the historical Kursi parish, 10 km southwest from the main building of Puurmani manor, on the strip of mineral land in the middle of swamps and bogs (Fig. 1). It is now in the territory of Jüriküla village of the Puurmani municipality.

The first data about the Utsali glass-house in written records dates from the year 1761 and the glass-work is known to have operated until the year 1771 (Varep 1962, 199). The owner of Vana-Põltsamaa manor, Woldemar Johann von Lauw (1712–1786), founded also the Utsali glass-house. There is no written record regarding the production of the glass-house or the glassmakers work at Utsali. The site of the glass-work is marked on the Carl Gottlieb Rücker's map of the Governorate of Livland from the year 1839 (see excerpt in Tvauri 2012, fig. 1).

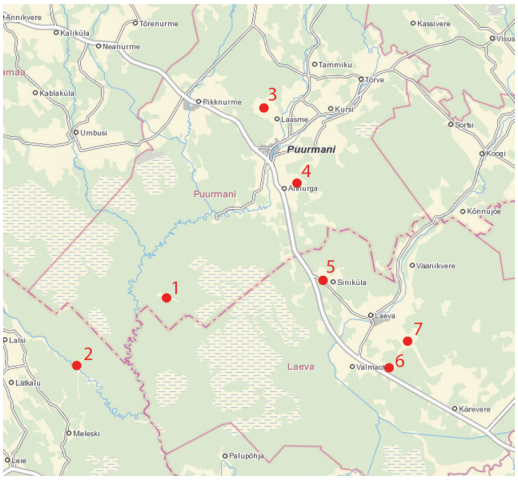

Fig. 1. Location of glass-works described in the article. 1 – Utsali, 2 – Laashoone, 3 – Laasme, 4 – Altnurga, 5 – Tõrna, 6 – Hoone, 7 – Haava.

Jn 1. Artiklis käsitletud klaasikodade asukohad. 1 – Utsali, 2 – Laashoone, 3 – Laasme, 4 – Altnurga, 5 – Tõrna, 6 – Hoone, 7 – Haava.

Map / Kaart: Andres Tvauri (on Estonian Land Board map.)

The exact location of the Utsali glass-house was determined in the year 2010. It is currently covered with natural forest of dense underbrush. The location is easy to identify due to glass-making waste that covers an area of approximately 1500 m^2. No remains of glass furnaces or other structures are visible on the ground. The centre of the remains of the glass-house is located at N 58°30'23.0", E 26°10'24.9".

Archaeological investigation of the Utsali glass-work began in 2011 when a detailed elevation map of the area was made using a total station, the character of the cultural layer was identified, and the location of a glass furnace was ascertained (Tvauri 2012). In 2011 only a part of the firing chamber, 0.5 m in length was unearthed. In 2012 the 1.5 m wide and 4 m long extension was dug to the existing trench to reveal the measurements and construction of the furnace (Fig. 2). The bottom of the 90 cm wide

firing chamber that was unearthed in 2011 appeared to extend southwards. The firing chamber has been at least 1.2 m long and up to three rows of bricks were preserved. Clay was laid between the bricks. In the southern part of the trench the brick walls of the furnace ended, but in the northern part they still extend to the unexcavated area. The bottom of the firing chamber was made of large cobblestones. The walls as well as the bottom side of the firing chamber were severely shattered due to the heat. Originally the greyish yellow sand that was surrounding the furnace had turned red. Numerous fragments of melting pots and glass residues were found inside the furnace and around it. From atop the furnace a Russian copper denga from the year 1731 was found.

