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EDITORIAL

It is a fact that the journal of the British Society of Scientific Glassblowers has been welcomed by the membership as a great asset to the Society, for not only does it fulfil the aims of the Society but as a means of communication between members it not only bridges the provincial borders but takes information all over the world.

You might well ask, why we remind you of the obvious? Let it be clear to all members and readers of this journal that, if you have no news or information to tell . . . then this journal is in the same predicament.

We must have material for publication . . . anything that interests you as a glassblower will interest other glassblowers, so don't be shy, become a contributor to your own journal.

The new editorial team, and all concerned with the journal would like to take this opportunity of saying "thank you" to the retiring editor Mr. J. Burrow and also Mr. I. C. P. Smith, who has been in charge of the journal distribution.

Mr. Burrow has been an editor of the journal since its inception in 1964 and Mr. Smith too, has always been associated with the journal, he being the first advertising manager before taking over the distributive side of the journal.

I am sure all members must be well aware of the many hours of effort that have been put in by these two "stalwart members" of our Society, we know that the Society will be thanking them both, but we from the journal would like to wish them "health and all the best for the future".

SYMPOSIUM 1970

REGISTRATION

The organizers would prefer all bookings to be made by 4th September. It will still be possible however to register at the reception desk and it is expected that accommodation will be available in the University or nearby.

Photograph by courtesy of "The Caxtonian" house journal of Mardon Son & Hall Ltd., Bristol.

THE EARLY BRISTOL GLASS INDUSTRY

F. G. Porter — Bristol University

As a Bristolian and a glassblower I have often wondered about the old glass trade here, and it was whilst looking at some examples in the city museum that my imagination was fired. I spoke to several people about my interest and eventually I met Mr. John Cooper of the Bristol Art Gallery. He gave me some literature and advice on where to collect information and indeed he has loaned me the slides and pieces of Bristol Glass for these illustrations.

My search began at the City Archives and the Reference Library and I have lost count of the hours spent there. I am not claiming any original work, most of what I have to tell you is extracted from other people's efforts. Nevertheless it has been a most useful and informative exercise.

It was during the seventeenth and eighteenth century that the glass industry in Bristol came into its own. If one studies the old prints of Bristol and maps, you can see that the prominent landmarks are its church spires and smoking glasshouse and pottery cones. The maps show quite clearly where some of the sites are, but there appear to be some differences as to which glasshouse is which. Tragically the art of glassmaking in Bristol is lost and all that remains is a derelict cone in Temple Meads. However, what glass is still around is sufficient to have established the fame of Bristol Glass for ever. Those people who collect and sell it will forever have a ready market.

The earliest record of glassmaking appears to have been about 1651 when Edward Dagney, an Italian, had a glasshouse here. By the end of the seventeenth century the trade was well established, there then being six houses for bottle making and four for flint glassware; one of the houses made window glass. By 1722 it is believed that there were fifteen glasshouses. Although often changing hands, the numbers varied only slightly during the

next hundred years. The most notable result of combined firms was the Phoenix Glassworks. These were sited in the Red Lane area and were in close proximity to the Phoenix Inn. At the head of the firm were James and George Taylor who sold out in 1789 to Wadham Ricketts and Co. Outside Redcliffe gate were the Redcliffe Bucks Glasshouses 150 yards from St. Mary Redcliffe Church, started in the early eighteenth century and owned by Mr. Jones, a prominent Bristol glassmaker. Its principle output was green and flint glass bottles. The firm changed hands several times and one of the owners, Messrs. Berrow and Crosse, was believed to be the first to make the celebrated Bristol Enamel glass. The expression white and flint glass includes green enamel glass. However they went bankrupt in 1760 and after a further change of ownership became part of the Phoenix Works. The St. Thomas glassworks about 200 yards North of St. Mary Redcliffe, owned by the Warren family, was well known for its fine crown window glass and bottles. Here, Thomas Warren is thought to have introduced brass bottle moulds for the first time. After several changes of ownership it too became part of Phoenix works. The Portwall Lane glasshouse was owned by a most ingenious but unsuccessful business man, Humphrey Perrott. Mr. Perrott specialized in crown window glass, but spent considerable time developing glass kilns and furnaces. Unfortunately he went bankrupt before his patented invention came out. The works remained idle for ten years in consideration of his patent. Eventually the works became a stocking factory and Humphrey Perrott became sexton of St. Mary Redcliffe Church.

Temple Street glasshouse. There seems to have been several changes here and the name Collyer, Cooke & Co. seems to have been that of the owner. It is interesting to read how Cooke junior and his wife Joanne took four apprentices between 1714 and 1718. This was a flint glassworks. The Phoenix works at Temple Gate owned by Messrs. Wadham Ricketts in Pile Street was a flint glass manufactory and the products were very much of the cut glass variety although commercial bottle making was carried out. Some say this works was built on the site of the old Phoenix Inn.

FIG. 1.

Phoenix is a name appropriate to glassmaking. The Pheonix was said to have burnt itself to ashes and then "come forth with new life". Many eighteenth century tokens were stamped with the Phoenix motif with the value stamped on the reverse side of the coin.

The Temple Backs glasshouse. A bottle works owned by Robert Bradley. Also referred to is Thomas Jones and Co. who made black glass bottles and in turn in 1773 became Farrel and Jones.

The St. Phillips glasshouse owned by a prominent Bristol family 'the Eltons', was located near the St. Phillips Ferry. Sir Abraham Elton, Bart was one time Sheriff of Bristol and an M.P. Its business was crown glass sheet and bottles. It eventually in 1801 became Elton. Miles and Wilcox.

