X.—THE HISTORY OF GLASS MAKING ON THE TYNE AND WEAR

Ursula Ridley

The glass that is attributed to Newcastle was manufactured for many centuries on both banks of the Tyne: from its mouth, ten miles to the east; to Lemington, four miles upstream to the west of the city. At the height of the prosperity of the trade there were no less than thirty glasshouses situated in important and separate boroughs, such as South Shields and Gateshead; and although the more famous glasshouses are described as being "within the liberties of Newcastle", in fact they were well outside the city walls.

It is unlikely that any of the glass found all along the Roman Wall in Northumberland was made in England, and if it was the art disappeared with the departure of the Romans. But there is no doubt that the earliest window glass ever to be used in this country was made for the great monasteries at Wearmouth on the Wear and, nine years later, at Jarrow on the Tyne. The Venerable Bede, writing in the seventh century, said that St. Benedict of Wearmouth sent ". . . messengers to Gaul to fetch makers of glass, that is to say artificers, who were at this time unknown in Britain, that they might glaze the windows, not only of the church" (of St. Peter) "but of the cloisters and dining rooms of the monastery . . ." which was founded in A.D. 675. These French glaziers remained in England and taught the Saxons the mysteries of their trade, by which, says Bede, ". . . lamps, windows, cups and an endless variety of useful and ornamental vessels are formed."

This architectural revolution of glazing the windows, which had previously been filled with wooden shutters per-

forated with round holes, or canvas, probably oiled, was no doubt responsible for the tradition handed down for many generations that "it was never dark in old Jarrow church".

From the seventh to the end of the sixteenth century glass was made in England wherever there was a satisfactory supply of wood for fuelling. "It was the practice of the glass-makers, when they had consumed all the suitable timber in one area, to remove their stock in trade to another, either of virgin forest or where the forest had regenerated."[1]

Contemporary opinion was divided as to the seriousness of the damage done to the woods by the glass-makers. Sir Robert Mansell, who was the first person to transform "an unstable and scattered art into a genuine industry", declared that ". . . no wood was fitt to make glasse under twenty years groath." Some considered that the glaziers consumed wood in a reckless way since ". . . glass making required just the sort of timber that best served the ship builders."[2]

On the other hand others maintained that the damage done to the woods was exaggerated. Jean Carré, writing to Sir William Cecil in 1568 applying for a monopoly for making glass in England, states that it was not proposed to cut down the trunks of the trees, but only the branches, so that the trees would grow fresh wood within nine or ten years. "It may be presumed, therefore, that insular prejudice against the *outlandish men*, as the foreign glass-makers were called, . . . was the principal reason for the Royal Proclamation of 1615 forbidding the use of wood for such purpose."[3]

Whatever the truth was the fact remained that the forests were depleted and the glass-makers were forced to follow coal. The first successful experiments were made with Scottish coal from the Firth of Forth—Newcastle "sea-coal" being then regarded as too sulphurous to be of service. Sir Robert Mansell tried Welsh anthracite and good coal from Notting-

[1] Preston Pilbin: M.Sc. Thesis, Department of Geography, King's College, Newcastle upon Tyne, 1935.

[2] J. U. Nef: *The Rise of the British Coal Industry*, London, 1932.

[3] E. G. Clark: *Glass-Making in Lorraine*. Journal of the Society of Glass Technology, 1931.

hamshire, but at both these places he found that the costs of transporting his products to London were prohibitive; so that ". . . for his last refuge he was enforced to make triall at Newcastle-upon-Tyne, where, after the expense of many thousand pounds, that work for window-glass was affected with Newcastle cole."

The coal owners were already supplying the London market, and their ships were available for transporting glass, while they were willing to invest capital in Mansell's enterprise.

The Sunderland Company of Glass Owners began operations on the Southwick bank of the Wear. According to Francis Buckley in his paper on Wear glasshouses, the company was a syndicate of ten, who let, leased, or worked themselves, glass-works at Deptford, Southwick and Bishopwearmouth Panns. Ayres Quay Bottle Works (ceased production in 1923) and one at Bishopwearmouth opened shortly afterwards.

For many years the quality of Mansell's glass was a source of complaint to his customers. It was said to be ". . . scarce, bad and brittle", and much later it was stated that Newcastle glass was of ". . . a sort of an ash colour."[4]

But the replacement of wood by coal presented difficulties and instituted a remarkable chain of events. First it was necessary to protect the melt from the soot, so covered pots were employed in place of the earlier open crucibles. This kind of pot necessitated higher temperatures to achieve fusion owing to the insulating effect of the cover, and this led to experiments to find a glass mixture which would fuse more easily. The substitution of lead oxide for lime satisfied this condition, and unexpectedly yielded a glass of very high refractive power which, under the name of crystal or flint glass became popular for making decorative articles—the

[4] *The Influence of Local Geography on the Glass Industry of Newcastle* by Preston Pilbin (University of Bristol). Journal of the Tyneside Geographical Society, Newcastle upon Tyne. No. 1, October 1936 (New Series), Vol. 1, pp. 31-45.

chandeliers, decanters and wine glasses so prized by collectors today.