Fig. 2. Bottom of the firing chamber of the glass-melting furnace in the excavation plot at the Utsali glass-house in 2012. View from the east.
Jn 2. Utsali klaasiahju kolde põhi 2012. a kaevandis. Vaade idast.
Photo / Foto: Andres Tvauri

All in all, 95 kg of glass producing waste was collected in 2011 and 2012 from the test pits and excavation trench, from the area of approximately 17 m^2. Examples of different types of waste are preserved in the archaeological collections of Tartu University.[1]

Laashoone

In 1764, W. J. Lauw founded a new glass-house 5.8 km southwest from Utsali. Laashoone (Ger. *Lasone*) glass-house was located in the forested area on the left bank of the Põltsamaa River, near Rõika in the Kolga-Jaani parish. The glass-house operated until the year 1775 (Amelung 1876, 5; 1892, 22, 24–25, 28). The site of Laashoone glass-house is located in the present Kolga-Jaani municipality, Lalsi village at N 58°28'12.3", E 26°6'3.73". No remains of buildings or furnaces are visible on the ground.

Already F. Amelung mentions glass objects found from the site of the Laashoone glass-house, in particular a small medicine bottle and a one inch long hand of a decorative figure. Amelung's argument according to which glassmakers used clay moulds is based on the finds from the site of the Laashoone glass-house (Amelung 1892, 25).

Max Roosma conducted excavations on the site of the Laashoone glass-house (1969, 77–79). Unfortunately, no report or other documentation has been preserved. There is, however, a representative collection of the glass waste collected during the excavations in the Estonian History Museum.[2]

An interesting find from the site of the Laashoone glass-house is a brick preserved in a private collection of Meleski Glass Museum (Fig. 3). It has the initials W and L (belonging to W. J. Lauw) along with a crown image on it and the number 1764, which is the founding year of the Laashoone glass-house. The brick has most likely lain in the walls of the glass-house.

[1] TÜ 1932.
[2] AM 18398.

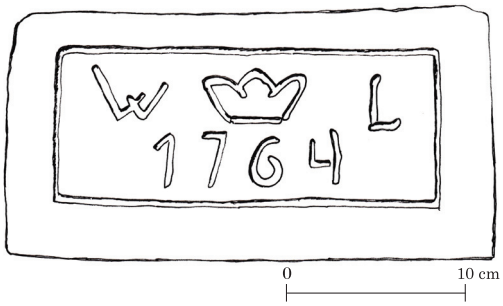

Fig. 3. *Brick with an inscription found at the Laashoone glass-work, now in Meleski Glass Museum.*
Jn 3. *Laashoone klaasikoja asemelt leitud kirjadega tellis Meleski klaasimuuseumis.*
Drawing / Joonis: Andres Tvauri

GLASS-HOUSES OF PUURMANI MANOR

In the 1760s two glass-houses were built on the territory of the Puurmani manor – owned by count Andreas Gotthard von Manteuffel (1714–1768). Written sources do not reveal, which of the two is earlier. According to archive records one glass-house has existed at least already in 1765 when a need to build a new glass-house is discussed. In the years 1767–1779 one of the glass-works of the Puurmani manor has been rented to Lauw. By the year 1782 both glass-houses of the Puurmani manor had ceased to operate (Varep 1962, 200).

It is not known whether the glass-houses had specific names. Archival records only refer to the glass-house of the Puurmani manor (Ger. *Talkhofschen Glashütte*). It is possible that the two glass-houses did not operate coevally.

Laasme

A glass-house known from archival records is situated in the present Puurmani municipality, in the kitchen garden of the Peetri farmstead, south and southeast from the buildings, in the Laasme village. Glass producing waste can be found on the ground that is centered at N 58°35'44.82", E 26°16'48.37". The diameter of the area covered with glass waste is approximately 100 m. According to a local villager there used to be piles of glass pieces that are flattened by now. In 2010 and 2011 a lot of glass producing residue was gathered from the site of the Laasme glass-house.[3]

Altnurga

The Altnurga glass-house was situated in the southern part of the present Altnurga village, 370 m east from the Tallinn–Tartu road. At present, there is a little hillock on a flat field created by Soviet time melioration.

Glass waste and pieces of bricks and roof tiles spread in an area of approximately 80 × 80 m, the centre locating at N 58°32'51.8", E 26°18'29.8". In 2012 I made 4 test pits, which enabled to conclude that the entire site of the glass-house has been destroyed by ploughing. In the depth of 40 cm from the ground, under the ploughed soil a natural moraine layer started. All glass-waste that reached the museum collections[4] has been gathered from the ground in the spring of 2011.