Mr. Tyndall's glasshouse, was not far from the Eltons', in Cheese Lane. From 1751 it appears that there were two houses belonging to him making crown glass and bottles. After a series of disputes the firm changed hands and there is quite a bit of confusion over the ultimate name of the business.

The Hoopers glasshouse, referred to as the Glasshouse without Temple Gate. There was a bottle making plant here and not much else seems to be relevant except that, as did most other

works, it changed hands quite often between 1744 and 1831. This house was set up by an extraordinary group of gentlemen. Robert Hiscox, who was a barber surgeon set up in business and set up a co-partnership with seventeen persons, dividing up shares into 24 parts. There were himself, five Hoopers (now called Coopers), one inn keeper, one pot maker, one maltster, two mariners, three merchants, one soap maker, one sugar baker and one glassmaker. What a collection! Needless to say like the other glasshouses their fortunes changed and eventually it came into the hands of the Powell family. It was Powell, Filer and Ricketts who first used the Siemens Gas Regenerating furnaces which took the place of the old coal fired furnaces. It is interesting to note that in 1857, a process is mentioned here for the making of green glass butter dishes from Uranium glass.

In Cheese Lane the Soap Boilers and Crown Glass Works was to be found and I think warrants a mention. It appears that four soap makers Messrs. Mountjoy, Purcell, Thomas and Heller thought to use their Soapers or (Sopus) Ash residues to an advantage. The source of alkali for soap making and glass making was obtained from plant ash or kelp (seaweed). The caustic alkali was produced by boiling the plant ash with lime. This resulted in a caustic liquor which was used for treating the fat. After other due processes a residue was left. This precipitate was called Soapers Ash. An advertisement in the local press of the day priced it at 6d. per cart load.

There are other glass houses referred to and I conclude with that of one which has in its name associations with the City emblem – The Nonesuch Flint Glass Manufactory. A Mr. Isaac Jacobs completed a glass manufacturing works in the gardens near the Avon. He would make every article in the glass line, even common articles, of a superior quality to any other house in the kingdom. (What a sweeping statement to make). He made cut glass items and engraved ware in Royal Purple and Blue. He was later styled as "Glassmaker to His Majesty the King". There has been mention of glassworks around Bristol at Crews Hole, Chelwood, and of course, Nailsea, but I think that enough has been said about the glass. works themselves. It will I am sure be of interest to you to know that in Bristol City Archives there is adequate evidence to show just what a thriving industry glassmaking was. Reference to its activities were as commonplace as those to the local football teams in today's papers. It throve from the early seventeenth century until the final closure of the last works just after the First World War. The reason for its decline was tragic and simple. Glassmakers preferred their work near coalfields – Bristol had a moderate supply from Speedwell and Kingswood. The production of cheap glass from Ireland in 1780 deprived Bristol of one of its chief markets. The government of England added to their difficulties by imposing heavy duties on spirits, etc., which meant that the trade which exported many bottles for wines and spirits now found that the demand fell off, since wines and spirits came in bulk and into bond. Excise duty on glass itself was £4 – £5 per cwt. Eventually the Bristol glassmakers moved on and took their skills to Lancashire and elsewhere and to this day their following generations still have the title glassmaker.

The Glassmakers "Hallmark"

The photographic heading depicts all that remains of any of the old glasshouses and I feel an appropriate caption would be "The tragedy that is Bristol's". This glass cone, which was last used as a place for mixing fertilizer, is situated behind St. Mary Redcliffe Church. Its construction is quite interesting. Upon a large circular foundation, about six feet thick below the ground, arches were built, and from about 15 feet above floor level the whole structure was only nine inches thick. The diameter inside was about 50 feet on the ground and the structure was 90 feet high. The whole structure from the foundations upwards was built to lean towards the centre. The bricks used were made locally at St. Phillips and were called Mash bricks. The cone illustrated is said to have been the largest ever built in Bristol.

I should now like to go on and tell you a little about Bristol Glass itself. I am no expert and am not fortunate enough to possess any whole pieces.

So much has been said about owning a piece of Bristol Glass that you might well remember an old Aunt who had something that might be Bristol and go away and dig out a real gem.

Bristol is probably the most misused word in glass fancying. Some say it is transparent, some white and opaque, others collect odd bottles and dishes of coloured glass and are happy to believe they own a piece of Bristol Glass. I have talked to various people about the subject and I am forced to the conclusion that the only way one can be sure of being the possessor of genuine Bristol glass is to have a piece with a maker's name or style found in the glass, engraved or in gilt. The main business of Bristol was crown sheet glass and commercial bottle making although there are not many examples of this work about and I am afraid those that exist do not appear to have much value. The ware which is expensive and famous is the table glass artware and it is this material (which should not be confused with the other), that is generally accepted as Bristol Glass and was made by only a few concerns.