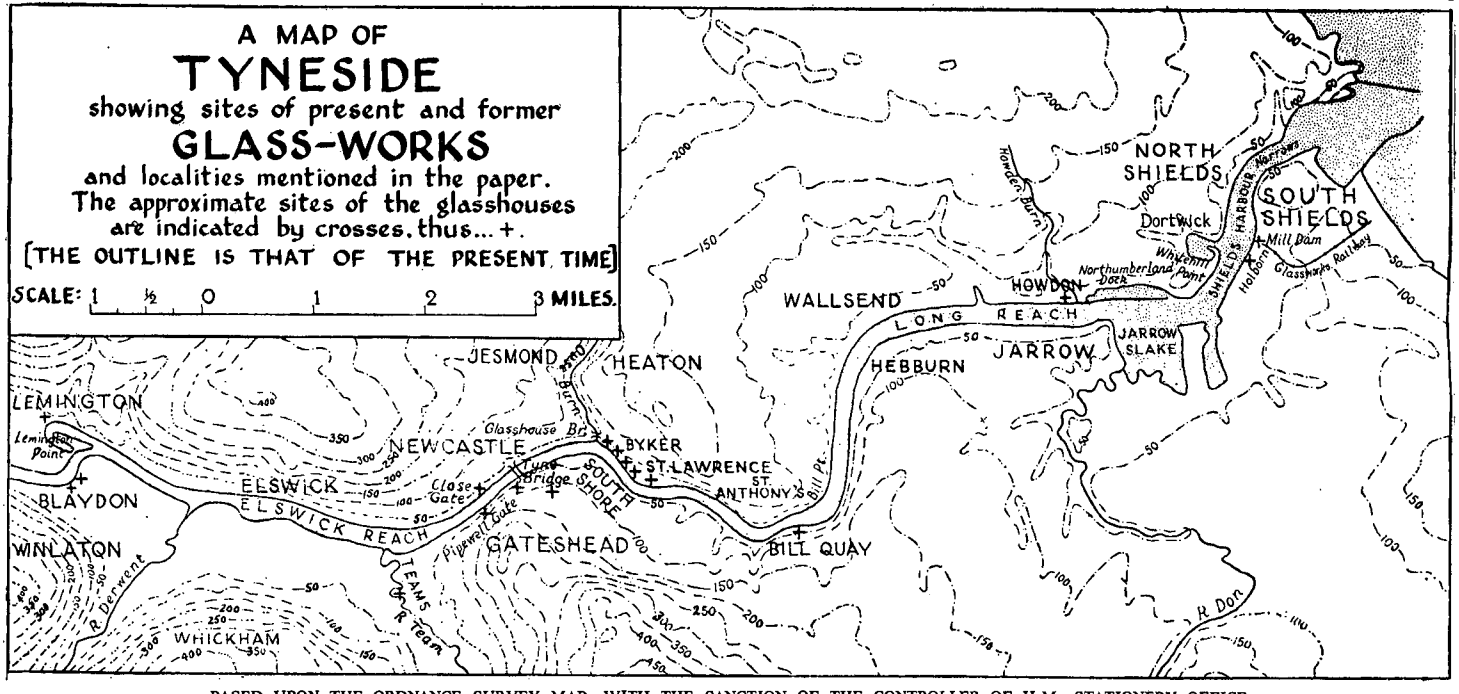
Mansell established his first glass works on Tyneside on the north shore to the east of the junction with the Ouseburn. To this day—three hundred and forty years later—Glasshouse Bridge and Glasshouse Street still exist though there is no trace left of the original works. It was an admirable site, being easily accessible to the pits and a supply of coal; far enough downstream for the products to be loaded directly on to the ships, while the prevailing west wind blew the smoke from the furnaces out to sea and away from the inhabitants of the town.

Mansell's products included bottles, window glass, mirror glass, tumblers and spectacle glass, while his output amounted to six or eight thousand hundredweights a year. By 1623, he was granted the sole right to carry on the glass industry in the whole of England. He reigned supreme until the Civil War of 1642 put an end to his monopoly, although his family are believed to have remained in business until the end of the seventeenth century, when it was eclipsed by the arrival of the famous Dagnia brothers.