THE GLASS-HOUSES OF KÄREVERE AND LAEVA MANORS

The neighbouring manors of Kärevere and Laeva belonged to the Igelström noble family. The precise founding date of the three glass-houses that operated here is not known. In a letter from 1765 sent to W. J. Lauw probably by the owner of the Kärevere manor at the time, baron Harald Gustav Igelström (1730–1804), the launch of three glass

[3] TÜ 1968, JKM 758.
[4] JKM 759.

furnaces is discussed (Varep 1962, 200). Only two names occur in written sources: Tõrna (Ger. *Tirna*) and Haava (Ger. *Awaschen Hütte*).

In around 1777 W. J. Lauw rented the glass-houses of Kärevere and Laeva manors and brought glassmakers from Laashoone to work here and also hired more craftsmen from abroad. After the death of Lauw in 1768 Vana-Põltsamaa manor and all its enterprises were sold to pay the dept to the state. Tõrna along with another glass-house situated in the forests of the Kärevere manor (either Haava or Hoone) was rented out to the glassmakers that used to work there. Later, different entrepreneurs of Saint Petersburg and Riga rented the glass-house and eventually it was managed by Carl Philipp Amelung. All enterprises were closed down in 1807 (Amelung 1892, 37).

Tõrna

The Tõrna glass-house was established into the forested area of the Laeva manor in the historic Kursi parish (Fig. 1). Its location is marked on the Ludwig August Mellin's atlas (1798).

The site of the glass-house is located in the present Laeva municipality, Siniküla village, on a field northeast from the road leading from the Laeva village centre to the Tallinn–Tartu road. Glass producing waste is observable on the ground in an area with a diameter of approximately 120 m. The centre of dense find concentration is located at N 58°30'40.79", E 26°19'42.68". The spots with abundant brick fragments and granite stones probably indicate the sites of glass furnaces.

The Tõrna glass-house was founded in the 1760s and its production was rearranged by W. J. Lauw in 1777, who started to produce high quality transparent window glass (so-called Bohemian window glass) being the first in the whole territory of the Baltic governorates of the Russian Empire. Some time around 1782 Lauw started to produce mirror glass (Amelung 1892, 30–32; Varep 1962, 199–200).

No excavations have been conducted in the site of the Tõrna glass-house, all glass waste that has reached museum collections[5] has been gathered from the ground in the years 2010–2012.

Haava

The Haava glass-house was situated in the forested area of the Laeva manor in the Äksi parish. Its location is marked on the L. A. Mellin's atlas (1798). The site of the glass-house lies north from the houses of Valgehoone farmstead, in the flattened farming land, in an area of approximately 100 × 100 m, the centre of dense find concentration is located at N 58°28'38.88", E 26°24'57.22".

Pieces of burnt bricks, fragments of melting pots and glass residue were gathered from the ground.[6] In addition, a Russian copper kopeck from the year 1757 was found.

Hoone

The third glass-house operating on the territory of Kärevere-Laeva manor was situated in the Äksi parish next to the present Tallinn–Tartu road near the former Hoone farmstead. The Hoone glass-house is 2.2 km southwest from the Haava glass-house.

[5] JKM 757; TÜ 1915.

[6] TÜ 2006.

Information about how the glass-house was called when it was in use cannot be found from written sources.

The Hoone glasswork is marked on the L. A. Mellin's atlas (1798). The site of the glass-house is located in the present Laeva municipality, Valmaotsa village on the northern side of the Tallinn–Tartu road on a small hillock on flat farming land. The centre of the area covered with glass waste is located approximately at N 58°27'41.2", E 26°23'32.4". Several fragments of 19th – 20th century glass and ceramics can also be found from the ground. These come from the site of the Hoone farmstead. The buildings of the Hoone farmstead have been destroyed by Soviet time melioration.