The story starts with public demand and a fancy for a white glass which had been enamelled, made in Germany called Milchglas. It was the glassmakers attempt to rival the hard paste porcelain of Meissen and Vienna and the soft paste of Chantilly. The Bristol glassmakers felt they should look into what might well be a lucrative product. They eventually came up with the idea that they could make the glass vessels and the decorators of the Bristol potteries might be engaged to do the decorating. What kind of things should they, or could they make? One thing noticeably missing was cups and saucers and teapots. It is thought that the poor heat resisting qualities of the new material were unable to stand hot liquids and when one reads that the material was a pure soft lead Potash Glass, this seems to the glassblower a valid reason. Tea caddies, jugs, sugar-bowls and various types of vases seem to have been the general run of things and of course various types of decanter sets. The latter were usually of a blue or green colour with the name of the wine or spirit in gold enamel fired on. Candlesticks and small condiment sets were also quite popular. Tapersticks holding tapers, giving off various scents when burning, were also made. The actual shapes of vessels was limited to the glassmaker's ability to mould or shape glass as distinct from the potter who could throw up almost any shape he liked on his wheel. A lot of articles were painted in oils and fired on lightly not very permanent but quite effective. Some glassware was transfer painted using the type of transfer we were all familiar with when young, the wet transfer stuck on the back of the hand, the backing pulled off and the design left behind. The favourite and best of all was enamel painting in colours and the oriental pattern was most popular. The decorators were quite taken by the famous "Long Elisa", the elegant lady who carries a sunshade. Rose motifs were also used. There are for sure some pieces of ware painted by Michael Edkins who was the most noted of the Bristol Glass painters. He was at one time a painter and decorator working on coaches, etc. He later worked on Bristol delftware and some of the plate in the Victoria and Albert Museum is attributed to him. He eventually set up on his own and it is interesting the very low charge compared with today he made for his work, for example "To lettering of a sauce bottle – one penny", "Four enamelled canisters – one shilling". It appears that all his time was not spent painting glass for he found time to sing at Covent Garden and appeared on the stage. His wife Elizabeth, daughter of a Bristol glassmaker, bore him thirty-three children.

It would not be right to end without saying something about the most popular known glass "Bristol Blue" (I do have part of the neck flange of a decanter). It is simply this – the only true "blue" as a colour has a soft rich brilliant hue, which inclines towards violet rather than purple. Anything else is likely to have come from Birmingham, Warrington or Sunderland. Since 1695 glassmakers have made "blue" all over the place. A vitreous form of Cobalt Oxide known as Smalt was available and had been used by the Venetians as a colouring agent. Fired with Potassium Carbonate it formed a dark blue glass. I mention this since its bearing on "spurious Bristol Blue" is pertinent, since imports of the material had increased over seven years from 180,000lb. to 286,000lb.

ABSTRACTS

EDITED BY

S. D. FUSSEY

GLASS

Phase Separation as seen by Electron Microscopy and Scanning Electron Microscopy.
T. H. Elmer, M. E. Nordberg, G. B. Carrier & E. J. Korda.
Jour. Amer. Ceram. Soc., 53, 4, 171, April 1970.
Microstructures of two sodium borosilicate glasses were examined, showing that the microphases increase with temperature and time of heat treatment, although the relative amounts of soluble and insoluble microphases were unchanged. Scanning electron micrographs show that the insoluble phase is randomly connected. J.M.

Mechanical Relaxations in Mixed Alkali Silicate Glasses. 2.
James E. Shelby, Jr. & Delbert E. Day.
Jour. Amer. Ceram. Soc., 53, 4, 182, April 1970.
The Internal Friction of Mixed Alkali-Silicate Glasses is interpreted and a direct correlation between the mechanical and electrical loss properties was found.
(See *Jour. Amer. Ceram. Soc.*, 52, 4, 169, 1969 for part 1). J.M.

Permeabilities of Helium and Deuterium Through a Borosilicate Glass.
L. C. Walters.
Jour. Amer. Ceram. Soc., 53, 5, 288, May 1970.
The permeabilities of helium and deuterium through borosilicate glass is studied relative to the cooling rate of the glass from the annealing temperature. J.M.

GLASS APPARATUS

A Greaseless Multi-Purpose Extraction Device.
W. den Hollander & B. van Zanten.
Chem. & Ind., 23, 742, June 1970.
A glass apparatus is fully described which can be used for a reaction apparatus, solvent distillation, continuous extraction, hydrogenation and sublimation. Teflon is used on all joints and stopcocks. J.M.

An Efficient Scrubbing Column for Effluent Gases.
J. R. Bacon & N. S. Daly.
Chem. & Ind., 21/London, 686, May 1970.
Details and diagram of glass apparatus for scrubbing toxic or hazardous reaction effluents, the volumes of which are too great for direct discharge through a fume cupboard vent. No hydrogen sulphide gas could be detected with lead acetate paper at the outlet, even when the evolution rate was at its maximum of 1.5 l–1. J.M.

An Apparatus for the Measurement of Apparent Densities of Solids.
D. Dollimore, G. E. P. Elliott, T. R. Hutton & R. Stock.
Jour. Sci. Instr., 3, 465, June 1970.
Constructional details of glass apparatus used to determine densities of particulate solids using a variety of liquids, including mercury, as the displacement fluid. Drawing. D.A.H.

Improved Viscometer for Vulnerable Fluids.
T. Tovrog & A. A. Krawetz.
Rev. Sci. Instr., 41, 3, 478, March 1970.
Full constructional and operational details of an improved viscometer for vulnerable fluids. T.D.R.

GLASS TECHNIQUES

Capillarity-Induced Smoothing of Glass Surfaces by Viscous Flow.
D. C. Cassidy & N. A. Gjostein.
Jour. Amer. Ceram. Soc., 53, 3, 161, March 1970.
Theoretical and experimental study of the smoothing rates of corrugations on glass surfaces. Technique allows determination of viscosity of glasses from 10^8 to 10^{12} p. A theoretical analysis of the decay of an isolated V-shaped groove by viscous flow is also presented. J.M.

