HIGH MEDIEVAL GLASS PRODUCTION IN THE CENTRAL GERMAN LOW MOUNTAIN RANGES

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In grateful memory of Claus Chwalczyk (†) – forestry expert and authority on the Reinhardswald

INTRODUCTION

The archaeological exploration of medieval and later glassworks in Europe has increased during the last two decades. In Germany most of the research work was concentrated on well-known production areas in the Southwest or, for example, in Speessart (Krimm 1982; Loibl 1996), Kaufunger Wald (König and Stephan 1987; Sippel 1987; 2001), Bramwald (Schröder and Schröder 1982; Stephan 1990a; 1990b; 1998; Stephan et al. 1993), Solling, Hils (Leiber 1990/91; 1994) and adjoining woodlands in Lower Saxony (Bloss 1977; Schröder and Schröder 1982; Stephan 1990b). In future new technological evidence can be expected from glassworks in the Bavarian Fichtel Gebirge (P. Steppuhn and G. Zeh pers. comm., Autumn 2003).

On the initiative of the Archaeological Board of Hesse and a number of interested volunteers, large-scale surveys of the woodlands in Northern and Central Hesse were carried out in the 1990s. On this basis at least two new ‘glass landscapes’ could be postulated in the Reinhardswald (Buthmann and Zickgraf 2003; Henne 2001; Recker 2002a; 2003a; 2003b; 2003c) and Taunus (Berg 2000; Schmenkel 2003; Steppuhn 2001; 2002; 2003a; 2003b; Wächtershäuser 2003). In 2000 the Kommission für Archäologische Landesforschung in Hessen (KAL) incorporated glass research in Hesse into a long-term interdisciplinary research program on ‘Economic Archaeology in the German Low Mountain Ranges’ (Recker 2002b, 215).

This paper is restricted to new aspects of the high medieval glass production in the north Hessian Reinhardswald.

THE REINHARDSWALD

At present the Reinhardswald covers an area of nearly 60km² (Bonnemann 1984; Chwalczyk 2000; Jüger 1951; Koch 1998; Rapp 2002; Schenk 1996). A diversified cultural landscape with a wide range of vestiges of medieval and later economic activities is well preserved in its northern part. Deserted medieval villages, extensive field systems, traces of open digging, carbonising furnaces and charcoal works, shaft and smelting furnaces as well as ironworks and more than 50 glassworks (Henne 2001) give a general idea of pre-industrial economic processes in the area.

Scientific analysis of archaeological finds as well as written sources from the Middle Ages can help us to answer at least some of our questions. They help us to gather information on the selection of raw materials, give us an insight into its processing as well as firing and melting techniques. With regard to medieval written sources we have to mention Theophilius Presbyter’s famous Schedula diversarum artium (Brepohl 1999) in the first place. It was written around 1122/23 in the imperial abbey of Helmarshausen which is located at the north-western edge of the Reinhardswald. In volume two a comprehensive description of the contemporary manufacturing process of glass is given, which underlies major parts of our knowledge of high medieval glass manufacture up today.

The archaeological part of the Reinhardswald project was concentrated on a glassworks site called Heiderkopf next to the village of Gieselwerder (FIG. 1). Apart from archaeological remains, historical records were studied as well as all kinds of interactions, interdependences and dynamics resulting from economic activity at the site. The non-archaeological part of the project is concentrated on the close relationship between three central points: natural resources, the environment and society. It is aimed at a diachronic account reflecting all the elements, general structures and specific frameworks of economic activity in the Reinhardswald.
The exploration of the Reinhardswald region is conducted by KAL, the Archaeological Board of Hesse, the University of Bonn – Department of Geography, Division Historical Geography, and the University of Würzburg – Department of Mineralogy.

THE HEIDERKOPF SITE

Topography and Archaeology

The Heiderkopf glassworks (FIGS 2, 3) was located on the south of a plateau on a steep slope. It was linked to the local road system by a footpath that passed the Reinhardswald in a north–south direction. The bank of the Weser river could be reached via a path leading west–east that crossed the north–south communication a few kilometres south of the plateau. The plateau and parts of the adjoining steep slope were investigated by means of a geomagnetic survey, which showed that the glassworks had a maximum extent of 90m². A smelting furnace was located in the middle of the production site and three anomalies lying to its north-west and west could be identified as rubble and clay pits. A fourth pit was discovered in front of the flue. South-east of the furnace a large number of local sandstones had been piled up. Their size corresponded to that of the stones used in the inner structure of the furnace. Following the slope downhill a number of rubbish heaps could be made out south-west of the glassworks covering an area of about 180m². The western part of the rubbish heaps had been destroyed by a modern forest path. The necessary water supply was guaranteed by a nearby spring that even today is periodically water bearing.

Most striking was an oval shaped – c. 7x6m – large accumulation of local sandstones that once had formed the glass furnace. Its dome and the front of the flue had collapsed, but the foundation, parts of the inner and outer masonry, the smelting chamber as well as the back part of the flue with a vault were well preserved.

The furnace had been built on a layer of light grey unfired clay of non-local origin. The same clay was found in one of the pits south-west of the furnace. The foundation and the outer masonry (FIG. 4) had been constructed with large – c. 0.7x0.4m – local sandstones whereas distinctly smaller sized stones – c. 0.25x0.25m – had been used for the erection of the inner structures of the furnace. The walls had been preserved up to a maximum height of 0.8m.

