

Technical Inquiry

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The development of Antique and other glasses used in 19th- and 20th-century stained glass

PLATE 4 (*overleaf*): Detail of a Henry Holiday cast 'Puddle' slab, first made and used by him in the 1890s. The slabs were made at the Fulham Glass House, where he had a studio, by dropping glass rods and frit onto a hot metal plate. It was a rather casual process and the resulting glass was often poorly annealed and would not cut without flying, in which case it was melted down once again.

Glass painting at the beginning of the nineteenth century consisted of applying enamels to the surface of glass which was so thin and lacking in body that if any area was left unpainted it would appear to be a hole in the glazing.

One of the most influential glass painters of this time was Charles Muss¹ (1779-1824), enamel painter, etcher and stained glass artist, who worked in London and trained James Henry Nixon,² who later entered into a partnership with the London glazier Thomas Ward.³ John Pike Hedgeland⁴ managed the studio of Mary Muss after the death of her husband, Charles. Employed in the same workshop at that time was Benjamin Baillie, who together with Nixon worked on the restoration of the medieval glass in St Neot's Church, Cornwall, and on making new windows to complement the existing glazing. The other dominant London glazier at the beginning of the nineteenth century was Thomas Willement who made his first window in 1812. He also trained a generation of glaziers and glass painters, including William Warrington and Michael O'Connor.

Muss and Willement in their endeavours to restore medieval glass and make new stained glass windows had only three types of glass available to them: thinly spun crown glass that was made with kelp ash rather than wood ash; imported Continental cylinder sheet famed for its transparency and thinness; and flint glass⁵ – which had a little more body and richness of colour than the former. Transmitted light was controlled with enamel matts or applications of *couverte* on the exterior surface in an attempt to stop the thin glass glaring and to make it glow in the manner of medieval glass.

Kelp ash gave British crown glass unique properties because it reacted to silver stain by darkening from yellow to a ruby colour through repeated firing (FIG. 1).⁶ The three studios of Willement, Warrington and William Wailes⁷ (who had been making stained glass from 1838), all employed glass painters trained in the Georgian era. Many of them became practised in painting to match medieval glass by applying antiquing techniques such as splattering to simulate the effect of pitting and corrosion, and using matts to reproduce the patina of time.

In 1845, the restriction that only allowed glass houses to make either flint or crown glass – but not both – was lifted;⁸ as were many of the constraining excise duties and taxes which coincided with the neo-gothic building boom and an increase in stained glass commissions. A. W. N. Pugin, attempting to design stained glass with the qualities of medieval glass, believed that he could not achieve the results he wished for by employing the services of Willement, Warrington or Wailes and their glass-painting techniques. He also considered their work to be too expensive. In 1845 he persuaded John Hardman of Birmingham to establish a stained glass workshop and encouraged him to source new glass, in particular, a streaky ruby that emulated medieval glass from the glass manufacturer James Hartley of Sunderland.⁹

The quest for a medieval-type glass: Antiques and Rubies

A new type of glass was also required for the general restoration of medieval glazing schemes which were widespread at this time. In 1847, the Bristol-based

glass painter Joseph Bell was instructed by the Bristol and West of England Architectural Society (BWEAS) to buy ‘Ancient Glass for Painting on’ from the lead and glass merchants ‘Messrs Stock & Sharpe of Cannon Street, Birmingham’ for the restoration of the medieval glass in Bristol Cathedral. In the same year Pugin wrote ‘I found that flint glass was indispensable for richness of colour. Crown glass was cut with a diamond and had to be ground with a tool. This added at least 20 percent on the labour but I did not hesitate a moment in adopting it’.¹⁰ Undoubtedly this last reference was to a small crown (not the large thin spun sheet) that varied in thickness with an irregular surface and would have been difficult and therefore more expensive to cut into the intricate shapes found in mosaic stained glass designs. Harry Powell referred to it as ‘Much used crown glass – spun small not large’.¹¹

Messrs Stock & Sharpe, lead and glass merchants, would have acted as agents to James Hartley, amongst others, who was regarded as the expert maker of crown glass¹² and had moved from Chance of Birmingham¹³ in 1836 to start his own manufacturing works in Sunderland.