MISCELLANEOUS APPARATUS

A Dilatometer for Determining the Rates of Moderately Rapid Reactions.
H. K. Hall, Jr.
Jour. Chem. & Indust., 15/London, 497, April 1970.
Alternative construction to Pasika and Fitch; simpler and permits the study of heterogeous reactions, using mercury as the travelling liquid. J.M.

A Sensing Device for an Automatic Liquid Nitrogen Dispenser.
R. Lambert & N. Singer.
Jour. Sci. Instr., 3, 463, June 1970.
A mercury-filled glass manometer, with platinum contacts, is operated by the temperature-controlled pressure within an attached, stainless steel, coiled tube which is located inside a dewar. The completion of an electrical circuit by the mercury and platinum contacts, operates a compressor to pump liquid nitrogen into the dewar. Drawing of manometer and circuit of sensing device. D.A.H.

Apparatus for Automatic Measurement of Rate of Oxygen Absorption, Particularly at Elevated Temperatures (¶150°C).
M. A. M. Bradley & A. D. Forbes.
Jour. Chem. & Indust., 15/London, 495, April 1970.
Continuous flow apparatus of improved accuracy and simplicity with oxygen uptake rates directly computed and plotted within temperature range to 300°C. Sample size 0.5–10 ml, air flow rate 50–120 ml. min–1 and overall oxygen uptake rate 0–3.6 ml. min.–1. J.M.

Self Powered Fraction Collector.
N. E. Boulting.
Jour. Chem. & Indust., 22/London, 717, May 1970.
A simple fraction collector utilising the effluent from the column to propel a syphon around a ring of stationary collecting tubes. J.M.

A Low-Temperature "Thermostat-Reactor".
P. A. Bristow & M. C. Whiting.
Jour. Chem. & Indust., 18/London, 590, May 1970.
Design for low-temperature, thermostatically-controlled reactor which will maintain temperatures down to —196°C to within ±2°C. Further methods of control are also described maintaining temperature within ±1°C. J.M.

Production of Micro-Steam Quantities for Dynamic Gas Flow Reactors.
M. Landau, M. J. Langford & G. Sniezko-Blocki.
Jour. Chem. & Indust., 18/London, 591, May 1970.
Details of apparatus for electrolytic conversion of water to hydrogen and oxygen, recombining near the reactoin site to give steam quantities as little as 3 ml/min. For use in the continuous dosage of d.t.a. experiments throughout the working day. J.M.

An Inexpensive Sieve Pump.
R. J. Withey & M. van Dyk.
Lab. Pract., 19, 6, 614, June 1970.
The vibration of two acoustic speakers mounted at opposite ends of a glass or metal tube cause a vertical pumping action across a sieve fixed within the tube. Under certain conditions, the apparatus described can produce in seconds a sieved equivalent to one week by conventional methods. B.R.W.

MISCELLANEOUS TECHNIQUES

Guide to Mechanical Tests for Brittle Materials.
Anon.
Mater. Engin., 71, 3, 60, March 1970.
Brief account of major mechanical tests used to evaluate ceramics and other brittle materials. J.M.

Construction of Glass Orifice Plates for Coulter Counter Sampling Tubes.
M. Priem.
Jour. Sci. Instr., 3, 464, June 1970.
A modified Myford lathe is used to slice thin capillary plates which are embedded in Araldite. Plates having 50 μm holes and thickness from 50–250 μm were made. Detailed account of modification to lathe and assembly of glass for cutting. Diagram. D.A.H.

The Measurement of Surface Temperatures with Platinum Films During Nucleate Boiling of Water.
G. E. Foltz & B. Mesler.
Jour. Amer. Inst. Chem. Eng., 16, 1, 44, Jan. 1970.
Describes simple and reliable method of constructing small platinum film thermometers on Pyrex glass. Used for measuring surface temperatures during nucleate boiling of water at pressures between 1 and 4lb./sq. in. absolute. The thermometers were accurate to $\pm 1°F$ with a response time of 145°F/msec. J.M.

An Improved Window for Low Temperature Use
R. W. Dreyfus & M. Okrasinski.
Rev. Sci. Instr., 41, 3, 476, March 1970.
A simple, reliable method of sealing a silver chloride window to a silver metal frame, using an r.f. induction heater. Dimensioned sketch. T.D.R.

VACUUM

Adapting Standard Vacuum Flanges to Low Temperatures.
A. C. Anderson.
Rev. Sci. Instr., 41, 3, 469, March 1970.
Short report on the use and method of application of indium between flanges in vacuum systems. T.D.R.

A Fast Acting All-Metal Gas Valve for Plasma Research.
B. Novak & S. Pekarek.
Rev. Sci. Instr., 41, 3, 369, March 1970.
Design and construction details of an electrodynamic, impulse operated, all-metal valve to permit gases to be injected into vacuum systems. T.D.R.

MISCELLANEOUS

Glass and Windows.
A. Pilkington.
Jour. Chem. & Indust., 6, 156, Feb. 1969.
Lecture on the history of glass windows and its effect on architecture. Information on production methods old and new. Windows having special properties such as resistance to heat and resistance to impact are also discussed. D.A.H.

A Simple Device for Bonding Fine Wires.
W. Gee & R. G. Slavik.
Jour. Sci. Instr., 3, 313, April 1970.
A portable device for joining wires in an inert atmosphere by resistance welding. Broken thermo-couple wires may be repaired without removal from the apparatus. Authors have welded wires having diameters of 75 to 750 μm. D.A.H.

