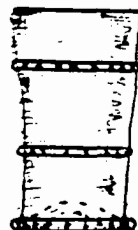


GLASSMAKING IN GLOUCESTERSHIRE

by HERBERT PENN



Most English glass has been made in London, Bristol, Stourbridge, Birmingham, the area round Newcastle-on-Tyne, Manchester, the Sheffield area, and of more recent years the St. Helens district of Lancashire. In these areas the basic ingredients - silica (sand), potash and lime - were melted into glass 'metal' at temperatures of about 1200° C, and as the metal cooled window glass, bottles and vessels were fashioned. Some glasshouses produced one or two of these categories, rarely all three. Elsewhere glass has been produced, but in more modest ways, and in this Gloucestershire (as it was prior to 1973) is no exception. It can claim the distinction of having two "Forest Glasshouses" worked by Huguenot emigres, later one of the first coal-fired glass furnaces, and then one of the first glasshouse 'cones'.

Roman remains are extensive in the County and glass, and glass fragments, have been found. It is certain that most was imported from the Continent, probably made at authenticated furnace sites in what we now know as France and Germany. A few years ago experts said that no Romano-British furnace sites had been found. Now the position has changed. Warrington (Lancs.), Caistor (Norfolk), Mancetter (Warwickshire) and Middlewich (Cheshire) have been accepted as furnace sites dating from Roman times, indicating that glass was made in England, though maybe not in Gloucestershire.

In medieval times much the same uncertainty exists. Clear glass made in the Weald was used in stained glass windows in our cathedrals and parish churches. Coloured glass - the blue, the red which was clear glass flashed with red, and the yellow which was flashed or tinted clear glass - was imported from the Continent, mostly from Lorraine and Normandy, some from Burgundy and Hesse. It is tempting to picture Barnard Flower, Glassmaker to Henry VII, taking delivery of his glass on the quay at Gloucester, setting up his workshops among the Masons' loges and Carpenters' shops, cutting and painting his glass, firing his colours, assembling the pieces in lead and fixing in position the East window of the Lady Chapel in the Cathedral and the windows of the church at Fairford.

In the late 16th century we come onto firmer ground, and the story involves Huguenot emigrés. Bearing in mind that the massacre of St. Bartholomew was in 1572, it was not surprising that Protestants with glass-making skills arrived from Lorraine and settled in the southeast of England in the early 1570s. Nor was it surprising that they gravitated to the area around Chiddingfold on the Surrey/Sussex border - an area where glass had been made from early medieval times. They were "Forest Glassmakers", by their nature itinerant, moving on as their

fuel (mainly beechwood) was exhausted. In this case there was severe competition from the ironmasters: also, their staunch Calvinism did not endear them to the local inhabitants. Soon they moved on and the move was at first westwards and later northwards.

By 1580 they were at Buckholt in Hampshire, soon after in Gloucestershire and Herefordshire, by 1585 in Worcestershire, later in Shropshire and Staffordshire and still later in the Newcastle-on-Tyne area. The names of some of the families are known - the De Hennezells, De Thietrys and the Tysacs, later to be anglicised as Hensey, Tittery and Tysack. It is interesting to note that their arrival in the Stourbridge area of Worcestershire was the start of what blossomed into the largest glassmaking centre in the country and continues as such today. The present Royal Brierley Crystal Company traces its origin back to a Hensey.

WOODCHESTER circa 1590-1615 (see sketch A)

When they arrived in Gloucestershire they first settled in Colliers Wood, part of Woodchester Park, between Stroud and Nailsworth. The Glasshouse was built on a level platform in the middle of a heavily wooded clay bank, on a bed of Cotswold sand covered only by a thin layer of topsoil; the adjoining stream, and ponds were fed from lakes further up the valley.

Opinions as to the dates of operation vary between 1590-1615 and 1599-1617. These commencement dates fit in with the general movement of the glassmakers mentioned earlier. The dates for closure fit in with the Royal Proclamation No. 42, 23 May 1615 "A Proclamation touching glass". The King noted - "there hath been discovered and perfected a way and means to make Glasse with sea-cole, pit-coal and other Fewell, without any manner of wood, and that in as good perfection for beauty and use, as formerly was made by wood". Recognising the need to conserve timber for other uses, he banned it as fuel for glassmaking and at the same time Patents of Monopoly were granted for making glass, using coal as fuel. Monopolies were not new. In fact Sir Jerome Bowes had been granted a monopoly for the manufacture of drinking glasses for 12 years by Queen Elizabeth I. In 1598 he petitioned the Queen for drastic powers of suppression, his complaint being that "certain persons that lately erected houses and furnaces in some countie for making of Drinking Glasses, namlie in the countie of Gloucester and one Hoe a Frenchman hath built a glashouse and furnace and doth make greate quantities of glasses". News and law enforcement moved more slowly in those days, and although the "Proclamation touching Glass" spelt the end of the "Forest Glass" industry, its effect was not everywhere immediate and there is evidence that wood continued to be used, particularly in remote areas.