All finds that have reached the museum[7] have been gathered from the ground. In addition to glass producing waste a fragment of porcelain with a cobalt decoration (Fig. 4) was discovered. The fragment seems to belong to a cup made in the porcelain manufacture that operated in the Vana-Põltsamaa manor 1782–1800 (*see* Keevallik 1972; 1975).

PRODUCTION WASTE FROM THE SITES OF THE GLASS-HOUSES

From the sites of the glass-houses five main types of waste were found: 1) fragments of products which had broken during annealing or later; 2) glass dripped during blowing or the moils from blowpipe or pontil rod; 3) fragments of melting pots made of fire clay; 4) fragments of sandstone parts of furnaces; 5) impurities that have clustered in the bottom of melting pots or gathered floating on top of the melted glass or other dross-like waste. Only the fragments of glass products are described below.

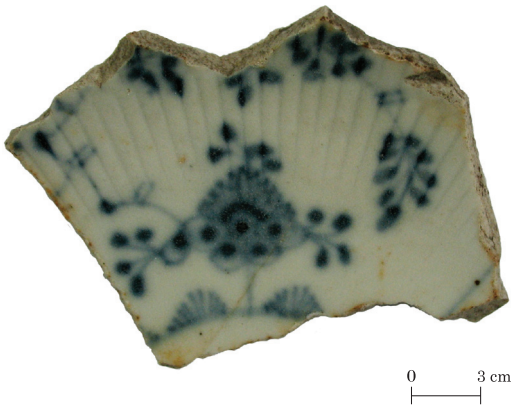

Fig. 4. Sherd of a porcelain cup, possibly a product of Põltsamaa porcelain manufacture, found at the Hoone glass-work.
Jn 4. Oletatav Põltsamaa portselanimanufaktuuris valmistatud tassi kild Hoone klaasikoja asemelt.
(TÜ 1987: 1.)
Photo / Foto: Andres Tvauri

Flat glass

According to written sources, the main production of the 18th century Estonian glass-houses was simple flat glass, which was used in house and coach windows and lanterns (AM D 296-1-68; Roosma 1969, 79). The majority of the waste found from the sites of the glass-works derives from the process of blowing, annealing and cutting of flat glass. The fragments of flat glass found are in average 2 mm thin. They are mostly greenish or slightly blue, made of so-called forest glass containing little bubbles.

According to written records W. J. Lauw started to make mirrors in the year 1781 (Roosma 1969, 80). Transparent flat glass of higher quality was produced in the Tõrna glass-house which is confirmed

[7] JKM 764; TÜ 1987.

also by the archaeological finds. Among the glass waste of Tõrna there were fragments of high quality transparent flat glass as well as drops and chunks with similar chemical composition.

In addition to the above mentioned types of flat glass fragments of pink or purple 6–9 mm thick transparent glass were found from the Utsali, Altnurga, Tõrna and Hoone glass-houses. These can be fragments of flat glass used for coach windows.

Bottles

According to the number of fragments, free-blown globular-form utility bottles were the most frequent type of vessels produced. In the 18th century mainly alcoholic beverages were stored in such bottles. Characteristic to the bottles of the 18th century is that the bottle mouths were reinforced with an applied simple glass collar below the rim and the bottoms were pushed up. Such bottle mouths have been obtained from the sites of the Utsali, Laashoone, Tõrna, Altnurga, and Hoone glass-houses. From the site of the Laashoone glass-work some fragments of larger bottles of a globular type have reached the museum.

Data about the sizes of the bottles can be obtained from the bottle seals – glass drops with stamped symbols and numbers placed onto the narrowing bottle neck. The requirement to equip bottles with a seal was imposed by the decree of the Senate of the Russian Empire from the 16th (25th) of September 1774 (Polnoe sobranie). The seal was supposed to grant that the product meets certain standards. It appears still that until the end of the 18th century Estonian glass-houses were not able to meet the requirements and only few bottles with seals were produced.