Ceramics, Glass, Carbon and Mica.
Materials Engineering (*materials selector issue*), 70, 5, 296, Oct. 1969.
Tables of physical, mechanical and electrical properties, heat resistance and uses of ceramics, glasses, carbons and mica. Glasses listed include soda lime, aluminosilicate, soda zinc, high lead, borosilicate and silica. J.M.

Glass Ceramics.
P. W. McMillan.
Ceram., 21, 252, 16, Feb. 1970.
Description of the glass-ceramic process; Properties of glass-ceramics; applications in the field of consumer goods, mechanical and chemical engineering, electrical engineering, electronics, research and instrumentation. J.M.

The illustrations Figs. 1, 2 & 3 are of a Blue Glass Plate with Gold design by Isaac, Jacobs and various types of Bristol Glassware.

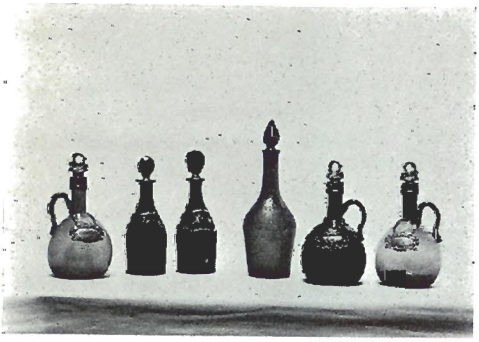

FIG. 2

Reproduced by kind permission of Bristol City Art Gallery.

FIG. 3

Some extracts from records and newspapers of the period:

Ibid. 3 Mar. 1792

"Wanted partner in Black Bottle House. Wanted partner in Flint Glass House. Replies to W. D. at the Post Office."

Daily Post 11 Nov. 1738

"Bristol, Nov. 11. Yesterday the Prince and Princess of Wales paid their promised visit to this City . . . The Companies of the City made a magnificent appearance in their formalities, marching two by two, preceding the Corporation and the Royal Guests. The Company of Glassmen went first dressed in white Holland shirts, on horseback, some with swords, others with crowns and sceptres in their hands made of glass."

Bristol Import and Export Books 1801

Summary of Glass Wares exported from Bristol during the first six months of 1801.

Total Amounts.

Bottles 364,796.

Also 1,376 baskets, 100 hampers, and 10 crates of bottles.

Window Glass (mostly Crown Glass).

8,935 boxes, 830 sides, and 312 crates.

Flint Glass.

262 crates, 121 boxes, 44 cases, 23 hogsheads, 18 tierces, 12 casks, 7 puncheons, and 1 basket.

Ports of Consignment and Numbers of Consignments

Cork (14)	Newfoundland (2)
Dublin (5)	Quebec (2)
Waterford (9)	Guernsey (8)
Wexford (1)	Jersey (9)
Newry (3)	Jamaica (3)
Belfast (2)	Trinidad (1)
Galway (1)	St. Vincents (1)
Limerick (1)	Barbadoes (1)
New York (5)	Martinique (1)
Charlestown (1)	Surinam (1)

References which I duly acknowledge:

1. Early Glasshouses of Bristol – Francis Buckley.
2. Glassmaking in Bristol – Arthur C. Powel (1926).
3. Journal of The Society of Glass Technology (1950).
4. Two Centuries of Ceramic Art in Bristol – H. Owen, F.S.A.

NEWS

FROM JAPAN

Directors of the Japanese Scientific Glassblowers' Circle (1968-1970). *Front from left to right:* Mr. Harada, president. Coe Gotoh with certificate of special membership of the ASGS, Dr. Asahina, chief councilor, Mr. Endoh, Advisor (father of Masami Endoh).

Recently, the British Society of Scientific Glassblowers, as represented by our chairman and our secretary, has entertained two visitors from Japan. Among other activities, both business and and social, they were shown over the Hirst Research Laboratories by Mr. J. Patrick of Messrs G.E.C.

Mr. Yoshio Kinoshita who is the President of the Kinoshita Rika Co. of Tokyo, has been touring the European and Scandinavian countries, attending industrial shows, conferences and industrial establishments.

The second visitor, Mr. Masami Endoh, an ambassador for the Japanese Scientific Glassblowers' Circle was much impressed by the hospitality shown him, and it seems certain that friendly developments will take place between their Circle and our Society. The first of these developments being a communication of goodwill and thanks from Mr. Coe Gotoh who is Director of the Japanese Scientific Glassblowers' Circle, who has sent us photographs relevant to their Circle.

One of the board of directors' meetings.

FROM SECTIONS

WESTERN

A visitor to the Western section in June was Paul McClarin.

Paul who is a glassblower at Queen's University, Belfast, spent four weeks at the School of Chemistry glass workshop at Bristol University. He was receiving instruction on lathe technique and also completing the Stage I course.

The Annual trip by the Western section in June, took us to the Ilminster firm of Gooch and Housego Ltd. Messrs. Gooch and Housego incorporate two other firms: Messrs. Brooks Crystals and Messrs. Megavolt Ltd.

We arrived at about 11 a.m. and while we had coffee Mr. Irish and Mr. Gooch gave us a brief outline of the firm. They are renowned for their fine quality of work in the optical field. The materials they work with are pure quartz, fused quartz, synthetic quartz and synthetic ruby. They also work with alumina based ceramics. For most of their work however, pure quartz is used, the material is mined in Brazil and they receive it in the form of large lumps . . . these lumps are cut up and the different crystal faces that are used have a direct bearing on the optical characteristics of the final piece of work. Each face of a lump of quartz is carefully selected for its own optical value.