The site was discovered by the late Basil P. Marmont who lived at Windsoregge, a property near Colliers Wood. From 1890 to 1920 he was frequently engaged in digging on the site, though for some of his time his quest may have been for his ferret rather than archaeological evidence. In 1904 following up some of his finds, Albert Harts

first definitive book on "Old English Glasses") and St. Clair Baddeley, the local historian and archaeologist (who lived at Painswick), assisted in the exploration.

It is sad to relate that only one unbroken specimen was found - an hexagonal bottle with rounded corners $2\frac{1}{2}$ " in diameter and a little over $5\frac{1}{2}$ " high. Fragments of other similar bottles were found, some up to $3\frac{1}{2}$ " in diameter. A considerable number of fragments of drinking vessels were found: they are of two principal types - the square-bottomed tumbler with a beaded cord running round the edge of the base, and the straight horn-shaped goblet with an open spreading widely hemmed (folded) foot. One fragment of a goblet has a trailed or looped band of darker glass running round the bowl rather like the decoration on Roman and Anglo-Saxon vessels. Many ornamental bosses or 'prunts' which had been broken out of vessels, and pieces of flat, deeply-ribbed wine flasks, were also found.

Pieces of window glass were discovered blown by the 'broad' glass or 'muff' method. This called for the bubble of glass to be blown into a mould so that it assumed the shape of a cylinder. The ends were cut off, the cylinder split open and allowed to flatten under heat, producing a piece of flat window glass. These pieces were larger than those made by the 'crown' method, but less brilliant, through contact with the flattening table.

Curious toadstool-shaped solid glass implements were found which are likely to have been used for smoothing cloth or linen or for holding and spreading out lace or other fine fabrics for repair: it appears that the 17th century name for these objects was "Callenders".

All the fragments are of a pleasant olive-green tint, due to impurities in the sand, including oxides of iron.

Also found were fragments of stoneware crucibles used for melting the 'batch' (the name given to the ingredients - sand, potash and lime). These fragments indicate that the crucibles were 24" high and about $18\frac{1}{2}$ " in diameter at the top, capable of holding between 150 and 200 lbs. of glass.

Remains of the furnace were also found. This was circular, 16 ft. in diameter, the earliest circular furnace discovered in this country, all the earlier ones being rectangular. There were two 'sieges' or shelves: on the lower the crucibles rested, near the central fire for melting the ingredients. The upper siege was used for roasting the 'frit', a preliminary partial melting of the ingredients. By carrying out the melting process in two operations, it was possible to produce glass at a lower temperature within the capabilities of the wood-fired furnaces of the time.

Nearby foundations of what was probably the annealing oven or LEHR were found, 9 ft. x 7 ft. This was quite separate from the main furnace and would be used intermittently. The shelf would be filled up with finished products, then the furnace would be fired and the whole heated up to a temperature of

450° - 550° C. Then the fire would be allowed to die out and the whole return to normal temperature. This process (still used in more sophisticated ovens today) is necessary to get rid of tensions in newly-made vessels caused by the manipulations of manufacture, and to give the glass stability.

There was no evidence of any protective structures, but this is not surprising, as these would have been fairly temporary, using whatever timber was available.

The materials would all have been local:-

Fuel - principally beechwood from the numerous trees which surrounded the furnace area.

Sand - the main constituent of all glass, would have been the local Cotswold sand. This would be too impure for modern glass, but its impurities, mainly the high iron content, could well explain the colour of the products.

Potash Alkali - mainly from the bracken which covered the open parts of the valley, which was dried and burnt. The ash was washed in water and the water then evaporated, leaving a cake of 'pearlash' which is an impure carbonate of potash. Other sources could have been the ash of the actual furnace fire or from burning local brushwood (timber too small for the billets required for the furnace).

Lime - a necessary minor ingredient, contributing to the durability of the glass, was present locally in the oolitic limestone.

Fireclay - probably local clay as used in the Stroud brickworks would have been suitable for the crucibles.

Cullet - in all glassmaking, some recycling occurs. Cullet or broken glass arising from the process was added to each batch to assist melting. The relatively small amount of fragments found on glass furnace sites, as compared with ceramic sites, is largely explained by this process.

This site is unique among contemporary glassmaking sites in this country, in that:

1. The size and quantity of the fragments are more meaningful than those from other sites.
2. The early circular furnace which could well have been the reason for the good quality of these fragments.

Reproductions based on these fragments were made in the 1920s by the Whitefriars Glass Company. Basil Marmont's friendship with H J Powell of Whitefriars led to reproductions being made of some 21 types of drinking glasses. In these reproductions first quality sand was used and the clear metal tinted, but Powell did experiment with local sand and from it made glass which had the same green tint as the originals. The complete bottle, many fragments, and the reproductions, can be seen in the museums at Stroud and Gloucester.

