

Ancient Monuments Laboratory
Report 82/93

GLASSWORKING DEBRIS FROM THE
GARDENS OF BRODSWORTH HALL,
YORKSHIRE

Catherine Mortimer BTech DPhil

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Summary

Fragments of glass and glassworking debris were recovered from a garden scheme at the house. They are probably nineteenth- or early twentieth-century, and may have been recovered from a local glass house. A blue glass was analysed and shown to be soda glass.

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Glassworking debris from the gardens of Brodsworth Hall, Yorkshire

Catherine Mortimer

Three pieces of high-temperature industrial debris were submitted by Andy Wimble (Landscape Branch) for investigation. They had been used as part of a decorative scheme in the gardens of Brodsworth Hall, possibly during an extensive remodelling of the Edwardian period.

The pieces were identified as fragments of ceramic debris (?furnace or tank wall), slag and waste from a glassworking process. The source of this material was sought using archaeological and scientific information.

Denis Ashurst kindly visited the Hall and examined the relevant areas. He states that the material is likely to have originated in a late 19th or early 20th century glassworks. Four small decorative features are likely to have required 'about a normal farm-cart load' of glassworking debris for their construction.

Samples

1) A piece of furnace or tank wall, *c.* 70-80mm thick, sides irregular (weight = *c.* 711g). On one side, an intense heat has caused the fabric to alter drastically; a reddish-brown slag deposit with a glass-like fracture overlies a hard white layer. On the other side, there is a layer of strongly-tinted blue glass (5-10mm thick) which is in a good state of preservation, although slightly iridescent and cracked. The ceramic fabric itself is grey and highly durable.

Chemical analysis of the glass (Energy-dispersive X-ray analysis):

Percentage oxides

Na ₂ O	8.8
MgO	5.7
Al ₂ O ₃	1.9
SiO ₂	64.7
S	0.3
CaO	15.4
K ₂ O	0.4
Fe ₂ O ₃	0.3
Total	97.9

Not detected: P₂O₅, Cl, TiO₂, Cr₂O₃, MnO, CuO, SnO₂, PbO, Co

This is therefore a relatively pure soda glass, with rather low soda and high lime content. The lack of alkali in the form of soda is not compensated for by high potash levels.

A small number of published analyses show that the major oxide composition of this glass is comparable with several window and bottle fragments from seventeenth- and eighteenth-century glasshouses in south Yorkshire (Ashurst 1992, App B). However, a blue glass seventeenth- or eighteenth-century sample from Bolsterstone (*ibid*) has much higher soda levels than the Brodsworth example and low levels of lime, alumina and magnesia; this

composition is quite similar to those of seventeenth- and eighteenth-century soda vessel glass made and used in the south of England (Mortimer 1993; Mortimer 1991). Unfortunately, no nineteenth- or twentieth-century glass samples from the south Yorkshire area have been analysed.

Cobalt was sought during the analysis but was not detected. The source of the colouration of the blue glass is therefore still unresolved. It may be possible that iron oxides were the significant colouring agent here; a strongly reducing atmosphere can give a blue colour. However cobalt may be present at very low levels (below the level of detection of the analytical system) and still cause strong colouration. *c.* 0.17% cobalt oxide was sufficient to give the Bolsterstone example (mentioned above) a blue colouration; this is probably below detection limits of the energy-dispersive system used for the Brodsworth sample.

2) A piece of pale green glass attached to an area of slagging which may be the remains of a highly-bloated piece of crucible or furnace (weight = 67g). The glass is rendered opaque by the presence of hundreds of tiny elongated bubbles (mostly less than 1mm in length, although a few are 2-3mm in length). The crucible or furnace material has been so intensely heated that it too is very porous, although in this case the bubbles tend to be larger (*c.* 2-8mm) and rather more spherical. The colour change, from green to dark grey is the clearest indicator of the junction between glass and former crucible - many of the lines of bubbles run through both materials.

3) A piece of glassworking slag or scum (weight = 119g). Grey, very irregular, areas of ropey slagging and other areas with very large bubbles, some very elongated. Very glassy surfaces in some areas.

Discussion

In the main, the samples supplied by Andy Wimble appear to be representative of the range of material found at the site. In addition to the types mentioned above, Mr Ashurst suggests that white enamel glass may have been present. He also comments that the material on site was probably the waste at the end of a production run, because of the high degree of crystallisation. The wall thickness of the ceramic elements and their lack of curvature further suggest that this is material from failed tanks or furnaces, rather than crucibles.

The identification of the most probable source of the Brodsworth material is not easy. Several Yorkshire glasshouses were active during the post-medieval period, although none of them are very close to this site. Mr Ashurst thinks that one of the three glasshouses at Mexbrough could be a likely candidate (Ashurst 1992, nos 21-23), in view of the type of material involved.

References

Ashurst D 1992 'Glassworking in South Yorkshire' (University of Sheffield Publications)

Mortimer C 1991 'Analysis of medieval and post-medieval glass from the City of London' Ancient Monuments Laboratory Report 135/91.

Mortimer C 1993 'Analysis of post-medieval glass and glassworking debris from Old Broad Street, City of London' Ancient Monuments Laboratory Report 52/93.