We were shown around the firm by Mr. Gooch and Mr. Irish and were able to see the quartz being sliced up, ground and in some cases, lapped by hand. Because of the critical tolerances involved, very elaborate measuring devices were used. Most of the machinery used was very specialised and very expensive to buy.

Upstairs was the polishing department, lenses and other pieces of glass of various sizes were mechanically polished for many hours before a high standard of surface finish was obtained. Hand polishing was also carried out here.

Very expensive synthetic ruby is used to make laser face plates, and we were able to see a gas laser demonstrated.

After lunch we were introduced to Mr. Webster of Messrs. Brooks Crystals, he explained how the quartz discs and rectangular shapes were cut to size and ground by Messrs. Gooch and Housego. Brooks Crystals then took over and adapted them to make crystals mainly for electronic purposes. He showed us the assembly of the quartz crystal from start to finish. A female labour force carry out the operations in making up the crystals, and they did so with great speed and accuracy. On some of these operations, the work was so small, the operators had to work through magnifying plates.

This was a very interesting day for everyone who attended the visit, for we were very well received by our hosts Messrs. Gooch and Housego. The tour round their works was most enlightening, for although this side of glassworking is highly mechanized, great skill is needed to maintain the critical tolerances that are called for. The art of hand lapping and especially hand polishing is still very necessary during finishing processes.

I would like to thank on behalf of the Western section, Mr. Gooch, Mr. Irish and Mr. Brooks for looking after us so well and to wish Messrs Gooch and Housego a very prosperous future.

R. T. BATCHEN

NORTH EASTERN

On the 14th May, Mr. J. Beeson of Messrs. Jencons paid the section a visit in the Physics glass shop of the University of York. He brought with him a cylinder of natural gas and a wide selection of natural gas burners. The seventeen members who attended were able to try out the burners on show and discuss with Mr. Beeson and each other the problems that will arise when conversion takes place.

We would like to thank Mr. Beeson for giving us the opportunity to see the natural gas in action and for answering our questions so ably.

York University was once again the venue for the sections third meeting held on the 12th June. Hans and Horst Baumbach of Quartz Fused Products came to address us on the subject of silica.

We were told that in the 1950s silica tubing was made by hand with six blowpipes in a muffle furnace, the results being far from satisfactory. Today, largely due to automation, high quality silica tubing up to 800 mm o/d can be produced and experiments are being carried out with the aim of making precision-bore tubing.

We were shown a very informative film illustrating the method of making joints, spirals, flasks, etc., emphasis was placed on the fact that all tubing should be kept extremely clean.

Great interest was shown in the display of silica apparatus, glassblowing tools and natural gas burners, that had been arranged by Hans and Horst Baumbach.

It is a great pity that only fourteen of our members came along to this excellent meeting, given by two of the top men in the silica field.

R. HALL

SOUTHERN

May was the last meeting of the present season. The attendance was on the small side, only about a dozen members were present to hear a talk given by Mr. I. C. P. Smith on "Maths for the Glassblower". After arraying the walls with charts on measures of Length, Weight, Volume and Pressure, Mr. Smith proceeded to describe various units of measure with the same name but having different values. The American ton, for instance, which consists of 2,000lb. and the British of 2,240, the long or gross ton. The differences between the statute mile, international nautical mile and so on.

He then described how to simplify some calculations by remembering some volume comparisons:

The Volume of a Sphere = Volume of a cylinder which has same base Radius and a height of two thirds the diameter of the Sphere.

The Volume of a Cone = Volume of a cylinder which has the same base Radius and a height of one third of the radius of the Cone.

The Volume of a Hemisphere = Volume of a cylinder which has the same base Radius and a height of two thirds of the Radius of the Hemisphere.

This type of quick calculation is useful when estimating the amount of glass needed for shaping a cone or doming end of tubing such as for test tube making.

Mr. Smith expressed the hope that we made full use of a slide rule and explained how to calculate the bulb size and marking on a McLeod gauge. He then went on to show us his apparatus for measuring leaks on stopcocks. Having decided that the present method is by no means fine enough Mr. Smith has devised an extremely fine flow meter which can read not 1 ml. per sec. but the 25 thou. litre per sec. that he required. Although I made detailed notes of Mr. Smith's device it is, or soon will be, covered by patent so I will not attempt to describe it. All I will say is that it is ingeniously simple, cheap to manufacture and appears remarkably fine. Several stopcocks were tested and even the smallest leak was instantly apparent and measurable.

Mr. Smith's remarks about various forms of measure brings to mind some of those forms of weights and measure we have inherited from the past – Firkins, Kilderkins, Hogsheads and the like. Beautiful sounding names. Cloves and Wey (cheese and butter weight), the Wey in Essex being nearly a hundred pounds heavier than in Suffolk. Counties had their differences – a pole ($5\frac{1}{2}$ yards) in Lancashire consisted of 7 yards, while in Cheshire and Staffordshire it was 3 yards. A far cry from S.I. Units, but then it was in 1895 that a Select Committee of the House of Commons recommended the use of the Metric System and now, at last, metrication is being adopted. Yet I still have to convert the millimetres on my sketches and drawings to thousandths of an inch to enable the Toolroom to make the part needed.

On Wednesday afternoon, the 17th June, seven Southern section members had a very enjoyable visit to the Royal Aircraft Establishment. We were shown around by Mr. J. Brickles, the P.R.O., and accompanied by two of the R.A.E. glassblowers, Sid Collins and Alf Gardner.