NEWENT circa 1598-1638 (?) (see sketch B)

This site is about 3 miles south of Newent near Clifford Manor, in the hamlet presently called Glasshouse, in which there is an inn called "The Glasshouse", again with a stream and in this case a tributary of the Leadon.

The first record of the Glasshouse occurs in the Newent Parish Register for 1598 when a daughter of "Mr. Bridgeman of the Glasshouse" was baptised. Later entries include :-

- Feb. 1599 Baptised, Thomas sone of Anthony ... of the Glasshouse (presumed to be Anthony Voydyn).
- Aug. 1599 Baptised, John Plyme sone of Jasper Plyme, a Frenchman of the Glasshouse the xiith day.
- Oct. 1599 Baptised, Tyzack Abram sone of a Frenchman of the Glasshouse the xxyth daie.
- Feb. 1601 Baptised, Margaret daughter of Anthony Voydyn, glass founder.

These are indications of the early days of the operation, and of the involvement of French Huguenots. There are other references, possibly indicating the last days and when the operation ceased :-

- 1634 In the Will of John Bulnoys, glassmaker of Newent, "I give and bequeath unto John Bulnoys my eldest son all my moulds and tools for making of glass whatsoever ..."
- 1638 John Gulney aged 23, glassmaker of Newent, was married.
- 1640 Widow Davis paid only £1.0s.0d. rent for the glasshouse, which suggests that it was in decline or no longer in operation.
- 1707 By this date the glasshouse had been demolished.

In 1968 there was agricultural reclamation involving the levelling by bulldozer of some portions of a field into a central stream bed. Subsequently there was a certain amount of field walking, when numerous fragments of glass and pottery were found. Of the glass fragments recovered, the majority were of a light green colour. There were some of blue glass and it is tempting to believe that these were importations. Several product types can be identified :-

Goblets - of varying sizes, the majority plain, but indication that some may have had moulded decoration.

Beakers - usually having an applied strip of glass round the base. Again, mainly plain, but some decorated fragments which may have been parts of this type.

Bottle glass - A few fragments from the necks and bodies of wine bottles.

Linen smoothers - several fragments with the typical mushroom-shaped heads and solid stalks.

Tubing & rods - fragments of varying sizes.

Window glass - a number of these fragments, and one fragment of Crown glass pane with folded edge.

Glass slag & wasters - in quantity.

Crucibles - a number of fragments, often covered with a layer of glass.

No evidence of any glass furnace was found.

Again, most materials would have been local :-

Fuel - there were considerable woods nearby.

Sand - occurs locally. In fact silver sand has been found recently in building operations locally which, on analysis, has proved to be almost pure silica.

Lime - limestone occurs within a few miles and there is evidence of this being burnt in limekilns.

Fireclay - it is a brickmaking area. Within a mile of the site, in later times Bullinger had a brickworks at Cliffords Mesne and Phillips one at Taynton.

From about 1676 to 1750 the site was used to produce pottery and was referred to as the Newent Glasshouse Pottery. The site is now ploughed land.

NEWNHAM-ON-SEVERN circa 1616-1715 (see sketch C)

Rudder in his "New History of Gloucestershire" (1779) states: "Sir Edward (sic, but of course Sir Robert) Mansell, in the reign of Charles I, erected here the first glasshouse in England which was worked with stone-coal, the foundations of which still remains."

G. H. Kenyon says - "There was a glasshouse at Newnham-on-Severn (by the Old Quay) where Mansell may have tried out the new type of furnace fired by coal from the Forest of Dean in 1616 or soon after". But Ada Polak, in "Glass, its makers and its public", stated - "but by 1612 a satisfactory coal-fired furnace had apparently been established, for in that year Simon Sturtevant wrote in his METALLICA 'Very lately by a wind furnace, green glass for windows is made as well with pit coal at Winchester House in Southwark (London) as it is done in other places with much waste and consuming infinite stores of billets and other wood fuel.'"

The coal could have been brought down laboriously from the Forest of Dean or by sea from Swansea, where Sir Robert Mansell had coal mining interests.

Linked with the Royal "Proclamation touching glass" of 1615 already referred to, Newnham had one of the earliest coal-fired glasshouses.

In 1662 James de Hugh (another Huguenot?) glassmaker of the town, was married. By 1671 James Legree (Legury) had built a glasshouse on land beside the Severn, south of Newnham Pill. This was near the site of an early coal-fired glasshouse, where "many Seals (described as rough buttons) and a considerable amount of black glass slag have been found". In 1673 he was making green glass bottles with a London brewer, Stephen Willcox, who had acquired an interest in the property in 1671. His son carried on the business in the 1680s, and was also the tenant of another glasshouse in Newnham.