Edward Dagnia, who is described as an "ingenious Italian", had a glass-works at Bristol; but in 1684 his three sons—Onesiphorus, Edward and John—tiring of the parental roof perhaps, or wanting to set up in a business of their own, emigrated to Newcastle where they built their first glasshouse in the Closegate, and for many years it was the only flint glasshouse in the city. Mr. Thorpe attributes the idiom and tradition that has come to be associated with "Newcastle glass" entirely to the Dagnias' designs.[5]

This glass is of a clear, brilliant metal and may be said to "glisten" more than glass by other makers. The shapes of the wine glasses can also be recognised by certain characteristics—such as the long slender stems with several knops,

[5] A. W. Thorpe: *The Dagnia Tradition in Newcastle Glass.* The Connoisseur, 1933.



BASED UPON THE ORDNANCE SURVEY MAP, WITH THE SANCTION OF THE CONTROLLER OF H.M. STATIONERY OFFICE.

which are appropriately known as "light Balusters"; or by their "Tin-Hat" feet, a distinctive type of domed foot resembling the tin hats worn by British troops. The "dripping tears" are another characteristic of these glasses, which Mr. Thorpe compares to "little icicles" dripping downwards through the knops of the stems and into the solid bases of the bowls. All these features give Newcastle glasses a distinct identity, which can be confirmed by the fact that so many made in these traditional shapes were engraved or enamelled so as to leave no doubt about their provenance.

In 1769 a new glasshouse had been set up in Sunderland by John Hopton for flint glass and fine table ware, double flint, white enamel, and fine blue and green glass, and Georgian goblets were probably made here. In 1809 these works moved to Hilkiah Hall.

In 1730 John Williams joined the Dagnias from Stourbridge and married the widow of Onesiphorus, whereupon the Dagnias moved to South Shields and the Closegate works were managed by William until 1775, when they were bought by the company of Cookson and Airey, who worked them until 1845. The Huguenot families of Henzell and Tyzack who had settled at Howdon Pans at Wallsend (and were incidentally Quakers) as early as 1670 made window glass and bottles only. In 1680 an advertisement appeared in the London Gazette proclaiming that "Newcastle cut glass good and sizeable, may be had by all merchants and others at 13/- per hundred foot."

This refers to window glass cut into appropriate shapes and sizes and not to cut-glass articles. (One would like to think that the magnificent cut-glass chandeliers in the Newcastle Assembly Rooms built in 1776 were made on Tyneside; but there is no evidence for this wishful thinking and they are thought to be French.)

The Dagnias were the only ones to make flint glass, but it was revealed in the Treasury papers for 1697 that ". . . Onesiphoris Dagnia was fined £200 for having fraudulently concealed over 2,697 dozens of glass bottles."

Although the Dagnia monopoly ended in 1728 their traditional designs persisted, and it is now thought that most, if not all, of the Jacobite glasses were made on Tyneside. Since Newcastle was in the thick of the Rebellions it is not unreasonable to assume this. The fact that so many of them were thought at one time to be of foreign origin is explained by Mr. Barrington-Haynes because ". . . they are made of soda metal and bygone English collectors somehow became persuaded that because the continent used soda metal, therefore soda metal glasses were continental."[6]

But, as Mr. Barrington-Haynes points out, there was never any strong Jacobite feeling on the continent and he is certain that "these despised Jacobites were made on Tyneside, engraved on Tyneside, and no doubt sold there too. They tally in form and twist exactly with recognised English lead glasses, and the engraving tallies, too, in every detail." He adds: ". . . The Tyneside area turned out some noteable lead glasses, but it also made quantities of utility glass in the cheaper soda metal for the poorer, or more frugal, people of the North."

Mr. Charleston,[7] in his paper on "Dutch Decoration of English Glasses", has shown how David Wolff and Aert Schouman engraved with diamond point some typical Newcastle glasses now in the Victoria and Albert Museum. And he leaves us in no doubt that many English glasses were sent to Holland to be engraved on account of the fine quality of the glass for that purpose.

There were also glass engravers working in Newcastle: notably John and Samuel Challinge in the eighteenth century and later John Williams. There is a jug in the Nelson Museum, Monmouth, with engraving referring to Lord Nelson and signed in diamond point "John Williams, Engraver, Newcastle".

But Newcastle's greatest claim to fame in the ornamenta-

[6] *Glass Throughout the Ages* by E. Barrington-Haynes.
[7] *Dutch Decoration of English Glasses* by R. J. Charleston, Transactions of the Society of Glass Technology, 1957.

tion of glass will forever be connected with the name of Beilby. William Beilby was a silversmith who moved from Durham to Gateshead about the middle of the eighteenth century. He had four sons and a daughter who were all talented to a high degree.

Richard, the eldest son, served an apprenticeship to a die sinker or seal engraver, at Birmingham. Ralph, the third son, is perhaps the best known as the master of Thomas Bewick. But the second son, William, and to a lesser extent, his sister Mary enriched the art of glass enamelling with some beautiful designs and with a perfection of technique which has seldom been equalled. His work is to be seen in the Victoria and Albert Museum, while Sir Hugh Dawson also has a fine collection of Beilby glasses.