First of all we went to the Laboratory where they test for rain erosion. A droplet of water is suspended in a web of aniline and perspex; then a bullet with a nose of the material to be tested is shot at the speed of sound, hitting the water so hard that the surface of the material is eroded. This shows how aircraft can be badly damaged by flying through rain. The operation is recorded by high speed camera. We then went to a restaurant for tea and biscuits.

After refreshments we were shown the biggest wind tunnel in Europe, twenty-four feet in diameter, worked by a huge propeller. An impressive sight even though it was not working.

A mini-bus then took us around the perimeter of the airfield to the accident centre where wrecks of planes are kept and recorded to find the cause of crashes. Great care is taken to sort out the many pieces into different piles and from such things as paint scratches and chippings, clues to accidents are often found.

Then back in the bus and the last stop, to the Glassblowing Laboratory where we saw several types of natural gas burners.

Thanks to everyone concerned for an interesting and worthwhile afternoon.

This month Vic Woolley has sent me an article taken from "The New England Journal of Medicine", Vol. 267, No. 16, October 1962. Sounds rather outdated, being eight years old, but a technician with whom he is acquainted recently received third degree burns from having Fluka "Durcapan" poured over his leg.

Tough and heat resisting, the epoxy resins are being used for adhesives, coating metal and castings. The liquid resins are irritating to the eye and skin. The catalyst, or hardener, however, can cause dermatitis and asthma-like effects, as it is usually a strong basic compound (pH 13 to 14) which can produce chemical burns to the skin. This can leave a permanent hypersensitivity with reactivity to amines which can be triggered off by faint amine vapours or small amounts of amine hardener being in the near vicinity.

Should you have occasion to mix resin and hardener do it in a well ventilated room or, preferably, a fume cabinet, wear protective gloves and clothing. Maintain cleanliness of work areas. Wash with mild soap and water to remove resin or catalyst from skin immediately and dry on paper disposable towels. DO NOT use organic solvents for this purpose as these can spread the contamination and are themselves irritants.

I am no expert on resins so do please accept this as information offered by a fellow glassblower. If you should have an accident go to your surgery or your doctor as soon as possible. In Vic Woolley's department they have been advised to use a 3% Boric Acid solution for the removal of contamination from the skin.

Natural gas is still causing a few bangs. The glassblower in our Research Department took a couple of days off recently to recuperate after an especially loud report that shook him rather badly. Had he worked in my department he would have been more used to minor explosions. Until I disposed of it, because of its repeated eruptions, I had a rotary sealing machine on which the gas seal was a carbon plate rotating on a metal seating: the plate continually clogged with powder, allowing gas to seep. The premix device allowed oxygen to overmix in the flame and the resultant explosion was enough to blow your hat off!

The explosions that have occurred when oxygen has filtered into Natural Gas appear to be usually due to the use of incorrect size of jet. The glassblower attempts to turn his flame down too far instead of changing to a smaller jet for a smaller flame. The total volume of NG/O_2 mixture is smaller than for TG/O_2 for the same heat output so the pressure is less. One remedy, therefore, is a jet with a hole about 80% of the previous jet size.

Another safety measure is to leave rubber connections tight but not wired. If, then, an explosion occurs it will blow the rubbers off rather than build up greater pressure.

R. J. W. HARVEY

British Society of Scientific Glassblowers

Results of Examinations held at Mabel Fletcher College, Isleworth Polytechnic, Bristol Technical College and Bristol University (New School of Chemistry).

1st June 1970
Scientific Glassblowing Stage One Course – Isleworth Polytechnic

W. Howell	Pass
A. Leeson	Pass
J. Garnett	Pass
T. Williamson	Credit
R. Clements	Credit
Davindra Dade	Credit
K. Bolton	Pass
M. Payne	Credit
A. Bennett	Credit

June 2nd 1970
Elementary – Isleworth Polytechnic

L. Knight	Pass
R. Savage	Pass
P. Kirk	Distinction
M. Field	Distinction
E. Collie	Pass
Manohan Singh Matharoo	Credit
T. Williamson	Credit
M. Friday	Pass

June 9th 1970
Elementary – Isleworth Polytechnic

Jarmail Singh Sekhon	Pass
R. Chapman	Pass
Soma Nand Bhalla	Pass
B. Wright	Pass
V. Gilbert	Pass
Newton Kwong	Pass
Domel Singh Grewal	Credit
Alimamy Mansary	Credit

July 9th 1970
Elementary – Isleworth Polytechnic

Susan Faulkner	Pass
L. Grace	Pass
J. Steed	Credit
B. Savage	Credit
R. Valentine	Distinction
R. Broomfield	Credit
Janet Corr	Credit

25th June 1970
Scientific Glassblowing Stage One Course – University of Bristol

P. McClarin	Credit

25th June 1970
Lathe Glassworking Stage One Course – University of Bristol

P. McClarin	Credit

March 19th 1970
Elementary – Bristol Technical College

M. R. F. Charrison	Pass
A. C. Greagsby	Pass
J. M. Evans	Credit

May 28th 1970
Elementary – Mabel Fletcher College

A. G. Smith	Credit
G. H. Pigott	Pass
P. J. Russell	Pass

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Applications are invited for appointment as glassblower. The person appointed will have a well equipped glass workshop and will be personally responsible for making and maintaining the scientific glassware as used in the research and teaching work of the Department. A familiarity with cold working techniques as applied to glass and ceramics, and of related laboratory arts, would be an additional advantage.

The successful applicant would take up the appointment at a time to be arranged, within the next six months. The initial salary will depend on the age, qualifications and experience of the candidate, up to a maximum of about £1500 P.A. with prospects of promotion later.