When pipes were being laid for the Newnham Waterworks in the early 1950s, the actual site of the Glassworks was discovered, with tracks of ashes and cinders leading up to a vacant piece of land behind "The Beeches", where the Anchor Inn was subsequently built. Fragments of black and green bottles were found, also thinner pieces, in all probability from drinking glasses.

In 1696 Houghton states there were two bottle factories in the town. (See his "Letters for the Improvement of Commerce and Trade" of that year.) In the London Gazette of 18th March 1706 the following appeared - "A good glasshouse, well situate at Newnham on the River Severn, very convenient for making of Broad Glass or Bottles is to be let or sold ..."

In 1710 the other factory was referred to as "the great glasshouse" with which two brothers, John Willcox of Gloucester and William Willcox of London were concerned. In 1715 the parish was unable to collect a rate from the Willcox Glasshouse; it may have gone out of business or been destroyed. Late in the 1770s, the site was referred to as Glasshouse Bank and the foundations of the Glasshouse were still visible, although by then a considerable verdigris factory had been set up in its place. The building on the land near Hill House (later Unlawater House or Newnham House) appears to have been part of the "works" and was converted into a private house in 1953.

One perplexing curiosity is the appearance in 18th century walls and buildings hereabouts of distinctive black blocks with a slag-like appearance; the blocks vary in size, the largest being approximately 16" x 9" x 9". They were produced in moulds and have an uneven top surface. Analyses of the blocks at two separate laboratories show that the main constituents were Silica and Iron slag. The blocks may have been formed as the slag (Scoria of forges) was removed from the molten iron at the foundries, either in the Forest of Dean or at Mansell's works at Swansea: most probably the latter, as transport in those days would have been easier by sea. The slag, after crushing, was probably used as one of the constituents of bottle glass. When glass production ceased, the remaining blocks were used as a building material, and again transport by water may explain their appearance in buildings in Gloucester and Tewkesbury and in a number of riverside villages. (see list of such places below.)

Later in the 18th and early 19th centuries, 'Stampers' - large crushing machines powered by water-wheels - were used at foundries at Parkend, Redbrook and Tintern, to crush the best of the 'scoria' into a fine powder for the glass industry, particularly for bottle glass. Their customers were the bottle glasshouses of Bristol. In about 1840 it was stated - "the superior quality of the Bristol black bottles has been attributed to the immemorial use of a portion of the slags of the charcoal furnaces from the neighbourhood of Dean Forest. The consequence of this long-standing practice has been to carry from the furnaces not only the old slags (of the charcoal period) but those currently made (of the blast coke period)". The charcoal slags were used for dark green (black) glass, the blast coke slags for light green or cream glass.

GLOUCESTER circa 1674-1744 (see sketch D. Kip's "Prospect of Gloucester" part.)

The registers of St. Nicholas Church near the Westgate give evidence of glass-making in Gloucester in the last quarter of the 17th century.

Burials are recorded :-

1685 March 20 Mary wife of Philip Weaver a labourer at the Glass house

Nov. 9 Edward Elliott, Glassman

1686 Aug. 13 John, son of John Morris, Glassman

1695 Jan. 8 A stranger from the Glasshouse buried at the charge of the Parish.

More importantly, the registers have this entry :

"In the summer of the year 1694 was built the great brick conical glasshouse on the Island"

The way this was phrased seems to indicate one or more smaller conical glasshouses were already in existence where Edward Elliott and John Morris worked. These 'bottle' or 'conical'-shaped kilns are shown on Kip's "Prospect of Gloucester" dated 1710 and the sites are shown on Hall & Pinnell's Map of 1780. These are certainly among the first to be built in England - they may actually be the first.

Such structures were found to be necessary as more experience was gained in using coal as fuel. Coal produced a higher furnace heat than wood, but to achieve this a considerable draught was needed, which in turn required a tall flue. This was constructed by extending upwards the circular wall which surrounded the furnace and working area in the shape of a bottle or cone. The "great-conical glasshouse" mentioned in the registers had an internal diameter of 49 ft. 6 ins (though a diameter at right angles seemed to be a few inches less!) with a maximum wall thickness of 3 ft. 9 ins. which reduced to 1 ft. 1½ ins. at 28 ft. 10 ins. above ground. Its height is not known, but it would not compare with the 100 ft. - 150 ft.

attained by cones built in the late 18th and early 19th centuries. There are only four glassmaking cones still standing, Wordsley (Stourbridge), Alloa (Scotland), Lemington (Newcastle-on-Tyne) and Catcliffe (Sheffield).