The earliest authenticated Beilby glass is dated 1763 and known as "The Standard of Hesleyside". It is a goblet, eleven inches in height and with a capacity of twenty-six fluid ounces, enamelled in colour with the crest of the Charltons of Hesleyside in Northumberland and still in the possession of the family. It has been broken and repaired several times as a result of the tradition that guests were invited to drain the standard at a draught.

Returning to the history of glass making on the Tyne: in 1759 the Howdon Pans glass-works were sold by the Henzells to Matthew Ridley, who owned many collieries and supplied the glass industry with raw materials as he also owned several fire stone quarries at Blyth, on the Northumberland coast. Matthew represented Newcastle in the House of Commons, and was, incidentally, my husband's great-great-great-great-grandfather. In 1765 his son, Sir Matthew White Ridley, second baronet, acquired the controlling interest in all the Henzell glass-houses and is mentioned as one of the principal bottle makers on the Tyne. He was also a Member of Parliament, and it was reported in the *Newcastle Courant* of the 4th of March, 1769, that ". . . on Sunday the bells were set a-ringing here on the arrival of the news of Sir Matthew Ridley keeping his seat in Parliament for Morpeth,

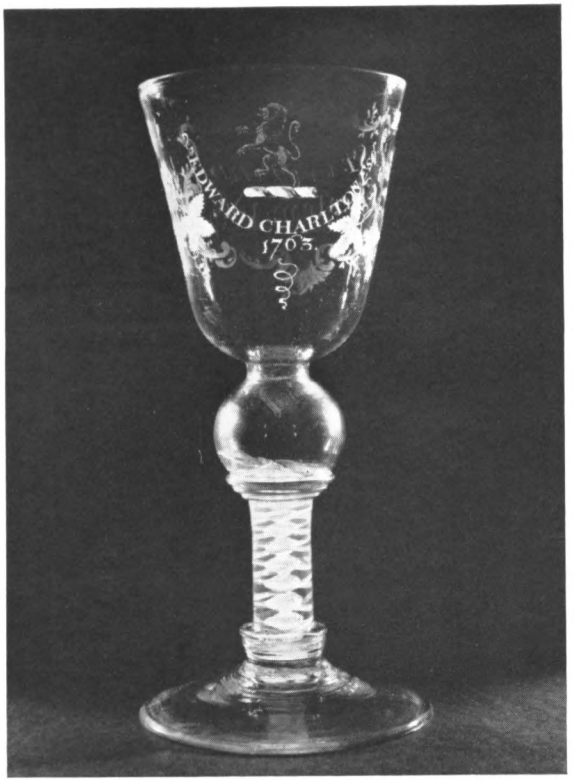


FIG. 1. BEILBY GLASS: "THE STANDARD OF HESLEYSIDE" IN THE POSSESSION OF MR. AND MRS. JOHN CHARLTON OF HESLEYSIDE.

FIG. 2. THREE EIGHTEENTH-CENTURY GLASSES FROM MR. T. A. LEWIS'S COLLECTION. BEILBY GLASS IN THE CENTRE.