Applications should be sent to Professor N. Thompson, H. H. Wills Physics Laboratory, Tyndall Ave., Bristol BS8 1TL as soon as possible, and in any case not later than October 5th. The names and addresses of two referees should be given in the application, as well as details of previous experience.

SESSION 1970-1971

Glass Technicians' Course

A two year part-time day and evening course intended to assist the apprentice or trainee glass blower to acquire a background knowledge and the practical skill expected of a good craftsman. The syllabus includes:

Industrial Calculations: meters and instruments: materials of construction: services: fuels: temperature measurement: composition of glass: quality: manufacture: manipulation: sealing: durability: special glasses: related chemistry and physics: safety: English.

The course leads to the award of the Isleworth Polytechnic Glass Technicians' Certificate, and the British Society of Scientific Glassblowers Stage I Glassblowing Certificate.

Glass Manufacture and Processing

A part-time day and evening course providing a background for all engaged in the glass industry. The course leads to the City and Guilds examination (No. 362) in Glass Manufacture and Processing, Parts I and II.

Glass Technology

An introductory course to the technology of glass, mainly for those in the industry who would like some technical knowledge of the material they handle.

Scientific Glassblowing

Classes of practical instruction in scientific glassblowing suitable for teachers, scientists and laboratory technicians. Individual instruction is given, and the classes are suitable for both beginners and those who already have some skill. The instruction will include:

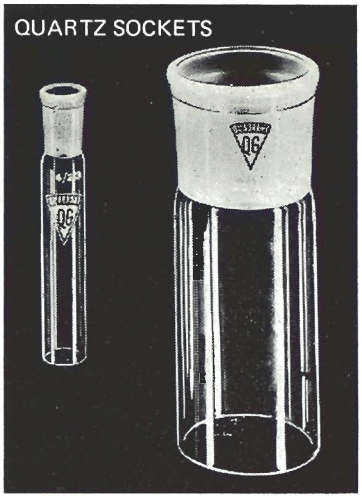
The use of soda glass and borosilicate glass. The use and care of standard joints, ball joints and stopcocks. Bench glassblowing, *in situ* glassblowing and use of the glassworking lathe. The detection of strain in glass and annealing. Glass-to-metal seals.

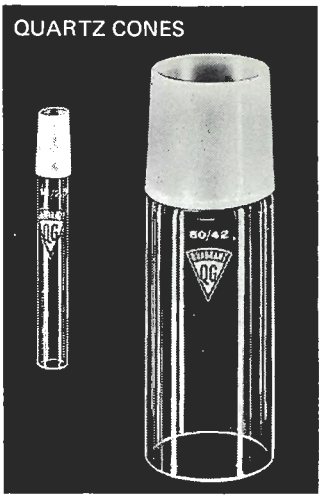
Numbers will be strictly limited on the courses and early application is advised.

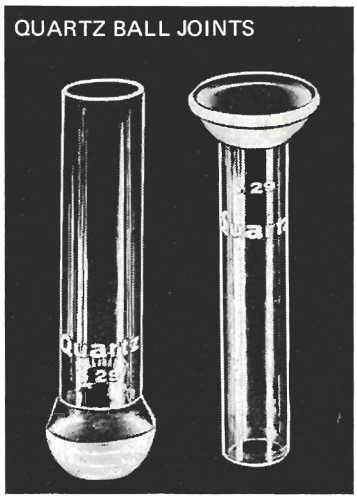
Enrolment 9th, 10th September 1.30–3.30 p.m.
6.00–8.00 p.m.

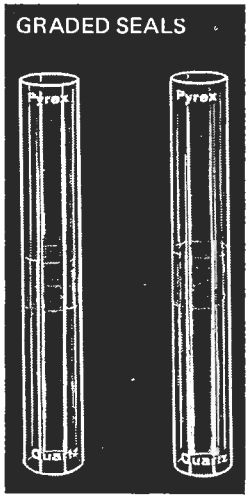
at Department of Science and Engineering, St. John's Road, Isleworth.

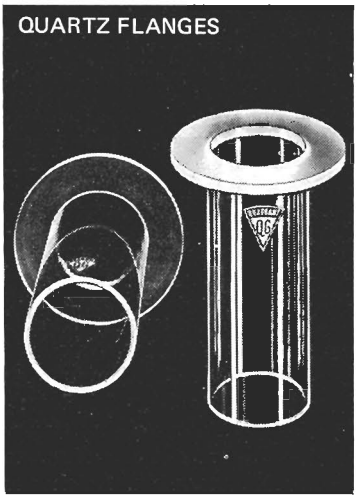
Further details may be obtained from the Head of Department of Science and Engineering, St. John's Road, Isleworth, Middlesex.

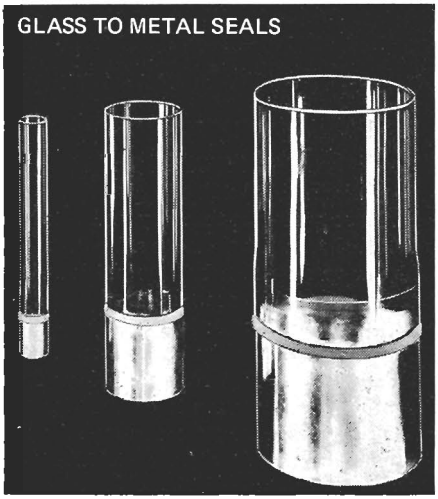












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