But to return to 1696 when Houghton stated that there were 3 glass bottle factories in Gloucester. In the main they produced bottles for the 'cyder' trade. This was the period when the English flint glass industry, following the work of Ravenscroft in establishing the viability of 'glass of lead' in the years 1673-1676, had expanded dramatically and had supplanted Venice as the leader in glass production. Not surprisingly, the Exchequer turned to the glass trade to help finance the war with France. In May 1695 the Excise Act of William and Mary enacted that all green glass bottles should contribute a shilling a dozen, and all flint (lead) glass at a general rate of 20%. As elsewhere, the Gloucester Works were hard hit. The following extracts from the House of Commons Journals tell of the efforts of local glassmakers which led to the tax being halved in 1698, and withdrawn in 1699 :-

16 Dec. 1696. "A petition of John Ely (?Ellis) and John Morris and divers glassmakers in behalf of themselves and many families in and near the City of Gloucester and the Town of Newnham was presented to the House. Setting forth, that since the Duty upon glass wares no glass hath been made in Gloucestershire the glasshouses being converted to other uses, to the utter ruin of the petitioners."

17 Feb. 1697. "Mr. Baldwyn gave evidence on the above petition. He said that there are 5 glasshouses in Gloucester and Newnham and not one of them have worked a fortnight since the Duty commenced."

21 May 1698. "Mr. Baldwyn, owner of a glasshouse, said in evidence that he is concerned in 3 glasshouses at or near Gloucester and that he has not worked 10 days since the Duty on bottles: whereas before there were above 100 families that depended upon the said houses who now for the most part want bread. That his customers among whom he chiefly dealt for Cyder, do now put the same into Cask instead of bottles, the Duty raises the price of bottles too high."

4 March 1699. A petition of poor working glassmakers of Gloucester and Newnham was presented to the House.

On 17th June 1712 this appeared in "Post Boy" - a "new built glasshouse, with convenient warehouses lying upon the River Severn in the City of Gloucester, together with several pots and all manner of tools is to be let or sold. Enquire of John Burroughs in London or John Ellis at the said glasshouse in Gloucester".

The following appeared in the Gloucester Journal of 30th June 1741 :-

"The glasshouse in the City of Gloucester is now at work. Where glass bottles are made with as fine and good metal as any in England and of all sorts and shapes. And any gentlemen may have their Coats of Arms or any other Mark on them as they please, likewise Pickling Pots, Melon Glasses and Butter Pots. All sold on as low terms as elsewhere by your humble servants, John Platt and Company."

But three years later one partner who was also the Manager, died, and the premises were offered for letting - "... the utensils and stock of bottles ... to be sold very reasonable and separate if required either wholesale or retail". Alternatively there was an invitation for any well-qualified person to enter as partner and manager. "It is presumed the glasshouse may be carried on to a great advantage there being a large stock of ashes in the City", presumably supplies of potash. (Gloucester Journal 1st May 1744)

In 1764 it was being used by Mr. Elton, Grocer, who was offering it for letting.

Sometime subsequently, the upper part of the structure was demolished and a roof formed at a lower level. Known as the Old Round House on the Quay, it was demolished in 1933 in the course of an extension of the premises of the West Midlands Farmers' Association. During demolition, quantities of the black slag blocks (mentioned under Newnham) were tipped into the river. Their presence on the furnace site again may indicate the use of iron slag in glass bottle manufacture.

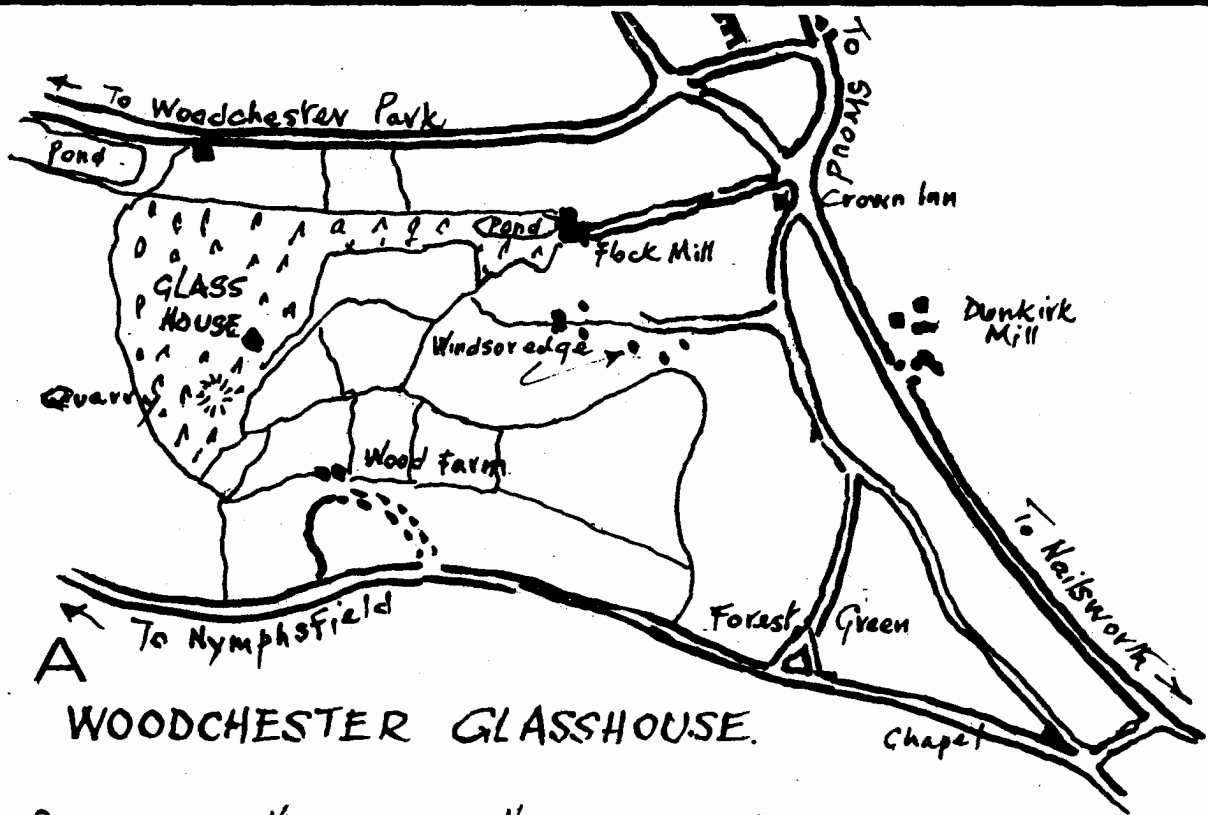
This would be the end of the story. There seems no evidence of glass having been made in the County from the middle of the 18th century to the middle of the 20th century. How different the story would have been if the City of Bristol, which at one time had 12 glasshouses, had been within the county of Gloucestershire!