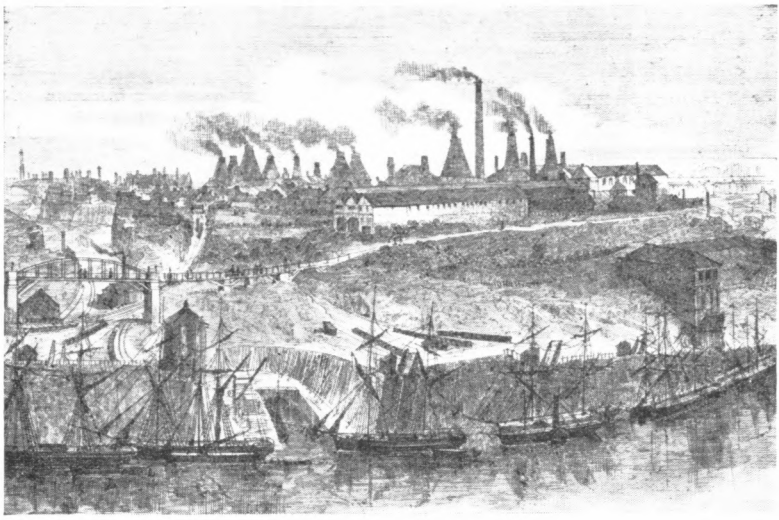
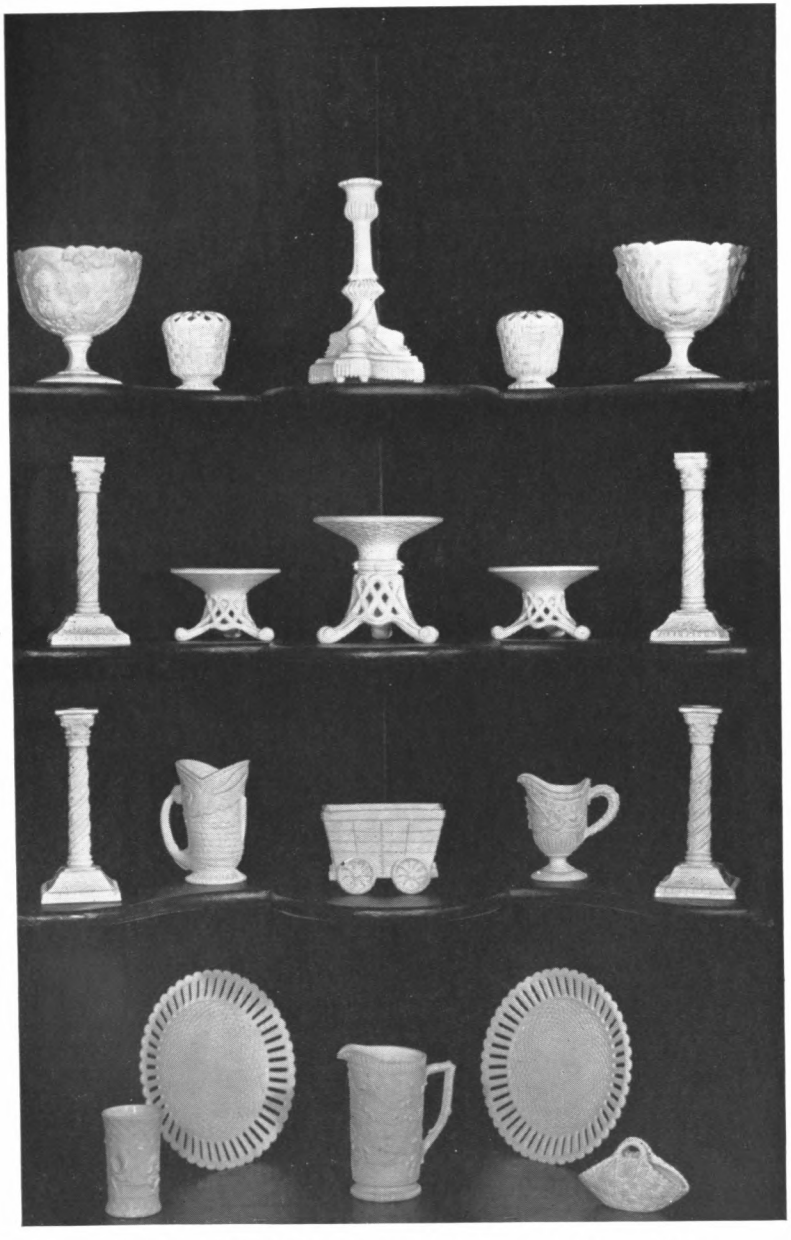


FIG. 1. HARTLEY'S GLASS-WORKS, SUNDERLAND.

FIG. 2. INTERIOR OF HARTLEY'S GLASS-WORKS.



NEWCASTLE WHITE "SLAG" GLASS FROM THE AUTHOR'S COLLECTION.

NEWCASTLE BLACK "SLAG" GLASS FROM THE AUTHOR'S COLLECTION.

and on Monday there were great rejoicings at the Low Glass Houses and at Blyth on that occasion."

Twenty years later the glass-workers had their own election—not for a Member of Parliament but for a King. On the 3rd of October, 1789, another entry from the *Newcastle Courant* reads: "On Saturday last came on at the house of Mr. R. Elliot in the Close in this town, the election for a King of the Glass-makers. The candidates for this high position were—the Honourable Sir John Turner and the Honourable Sir James Sanders, glass-makers. During the poll, the votes on each side were nearly equal, but at the close, Sir James Sanders obtained a majority."

Glass from the Tyne and Wear was shipped to many parts of Europe besides the regular trade with London during the eighteenth century. The *England's Gazette* for 1751 records that "the number of ships employed carrying not only coals and salt but glass and other merchandise to diverse parts of the kingdom as well as abroad makes it a fine nursery for seamen." There is a description of a shipment to Bergen consisting of decanters, quart mugs, candle-sticks, a sconce with four branches and a pyramid of salvers, sweetmeat and jelly dishes. Neve's *Builder's Dictionary* describes the method of packing glass for transport:

> "These cases are brought to London in the coal ships, they being set in end and in the Coles more than half its depth, by which means they are kept steady from falling and being broke by the motion and rowling of the ship. Mr. Leybourne saith, the price of Newcastle glass is uncertain, for when coals are plenty glass is cheap, and when coals are dear at London, then Newcastle glass is so likewise, not that they want coals at Newcastle; but because they have no other conveyance for it to London. So that sometimes it is at 30/- per case, and other times 40/-."