FIG. 2 The glassworks from the south; © Landesamt für Denkmalpflege Hessen, Archäologische und Paläontologische Denkmalpflege

FIG. 3 The glassworks from the east; © Landesamt für Denkmalpflege Hessen, Archäologische und Paläontologische Denkmalpflege

FIG. 4 Foundation, outer masonry (front) and part of collapsed flue (rear) of the glass furnace; © Landesamt für Denkmalpflege Hessen, Archäologische und Paläontologische Denkmalpflege
The glass furnace was aligned to the direction of the wind. Its flue had a clear height of 0.4m and was covered by a vault that was well-preserved in its rear part. Ash had been temporarily stored in an oval-shaped, 2×1.6m, working pit in front of the opening of the flue. It contained about 1 cubic metre of ashes from the last firing.

The smelting chamber was c. 1×0.5m, had no bench and had been covered by a dome originally. The stones of the inner walls showed clear signs of heat damage; they were vitrified and completely covered with glass. At two points the walls had obviously been repaired. Parts of the dome walls were found lying within the smelting chamber. The smelting chamber’s filling consisted of an unidentified vitrified compound and slag (Fig. 5). Questions concerning the existence of a chimney or openings in the outer walls cannot be answered.

At the back of the furnace a small store room had been built, that was accessible from the outside only (Fig. 6). Its inner surface covered only 0.35m² with a floor made of tamped loam. Comparable features are known from several glassworks sites (e.g. Boss and Wamser 1984, 157, fig. 111; Leiber 1990/91, 521, fig. 5; 1994, 18, fig. 2; Stephan 1990a, 132, figs. 4–7, 23, 24; Steppuhn 2003b, 189).

The number of finds was rather small. Only a few drops of glass, pieces of glass flux, a small quantity of glass sinter, one fragment of a crucible and some earthenware potsherds of two baggy pots (Kugeltopf) and a jug/bottle were found. In all probability the pottery is of local origin and had been produced in the nearby villages, now deserted, of Bensdorf or Thonhausen next to Gotbsüren in the 13th century (cf. Desel 1978; Leinweber 1982; Stephan 2000, 236).

Production Engineering, Trade and Environment

One of the most striking features of the Heiderkopf excavation is surely that the glassworks had only one furnace. It is very clear that the operation of a ‘one-furnace-glassworks’ has far-reaching consequences with regard to medieval glass-production procedures in the Reinhardswald. Because of the lack of any working furnace and/or annealing oven, as well as the structural characteristics of the glass-smelting furnace, the most sensible conclusion we can come to is that only raw glass had been produced there. This is why we have to think of a differentiated production system resulting in a spatial separation between the fabrication of raw glass and its processing to vessel glass or flat glass wares. Research on this matter is still in progress in the Reinhardswald, but we have evidences for such a way of production engineering in the Bohemian Forest (Cerná 2003).

The length of time a glassworks was in use in the Reinhardswald cannot be answered in general. Three variables are significant: the structural quality of the furnace, a sufficient supply of firewood and the availability of all required raw materials. The extensive consumption of wood made it necessary to shift the glassworks from one forest district to another. Historical geographical research on the Reinhardswald (Jäger 1951; Schenk 1996) shows that the wooded area shrank in the 13th century. Only the growing number of deserted villages and restrictions of the rights of users by the local aristocracy led to an increase of woodland in the early 14th century. According to secondary literature (e.g. Bonnemann 1984) a glassworks moved from one district to another in a 10–15 year rhythm. Based on written sources of the 15th–18th century we know that the Reinhardswald glassworks changed site within a period of approximately seven years (Dix and Sauer 2001). We do not have comparable data for the 13th/14th century yet, but what is clear is that the Heiderkopf glassworks had been in use for a much shorter period than this.

Prospects

Future research work will be concentrated on the interrelations between the exploitation of natural resources, the environment and society (Recker 2002b, 214). As already noted one aim should be to take into account all aspects of economic activity in the Reinhardswald, and to explore the resulting interactions. In addition we have to examine the relative importance of the natural landscape.
and the social structures in these economic activities. Thus the Heiderkopf glassworks can be used as a peg on which to hang questions concerning the human management of resources and the interaction of environment and society.

CONCLUSIONS

The research projects in the Reinhardswald and in the Taunus show that in regard to high medieval glass production a lot of research work remains to be done. One aspect of this is that the scientific analyses of the glass finds and the pottery remain to be completed. After two years of intensive research work we still can answer only some of the questions raised.

The excavations and accompanying studies gave us an insight into new structural aspects of high medieval glassworks. Most remarkable is the ‘one-furnace-glassworks’ and the spatial separation between the fabrication of raw glass and its processing. It is worth stating at this point that this interpretation stands in clear contradiction to traditional opinions. Consequently the future aims of the glass research projects in Hesse are to capture more data at different places within the research areas, to document their effect on the environment and to uncover their repercussions on the society. In doing so it should be possible to get a representative impression and depiction of essential aspects of the economic systems related to glassworks and their products.

REFERENCES


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