But it is not quite the end of the story. In the mid-1970s Pauline Solvern (late of the glasshouse in the Craft Centre in London) and her husband, Harry Cowdy, set up the Cowdy Glass Works at Newent. They have built up a small efficient team who produce glass from its basic materials and make crinkling glasses and other forms of art glass of a very high standard, using traditional methods.

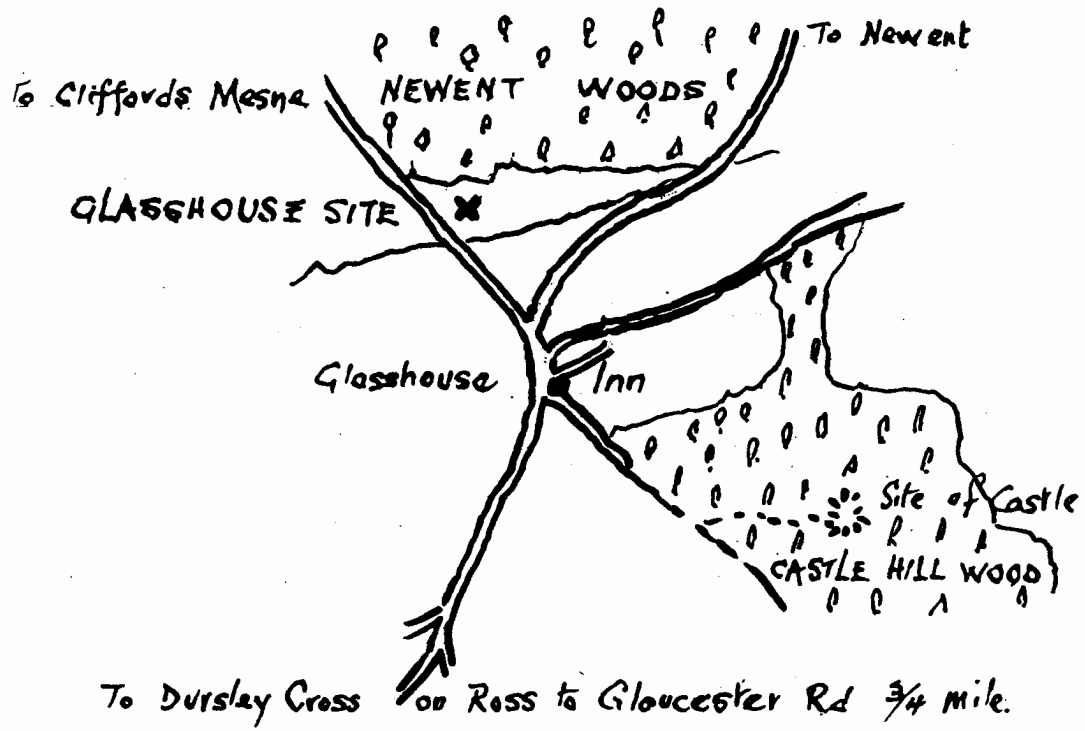
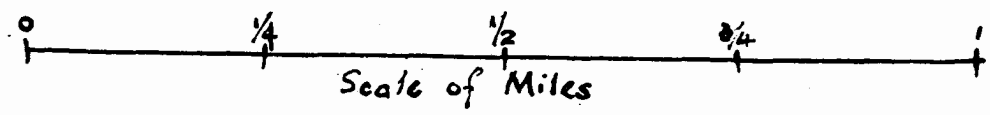
In conclusion, I wish to thank three of my friends - Lionel Walrond of the Stroud Museum, John Brooks the antique-glass dealer of Leicester, and Charles Hajdamach of the Broadfields House Glass Museum - for their help.