Until now, in Central Estonian glass-houses bottle seals have been found only from the Laashoone glass-house during M. Roosma's excavations (Roosma 1969, 77–78). During current investigations a bottle seal with an inscription (Fig. 5) was found from the site of the Tõrna glass-house.

In addition to globular utility bottles fragments of rectangular bottles have been found from the sites of the Laashoone, Utsali, and Tõrna glass-houses. Fragments of octagonal bottles have been collected from the sites of the Laashoone and Utsali glass-work.

Medicine bottles

Fragments of everted rims and bottoms give evidence of making small medicine bottles. Most common are small narrow cylindrical phials with a mouth narrower than the diameter of the bottle. Quite frequent are also phials with a rim with the same width as the bottle itself. Fragments of both types have been found from the site of Laashoone glass-house. Third, less frequent type of medicine bottles are small, round, with long neck and a disk placed under the bottom, forming a base. Distinctive bottom fragments of those phials have been found from the sites of the Laashoone and Laasme glass-works.

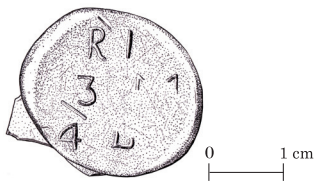

Fig. 5. Bottle seal found at the Tõrna glass-work.
Jn 5. Pudelimärk Tõrna klaasikoja asemelt.
(JKM 757: 5.)
Drawing / Joonis: Andres Tvauri

Decanters

Decanter bottles with a handle, characteristic to the 18th century have been produced at least in the Utsali glass-house. During the excavations a fragment of a handle of bluish green glass was found (Tvauri 2012, fig. 5: 4).

Drinking glasses

Numerous fragments found from all the sites of the glass-houses may belong to drinking glasses. Unfortunately, none of the fragments allows eliminating the possibility of being just a curved edge of a flat glass. Drinking glasses were standard products of the preterit glass manufactures.

From the sites of the Utsali and Laasme glass-houses fragments of drinking glasses widespread in the 18th century, made of transparent soda glass have been found. Similar fragments of drinking glasses have been found from the site of the Rekka glass-house.[8] As the vessel fragments have abrasions on them, it is probable that the vessels were used by glassmakers themselves.

Milk bowls

Milk bowls were glass bowls with a distinctive rim folded back outwards of the bowl. Larger vessels had a tubular rim (Tvauri 2012, fig. 5: 7). Edge fragments of the milk bowls have been found from the sites of the Utsali, Laashoone, Laasme, Altnurga, Haava, and Hoone glass-houses.

Such bowls were used to make sour milk or just let the milk rest in order to separate milk and cream. Estonian glass industry produced such milk bowls unchanging in their form until the beginning of the 20th century, indicated by numerous examples stored in museum collections.

Jars

Fragments of everted rims (Tvauri 2012, fig. 5: 8) characteristic to jars have been found from the site of the Utsali and Laashoone glass-houses. Jars to store food were produced already in the Estonian oldest, Hüti glass-house (Roosma 1966, fig. 145). Similar jars have been produced in several Estonian glassworks still in the 19th century (*see* Ruussaar 2006, 8).

Lab equipment

From the Laashoone, Utsali (Tvauri 2012, fig. 6: 1–3), Tõrna, and Haava glass-houses, small glass pipes with a diameter of 0.7–1.5 cm have been discovered. Similar 18th century pipes have been found from the Lehtse glass-house (AM 17968 L IV: 43). Most likely they derive from an alembic cap (see Roosma 1966, fig. 139, 141) or alembic, both used for distillation.

CONCLUSIONS

During the fieldwork in 2010–2012, the exact locations of the 18th century glass-works of Utsali, Laasme, Altnurga, Tõrna, Hoone, and Haava were documented for the first time. The site of the Laashoone glass-house has been researched before. Among glass

[8] AM 17968: LIV 64–68.

producing waste collected from all the sites mentioned above there were several fragments of different products, which allows us to draw conclusions about the production of the facilities.

