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Glass-working on Coppergate, York : An interim report

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The Coppergate excavations have produced evidence for many industries; wood, bone and metal working, including the minting of coins. Towards the end of the excavations came evidence of yet another craft, the making of glass.

Although considerable numbers of objects made of glass^{are} found on Roman, Saxon and Viking sites, there is very little known about how or where the glass was made, so the Coppergate discovery is an important one.

As with other industries, no complete workshop waiting for its owner to return was found; instead bits of rubbish thrown out by the glassmakers and the remains of the workshop after it had been cleared and levelled for rebuilding were discovered. Although the remains are rather scrappy a surprising amount of information can be extracted from them.

The most substantial find was an area of very intense burning, paved with re-used Roman tiles; This is interpreted as the base of the glass-melting furnace. Its date was not certain so samples were taken from it by

of Newcastle University and their thermo remanent magnetism measured to provide a date of c. 900 AD, the heyday of Viking York. After it went out of use, the furnace was dismantled so the area where it stood could be redeveloped. Pieces of its superstructure, more re-used Roman brick and tile, much of it with pools and runs of glass adhering, were found in contexts around the furnace base and just post-dating it. The pieces are not sufficiently large to allow the shape or size of the furnace to be reconstructed but they are evidence that the base had a superstructure which had been used to melt glass.

The furnace was not one vast tank of molten glass but enclosed an area where pots of glass were heated and melted. Many pieces of these pots have been found with a thin layer of glass still adhering to the inside. Some of them have glassy deposits on their out-turned rims and on the outside of the pot, the remains of dribbles lost as glass was removed from the pot. When

these potsherds were first found they were thought to be some sort of glazed pottery, a very strange find for Viking contexts. However a pot base turned up containing a pool of glass about a centimeter thick so the mystery was solved - they were glass-melting crucibles rather than glazed pottery. The pots are of a fairly fine buff or red fabric and are wheel-turned, which is itself unusual at this date. They were probably not made in York but their exact place and even date of manufacture is not yet known.

In addition to the glass in the pots, other scrap glass has been found. Instantly recognisable are the thin tapering dribbles of molten glass that solidified where they fell; a number of them were found on the ground near the furnace base. There are also irregularly shaped lumps of glass, pieces broken out of the pots, good glass but obviously not parts of finished objects. There are also lumps that look like solidified glassy froth. This formed on surface of the glass melt as impurities rose to the surface, carried by bubbles of gas.

All the finds discussed so far are evidence for glass melting, which is a far less complicated process than actually making glass. Broken and scrap glass (known as cullet) has always been remelted and reused and much early glass working is thought to have been simply the collection and reworking of glass, rather as the glass collected today in Bottle Banks is recycled. However, among the finds from Coppergate is evidence that glass was being made here from its raw materials. These glassmaking raw materials were quartz, usually in the form of sand, and natron, a naturally occurring form of soda ash. Later on in medieval times the natron (which came from the eastern Mediterranean area) was replaced by potash, which was produced locally from plant ashes. Analyses of the glass in the pots from Coppergate by Robert Brill of the Corning Glass Museum and John Hunter of Bradford University have shown that the glass being made here was the older, soda type.

Glass making from raw materials was a two-part process. First the sand and natron were mixed together and heated in an oven or subsidiary furnace

for several days, a process known as fritting. All the time the material was raked over to keep it well mixed and help the materials to react with each other. It was important that they did not melt at this stage so the gases produced could escape easily. In the second stage this frit was broken up, put into pots together with the cullet and melted in the main furnace.

The best evidence for actual glass making on Coppergate is a piece of partly vitrified material, truly glassy on the top surface but grading through partly reacted quartz to almost unaltered sand on the bottom. This was most probably part of the batch being fritted which got locally overheated and melted too much, too early on in the process. It was then discarded rather than being put in the pot and melted to produce glass. In addition there are other incompletely vitrified deposits on some of the glass melting pots which suggest that frit was being put into them and so was most probably being made on site, supporting the suggested origin for the material described above.

These descriptions of the evidence for glass making and melting on Coppergate are only first impressions gleaned from a superficial examination of only a proportion of the finds. Further work and a more detailed consideration of all the available material will allow a fuller and more definitive description of the processes being carried out on the site to be made.