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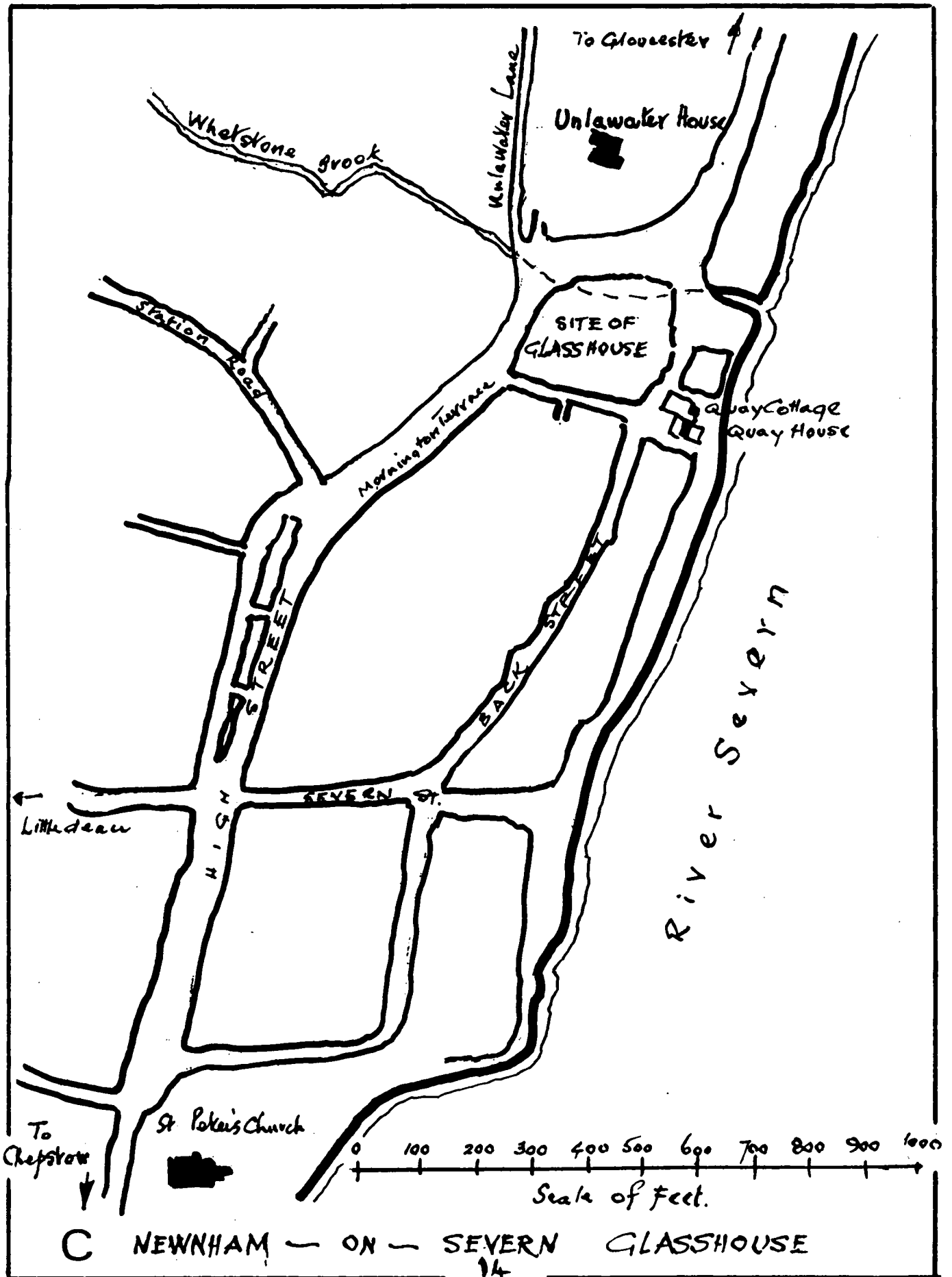