According to archaeological finds the main production article in all the researched Central Estonian glassworks in the 1760s – 1780s was flat glass. In addition, fragments of different bottles, lab equipment and a decanter were found. The production of all the researched glassworks has been very similar, made of so-called forest glass of low quality, impossible to distinguish in any way. Production waste of transparent, higher quality window and mirror glass was found only from the site of the Tõrna glass-house.

Archaeological data and finds gathered affirm and complement scarce written resources in terms of the production of the 18th century glassworks. Written sources provide information about the assortment of the production, information about the appearance and quality of those products can only be obtained with the help of archaeology.

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Polnoe sobranie = Полное собрание законов Российской империи, с 1649 года. Том XIX, 1770–1774. Санкт-Петербург, 1830..

ARHEOLOOGILISED UURINGUD KESK-EESTI 18. SAJANDI KLAASIMANUFAKTUURIDE JÄÄNUSTEL

Andres Tvauri

18. sajandil oli peamiseks klaasitootmise piirkonnaks Eesti alal ajaloolise Viljandimaa põhja- ja Põhja-Tartumaa lääneosa, kus Kolga-Jaani, Põltsamaa, Kursi ja Äksi kihelkonnas, Vana-Põltsamaa, Puurmani, Kärevere ja Laeva mõisade maadel, tegutses 1760.–1780. aastatel seitse klaasikoda. Seni on Eesti tööstuse varane ajalugu arheoloogide huviorbiidist täiesti välja jäänud. Enamiku klaasikodade täpne asukoht ja nende seisukord ei olnud enne käesolevate välitööde algust teada.

Vana-Põltsamaa mõisa maal töötasid Utsali ja Laashoone klaasikojad. Utsali klaasikoda paikneb Kursi kihelkonna lõunaosas keset soid ja rabasid (jn 1). Klaasikoja ase on kergesti tuvastatav maapinnal, umbes 1500 m² suurusel alal, leiduvate klaasitootmisjääkide põhjal, ahjude või klaasikoja muude rajatiste jäänuseid maapinnal tänapäevaks näha pole. Arheoloogilised uuringud Utsalis algasid 2011. a, mil ala plaanistati, tehti kindlaks kultuurkihi iseloom ja tuvastati ühe klaasiahju asukoht. 2012. a laiendati olemasolevat kaevandit 4 m pikkusel alal 1,5 m laiuselt lõuna poole, et selgitada välja klaasiahju kolde mõõtmed ja konstruktsioon (jn 2). Selgus, et kolle on olnud vähemalt 1,2 m pikkune ja säilinud kuni kolme telliserea kõrguselt. Kolde seest ja ümbrusest leiti arvukalt sulatuspottide katkeid ja klaasijääke ning Vene vaskdenga aastast 1731. Kokku on Utsali klaasikoja kaevamistel kogutud šurfidest ja kaevandist umbes 17 m² suuruselt alalt 95 kg klaasitootmisjääke, millest säilitatakse näidiseid.

1764. a asutati Kolga-Jaani kihelkonda Rõika lähedale klaasikoda, mis sai Laashoone nime ja töötas 1775. aastani. Hoonete ega ahjude jäänused maapinnal jälgitavad pole. Laashoone klaasikoja asemel tegi 1960. aastatel kaevamisi M. Roosma. Huvitav leid on Meleski klaasimuuseumis säilitatav tellis (jn 3), millel on klaasikoja asutamise aasta 1764, W. J. Lauwi initsiaalid W L ja krooni kujutis. Tõenäoliselt on see tellis paiknenud klaasikoja hoonel.

Kursi kihelkonnas asuva Puurmani mõisa alale rajati 1760. aastatel kaks klaasikoda, neist üks paikneb Laasme külas. Klaasitootmisjääke leidub maapinnal u 100 m läbimõõduga alal. Kohaliku elaniku andmetel olevat klaasitükke siin varemalt olnud lausa hunnikutes. Laasme klaasikoja asemelt õnnestus 2010. ja 2011. a korjata hulgaliselt klaasivalmistamisega seotud jääke.