Here is another example of the interdependence of coal

and glass. It was more than fitting that Beilby enamelled one of his glasses with the words: "And the Coal Trade."

However, the glass industry was affected by more than the price of coal. The Excise Duty imposed by the Government in 1746 became so increasingly burdensome and restrictive that it is a wonder that the industry survived at all. There are records among the Ridley family papers of the amounts netted by the Treasury amounting to £286,847 in England, and £45,530 in Scotland in 1808. The glass-makers were paying forty per cent of the price of the manufactured article in duty. In 1811 an Act was passed which changed the method of charging the duties, giving a benefit to the manufacturers. The Act was only temporary, however, and in 1818 when it was due to expire, Sir Matthew Ridley, third baronet (only two greats this time!) organised all the flint glass-makers in the country to send a petition to Parliament resisting a return to the old system of charging the duty by gauge in the pots instead of weighing the glass as it came out of the lear or annealing arch. We have letters at Blagdon, where I live, from Isaac Cookson of South Shields and Lucas Chance of Bristol amending Ridley's draft of their case, and also the printed document which was sent to the Government. It says that:

> ". . . The great objection to duty by gauge is from the crining or cringing of the pots. . . . The method of collecting duty when the metal in the pots is in a fluid state obliges the manufacturer to make glass that can scarcely be sold for the duty, and sometimes the metal is so foul that it cannot be made into a saleable article."

The excisemen carried out their tasks behind locked doors and were often corrupt and in league with the workmen to cheat the employers. ". . . The manufacturer was at the mercy of his servants, who for the sake of the penalty, or from motives of resentment, had it in their power to bring charges against him to a ruinous amount. In the year 1809

prosecutions were instituted against several respectable glass manufacturers, who were charged with penalties to the amount of nearly £700,000 on the evidence of discarded servants, of profligate and abandoned character, who, for the base purpose of revenge, and for the sake of sharing the penalties, had themselves committed, unknown to their masters, the very offences charged in the informations. . . . In addition to these grievances, the manufacturer was greatly injured by not having the management and control of the metal in a fluid state, which prevented him from making those experiments which are essentially necessary in every manufactory for the improvement thereof; and particularly in the making of flint-glass, where so much taste and elegance is required." The petition ends by saying: ". . . If the renewal of the system of gauge should again be resorted to, they will be driven to the painful necessity of abandoning a trade so surrounded by difficulties and so pregnant with ruin and destruction to their fortune, happiness and characters."

The petition failed, and the end of the Napoleonic wars also contributed to the hardships of the glass manufacturers. Sir Matthew Ridley complained that a workman in Bohemia was paid 10d. a day, whereas he, Sir Matthew, was having to pay his men 5/- a day. (Incidentally, a skilled glass blower today can earn 16/- an hour.)

But Sir Matthew was a pessimist and thought that the "Home trade is destroyed and nothing but the American and Free India markets keeps the manufacturer going." He continued, however, to make glass until 1859 and the trade cannot have suffered so very seriously, for Mackenzie, whose *History of Newcastle* was published in 1825, repeats what he said in the earlier edition of 1801 that ". . . more glass is manufactured on the River Tyne than in all the Kingdom of France, nor will this appear at all improbable when the various and extensive manufacture of this useful article in this district is considered."

A lighter side of the "art of glass" is mentioned in the *Newcastle Courant* of the 20th of September, 1823, when

". . . The flint glass-makers employed in the houses on the Tyne and Wear, walked in procession in this town. The men all wore sashes and glass stars suspended from their necks by chains or drops of variegated colour, the great majority having glass feathers in their hats. And every individual carried a glass ornament in his hand. Among the articles in the procession were many swords; a bugle; a windmill at work; a fort with a cannon; a violin and bow; a gentleman driving a gig; two elegant bird cages containing birds; a curious tube representing by means of the action of different fluids the circulation of the blood in the human body; and a representation of His Infernal Majesty." Some of the ornaments carried in the glass-makers' procession are now in the Saltwell Park Museum, Gateshead-on-Tyne. The men wore pink sashes trimmed with blue, the cutters had a cut rose, thistle and shamrock supporting the feathers in their caps.

Incidentally, a salute used to be sounded on a glass trumpet when a new Mayor of Newcastle was elected.