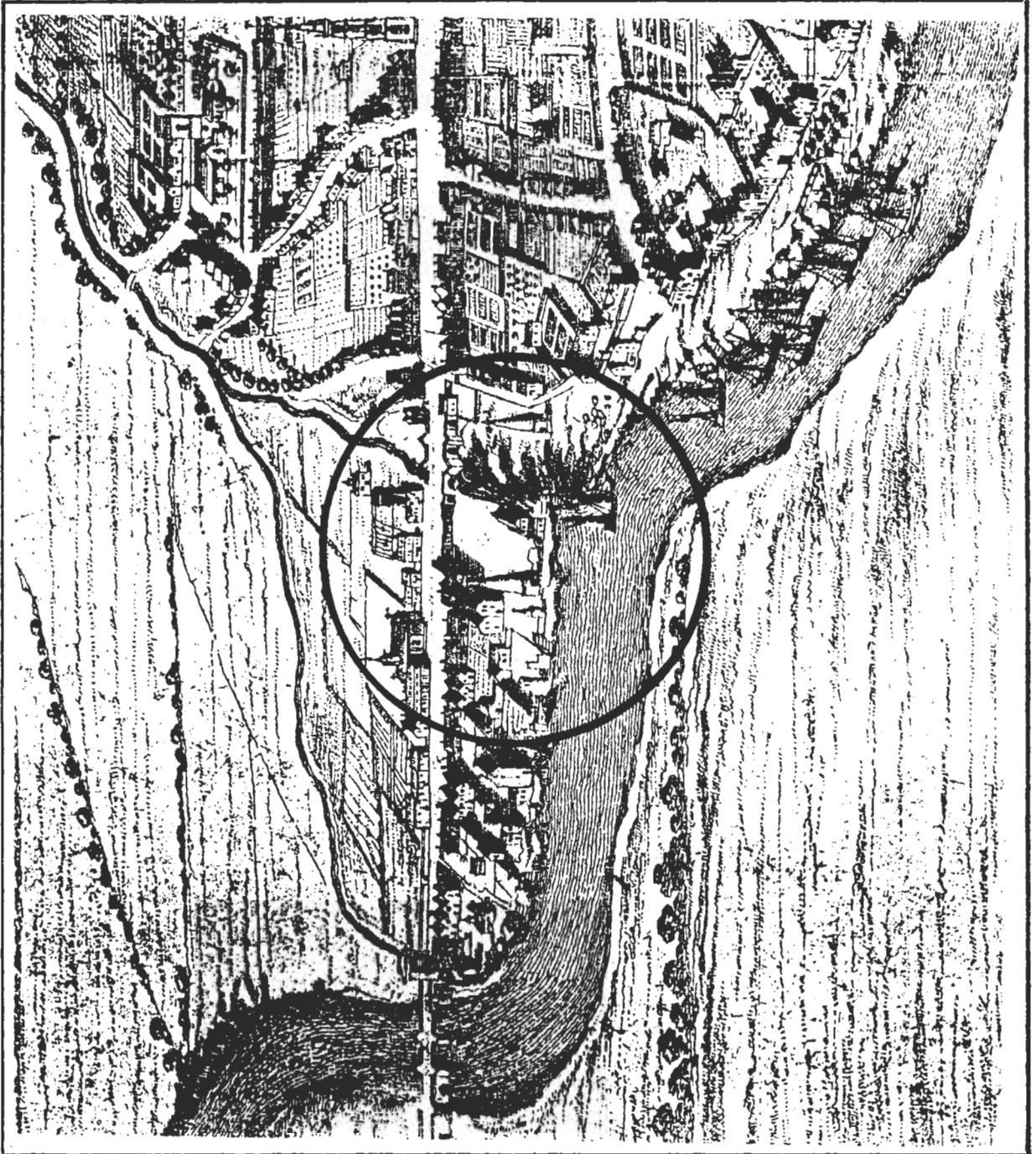
WOODCHESTER GLASSHOUSE.



B
NEWENT GLASSHOUSE



D
from -
KIP'S PROSPECT
OF GLOUCESTER
1710, showing
bottle kilns
on the Quay.



Places where slag blocks can be seen in walls & buildings

(as at March 1981)

Gloucester City

Wall in Organ's Alley, Barton Street.
Garden wall of Home Farm, Hempsted.
(N.B. But NOT the blocks at India House, which came from the Gloucester Foundry, late 19th century.)

Newnham

Many walls and buildings, especially in the Old Road, the Quay, and Hill House Lane.

Riverside villages

- a) Maisemore: Garden walls at Ship House & Bell House.
- b) Tirley: Cottage opposite the church.
- c) Minsterworth: Stabling near wall post-box at Pump Court; Float House near Bird-in-Hand Inn.
- d) Arlingham, The Post Office.
- e) Whitminster: Fromebridge Mill.
- f) Cambridge (Dursley Road): Narles Barn and terrace of nearby cottages.
- g) Slimbridge: Hearn's Farm and farm on corner of lane to Gossington.
- h) Frampton-on-Severn: Cottage near church; house in street leading from the south end of the Green; Garden wall of house at the southeast end of the Green.

Tewkesbury

Wall of Girls' High School in Gander Lane.

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