Altnurga klaasikoda paiknes Altnurga küla alal, praegusest Tallinna–Tartu maanteest 370 m ida pool madalal künkal. Klaasikoja asemel on praegu põld. Maapinnal on klaasitootmisjääke ning telliste ja katusekivide tükke u 80 × 80 m suurusel alal; kogu klaasikoja ase on kuni u 40 cm sügavusel paikneva loodusliku savika moreenini läbi küntud.

Kärevere ja Laeva mõisade alal tegutsenud kolme klaasikoja asutamise aeg pole täpselt teada. Nimeliselt on kirjalikes allikates mainitud vaid Tõrna ja Haava klaasikoda.

Tõrna klaasikoda oli rajatud Kursi kihelkonna alale Laeva mõisa metsa (jn 1). Tänapäeval paikneb klaasikoja ase Siniküla külas. Klaasitootmisega seotud jääke ja leide võib maapinnal jälgida ligikaudu 120 m läbimõõduga alal. Kohati on põllus näha telliste ja maakivide rohkeid kohti, mis arvatavasti on kunagiste klaasiahjude asemed.

Haava klaasikoda paiknes Äksi kihelkonna alal Laeva mõisa metsas. Tänapäeval jääb see Laeva küla Valgehoone talu hoonetest vahetult põhja poole põllule, u 100 × 100 m suurusele alale. Maapinnal on näha põlenud telliste tükke, sulatuspottide katkeid ja klaasi jääke. Lisaks õnnestus siit korjata vasest Vene kahekopikaline vaskmünt aastast 1757.

Kolmas Kärevere-Laeva mõisa maal tegutsenud klaasikoda paiknes Äksi kihelkonnas kunagise Hoone talu juures. Tänapäeval asub klaasikoja ase Laeva vallas, Valmaotsa küla alal Tallinna–Tartu maanteest vahetult põhja pool madalal künkal. Klaasikoja asemel on praegu põld, kus maapinnal on näha rohkelt klaasitootmisjääke. Klaasikoja aegseks võib pidada ka sinise koobaltmaalinguga portselannõu kildu (jn 4). Katke välimuse põhjal võib arvata, et see pärineb tassist, mis on valmistatud Vana-Põltsamaa mõisas tegutsenud portselanimanufaktuuris.

Suurem klaasikodade asemelt leitud klaasijäätmetest on tekkinud akende klaasimiseks kasutatud tahvelklaasi puhumise, lahtilõikamise ja jahutamise käigus. Lihtsa tahvelkaasi kilde on leitud kõikide siinkäsitletavate klaasikodade asemetelt. Leitud tahvelklaasi kildude paksus on keskmiselt 2 mm; tegemist on roheka või kergelt sinaka nn võsaklaasiga, mis sisaldab väikseid mullikesi.

Kõrgema kvaliteediga värvitu läbipaistev peegliklaas toodeti Tõrna klaasikojas, mis nähtub ka arheoloogilistest leidudest. Tõrna klaasijäätmete hulgas on nii kvaliteetse värvitu läbipaistva lehtklaasi kilde, kui sama koostisega klaasi sulandeid ja kamakaid. Lisaks on Utsali, Altnurga, Tõrna ja Hoone klaasikodade

asemetelt leitud 6–9 mm paksuse roosaka või lillaka värvivarjundiga läbipaistva lehtklaasi katkeid. Võimalik, et seda valmistati tõllaakende klaasimiseks.

Kildude arvu põhjal otsustades valmistati anumatest enim tarbe- ja veinipudeleid. 18. saj pudelitele on iseloomulik vaba käega ümber suudme keeratud kitsas, ümara või lintja läbilõikega suudmevõru ja sissepoole vajutatud põhi. Selliseid suudmeosasid on saadud Utsali, Laashoone, Tõrna, Altnurga ja Hoone klaasikodade asemetelt. Laashoone klaasikoja asemelt on muuseumi jõudnud ka mõned suuremad pudelite katked, mis kuuluvad kerakujulistele pudelitele.