The next twenty years saw a decline in the glass industry which had depended so much on the supply of the purer raw materials, such as sand and chalk brought back as ballast by the returning coal ships from Holland and the continent. The development of the iron-built collier eventually led to the use of water ballast and the curtailment of these raw materials for the glass industry. But the repeal of the excise duty in 1845 and the Great Exhibition of 1851 gave the industry a new fillip. Half the glass for the Crystal Palace was made by Hartley's of Sunderland.

In 1837 James and John Hartley moved from Smethwick to Sunderland, where they established the Wear Glass Works and started to experiment with cylinder glass. Other firms were also interested in the new sheet glass and at a manufacturers' meeting in 1841 it was agreed that Cookson's, a Tyneside firm, Greenall and Pilkington's and Hartley's should all be given a sheet glass quota, but that none of them should produce more than half the amount manufactured by Chance Brothers of Bristol.

By 1845, Hartley's were manufacturing both crown and sheet glass and in 1847 "rolled plate" glass was invented by James Hartley (British Patent 11,891). This "rolled plate", still called "Hartley's Plate" in the North of England, was made by ladling metal from the founding pot directly on to the casting table, instead of by way of the refining cuvette, the glass being limited to any size required. The resulting sheets were strong, cheap and translucent and especially suitable for skylights and glass roofing, where transparency was not essential. With the building of factories, railway stations, etc., this type of glass was in great demand and by 1852 it was on the market and Hartley's licensed both Chance Brothers and Pilkington's to make it for an annual fee of £500 per furnace.[8]

By the middle 1860s the three great glass making firms, Chance Brothers, Pilkington's and Hartley's, were making 340,000 cwts. of glass per annum. There was close co-operation between these three and by buying out competing firms which ran into difficulties, between them they gained control of the whole of the window-glass industry in this country. This industry continued to prosper until the removal, in 1857, of the import duty. As a result of this, large quantities of foreign glass were imported and sales of Belgian glass exceeded British sales. Attempts to open negotiations with the Belgians failed because, as R. L. Chance wrote to Richard Pilkington in 1877, "there is unfortunately no association of window glass manufacturers in Belgium and no understanding of any kind amongst them". However, this competition lessened after 1870 because the Belgians were handicapped by a temporary coal shortage and the high price of fuel. It was about this time that Pilkington's, partly owing to their favourable position as colliery owners and partly to their adoption of the tank system, were able to gain the predominant position in the association and apparently to exploit this at the expense of the other two: ". . . If I thought it advisable to consult

[8] Information from Miss Patricia Elliott, librarian of the Glass Manufacturers Federation.

my own feelings only, I should fall in with your views and say dissolve the partnership . . . I can quite understand your feelings or irritation at the treatment we are receiving. . . ." (L. C. Chance, junior, in a letter to Sunderland.)

The Wear produced a larger quantity of window glass than was made in the six extinct crown works on the Tyne, and Hartley's produced one third of all the English made sheet glass consumed in England. Incidentally Hartley's today are the finest makers of stained glass in the whole of England.

Robert Walter Swinburne was another firm at South Shields which made the rest of the glass for the Crystal Palace. In a paper read to the British Association in Newcastle in 1863 he said:

> ". . . The manufacture of pressed glass has cheapened flint glass articles to such an extent that almost the poorest of the population may be supplied with elegant articles of domestic use, which a few years ago were far beyond their reach. . . . But a great impediment to the glass manufacture in this district, is the Trade's Union amongst the workmen. In the blown flint trades, the Union exercises a power which amounts to a domination over the employer. In one case, at least, a manufacturer permanently gave up his business from this cause, and in other cases large works have been for a time wholly suspended. At present the blown flint glass-maker can only obtain a workman by taking the first on the Union list, and he must take the chance of his having the requisite qualifications, and must receive him without a character.
>
> "The workmen in a large window-glass factory on this river struck work because a non-Union man had been employed in a subsidiary part of the process. They abandoned their work the moment the obnoxious man made his appearance; the materials on which they were operating, of the value of £300, were spoiled and the works were a long time dormant. The relations of master

and man in the blown flint and bottle trades amount to a chronic strike. . . . The Union also orders the allowance of what is termed 'drink money', which is daily spent in the purchase of intoxicating liquors. This induces unsteadiness in the men and in the majority results in habitual inebriety. The apprentices and boys are encouraged by precept and example to follow in the same course so that the evil is perpetuated. The master is powerless to prevent intoxication, for if the 'drink money' is withheld the whole of the men strike work.

". . . Thus these infatuated men—many of them endowed with great ability in their craft—impair their own efficiency by their sensuality, violate the first principles of political economy and inflict upon the employer a burden which hopelessly fetters him in the race of competition and improvement.