Andmeid tarbepudelite mahu kohta annavad pudelimärgid – pudelite ahenevasse ülaossa paigutatud klaasitilgad, millesse oli surutud teksti ja sümbolitega templijäljend. Kesk-Eesti klaasikodadest oli pudelimärke seni leitud vaid Laashoonest M. Roosma kaevamiste käigus. Käesolevate uuringute käigus leiti Tõrna klaasikoja asemelt üks kirjadega pudelimärk (jn 5).

Lisaks silindri- ja tilgakujulistele tarbepudelitele on leitud neljatahuliste pudelite katkeid Laashoone, Utsali ja Tõrna klaasikodade asemetelt. Kaheksatahuliste pudelite kilde on kogutud Laashoone ja Utsali klaasikodade paiknemiskohtadelt.

Väikeste apteegipudelite valmistamisele viitavad selliste pudelikeste lapikuks vajutatud suuosade ja põhjade katked. Kõige arvukamaks tüübiks on silinderja kujuga apteegipudelikesed, mille suudmeosa on pudeli läbimõõdust kitsam. Teiseks apteegipudelite põhitüübiks olid väikesed silindrikujulised pudelikesed, mille läbimõõt on ligikaudu sama suur kui serva läbimõõt. Mõlema tüübi kilde on saadud Laashoone klaasikoja asemelt. Kolmandaks, eelmistest vähem levinud tüübiks olid väikesed, ümara kere ja pika kaelaga pudelikesed, mille alla oli pandud klaasist ketas jalaks. Selliste pudelikeste iseloomulikke põhjakatkeid on saadud Laashoone ja Laasme klaasikodadest.

Sangaga karahvine on valmistatud vähemalt Utsali klaasikojas. Sellest on tõendiks klaasikoja kaevamiste käigus leitud sinakasrohelisest klaasist sang.

Arvukalt leidub klaasikoja leiumaterjali hulgas kilde, mis võivad pärineda joogiklaasidest. Utsali ja Laasme klaasikoja asemelt on leitud läbipaistvast värvitust soodaklaasist joogiklaaside kilde. Samasuguste joogiklaaside katkeid leiti ka Rekka klaasikoja kaevamistel. Kuna esemetel on näha kulumisjälgi, näib olevat tegemist klaasimeistrite kasutatud esemetega.

Piimakausid olid klaaskausid, mille serv on iseloomulikult väljapoole maha keeratud. Suuremate nõude serv oli seest õõnes. Piimakausside iseloomulikke servakilde on leitud Utsali, Laashoone, Laasme, Altnurga, Haava ja Hoone klaasikodade asemetelt. Klaaspurkidele iseloomulikke sirgelt välja poole keeratud servade kilde on kogutud Utsali ja Laashoone klaasikodade asemetelt.

Laashoone, Utsali, Tõrna ja Haava klaasikodadest on leitud katkeid klaasist torukestest läbimõõduga 0,7–1,5 cm. Mujalt Eesti 18. saj klaasikodade asemetelt on selliseid leitud nt Lehtsest. Kõige tõenäolisemalt pärinevad sedalaadi torukesed destilleerimiskuplist või retordist, mida mõlemaid kasutati destilleerimiseks.

Uuritud klaasikodade tooted on olnud omavahel äravahetamiseni sarnased, valmistatud roheka tooniga madalakvaliteedilisest nn võsaklaasist. Vaid Tõrna klaasikoja asemelt leiti kvaliteetsema värvitu peegliklaasi valmistamisel tekkinud tootmisjääke. Kogutud arheoloogiline aines kinnitab ja täiendab Kesk-Eesti 18. saj klaasikodade toodangu kohta teada olevaid väheseid kirjalike allikate teateid. Viimastest on üldiselt teada vaadeldavate klaasikodade toodangu sortiment, kuid toodete välimuse ja kvaliteedi kohta saab teavet vaid arheoloogiliste leidude abil.