"This insensate oppression is derogatory to the intelligence of our time and most seriously obstructive to our local commerce. Large orders have been transferred from the Tyne to Belgium and the manufacturers here purchase foreign glass for the production of which they have every appliance at home, except labour at a reasonable cost. The success of the pressed glass manufacture is greatly to be attributed to its being independent of skilled workmen, its operation being chiefly carried on by machinery."

Mr. Swinburne ends this political and reactionary diatribe with these words:

". . . It is to be hoped that the manufacturers engaged in this important branch of our national commerce will energetically pursue the improvement of an art which most materially promotes the physical comfort and intellectual taste of the people—which has brought the costly crystal of antiquity to the tables of the poor, and has given, without stint, the light of heaven to the humblest of their habitations."

The process of pressed glass was introduced into England from America, where it was invented, about 1860. Sowerby's of Gateshead on Tyne, who had been in the glass business since 1760, were one of the first in this field. They developed a form of moulded glass which they called " vitreo-porcelain ", as it is opaque. Ingredients for this type of glass included slag from the iron blast furnaces and residue from the glass pots themselves, for which reason the name " slag glass " is sometimes applied. Other local by-products employed in the glass industry were salt-cake (sodium sulphate) from the alkali factories, and soap boiler's waste, both used as substitutes for soda-ash (sodium carbonate powder). Opacity was achieved by introducing tin oxide or cryolite (sodium aluminium fluoride). This last substance was imported into the Tyne in considerable quantities for manufacture of aluminium at Wallsend.[9]

Sowerby's " slag glass " can be recognised by their trade-mark of a peacock's head, but other firms produced similar articles. Greener of Sunderland on the Wear used a demi-lion rampant out of a torse as his trade-mark; and a slightly different demi-lion rampant out of a coronet was used by a firm called George Davidson of Gateshead, which was founded in 1868.

The slag glass that used to be made by Sowerby and Davidson is far better both in quality and design than Greener's, in my opinion. Incidentally Greener's successors are J. A. Jobling and Co., who produce a quantity of first-class Pyrex glass today. Slag glass was mostly made about 1880 on Tyneside and Wearside and is in four plain colours: black, white, yellow and turquoise blue. Other articles were made in colours streaked with white to resemble marble. The commonest of these marbled pieces are purple, blue and a greeny black, while rare pieces are found in terra-cotta and olive or jade green. They are not particularly beautiful but very amusing and they have a great fascination to a collector

[9] Personal communication from Mr. Campbell, Department of Chemistry, King's College, Newcastle upon Tyne.

—at least I find they have! Plates, candlesticks, sugar bowls and milk jugs, jars and vases are to be found in many "junk" shops in the north and south (though all were made in the north), and the Portobello Road market stalls are full of little baskets, coal tubs, scuttles, obelisks, drums and all sorts and shapes of ornaments.

There was also a very beautiful opal glass blown on Tyneside at the beginning of the nineteenth century. It is much rarer than slag pressed glass and I have seen very few pieces beyond the few I have in my own collection. It is of a pale, translucent blue or milky white with a "sunset glow" in certain lights which make it opalescent. It was made by adding to the melt small quantities of calcium phosphate. Under the name of bone-ash large quantities of this material were imported into the Tyne for the artificial manure industry.

Of the original glass-works on the Wear there remain today only Hartley Wood and Co., makers of stained glass; and James A. Jobling whom I have already mentioned as making Pyrex. Of the original glass-works on Tyneside there remain only three today: Sowerby's, Davidson's and the Lemington Glass Works, now owned by the General Electric Company. This firm was started in 1778 and the original cone built at that date is a local landmark and the largest cone in the country. It is no longer used as a chimney for the furnaces. In addition to commercial and industrial glass they are blowing some very beautiful tumblers and vases to the designs of Mr. Stennett-Willson. These glasses are as good as any from Scandinavia or America and it is valuable to the glass-blowers to be making such lovely things; since they have the satisfaction of seeing the finished product of their work as a variation to the test tubes and electric bulbs they turn out by the million and which have to be finished elsewhere.

As a fitting end to this paper I think it is worth recording that the first electric light was made at Lemington. Sir Joseph Swan gave a lecture to the Literary and Philosophical Society

in Newcastle on 3rd February 1879 demonstrating the evacuated carbon filament lamp. The Swan Electric Lamp Company was formed in 1880 and the first bulb was blown at Carr Hill at Gateshead while the filament was made at a village called Delaval two miles from Lemington on Tyne. Thus, the first window glass to let in the daylight during the Dark Ages and the first electric light both had their origin upon the banks of Wear and Tyne.

I am indebted to Mr. T. A. Lewis of Stocksfield on Tyne, who has an extensive knowledge and a valuable collection of Newcastle glass; to Professor Daysh, Professor of Geography at King's College, Newcastle upon Tyne; and to Professor Wynne-Jones, Professor of Chemistry, also of King's College, for information and advice in preparing this paper.