The Order Books of James Powell & Sons¹⁴ (Powell’s) reveal that ‘Antique’ glass first appeared in 1858 in a reference to a ‘Flashed blue circle on Hartley’s Antique Ruby’, sold by the firm to Hale church near Salisbury. Over the next few years the Order Books record more references to Hartley’s ruby or ruby sheet.¹⁵ Not long afterwards Chance Brothers advertised ‘Antique Sheet’ in the catalogue for the International Exhibition of 1862, and in 1885 Fred Miller in his book *The Training of a Craftsman* described the manufacturing of ‘Antique’ glass as being the same as crown glass, concluding that ‘Sheets of Antique are in the round’.¹⁶ The term ‘Antique’ was originally applied to these small spun crowns which possessed qualities that provided glazing with an antique appearance – just as glass painting techniques such as splattering were described as ‘antiquing’ processes.

Pugin had not been alone in wanting a new glass to reproduce the qualities of medieval glass. His quest ran almost parallel to that of the barrister and stained glass enthusiast Charles Winston, who had been an advisor to the BWEAS and Joseph Bell in 1847, and who knew all about Hartley’s antique crowns. In 1850 Winston was shown samples of ruby glass that Thomas Ward had received from James Hartley. Winston may have approached Hartley to manufacture his glass, but in fact it was Powell’s (who before 1845 had been manufacturing only flint glass)¹⁷ who agreed to make muff glass to the recipes of Winston’s collaborator, Mr Medlock.¹⁸ These recipes were the result of chemical analysis of medieval glass. In the light of Winston’s interest in medieval material, it is ironic that he championed the work of

FIG. 1:
Early 19th-century Cylinder Sheet glass with stained kelp glass centre. The origin of this glazed panel (discovered at the Fulham Glass House) is unknown.





FIG. 2: Chance 'Antique' sheet c.1930s, from the glass stock of the Fulham Glass House. A rare Gold Pink that survived only because it was so well concealed in the glass racks by its owner that he or she forgot all about it.

FIG. 3: Prior's 'Early English' Glass, showing slab side and bottom; manufactured in either the late 19th or early 20th century.



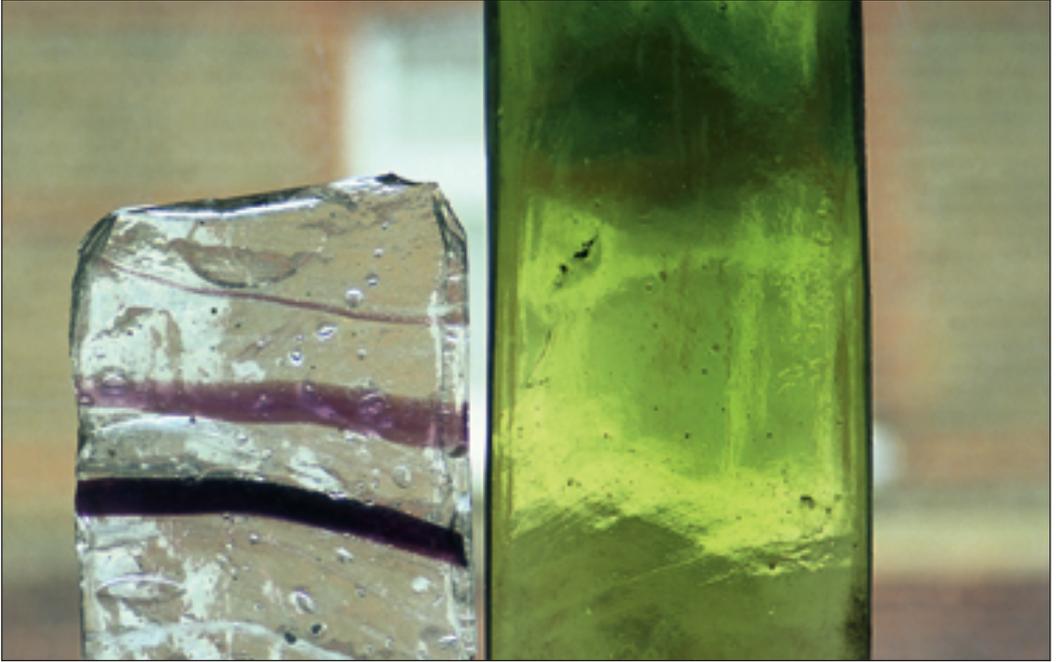


FIG. 4: Left, Prior's 'Early English' slab c.1900; right, Kilner bottle slab c.1930s, used by Lowndes & Drury. Evidently it was cheaper to cut up old or even new oblong Kilner bottles (when the tints were suitable) than it was to buy slabs.

FIG. 5: Left, Prior's 'Early English' slab c.1900; right, Hartley Wood slab c.1930s.

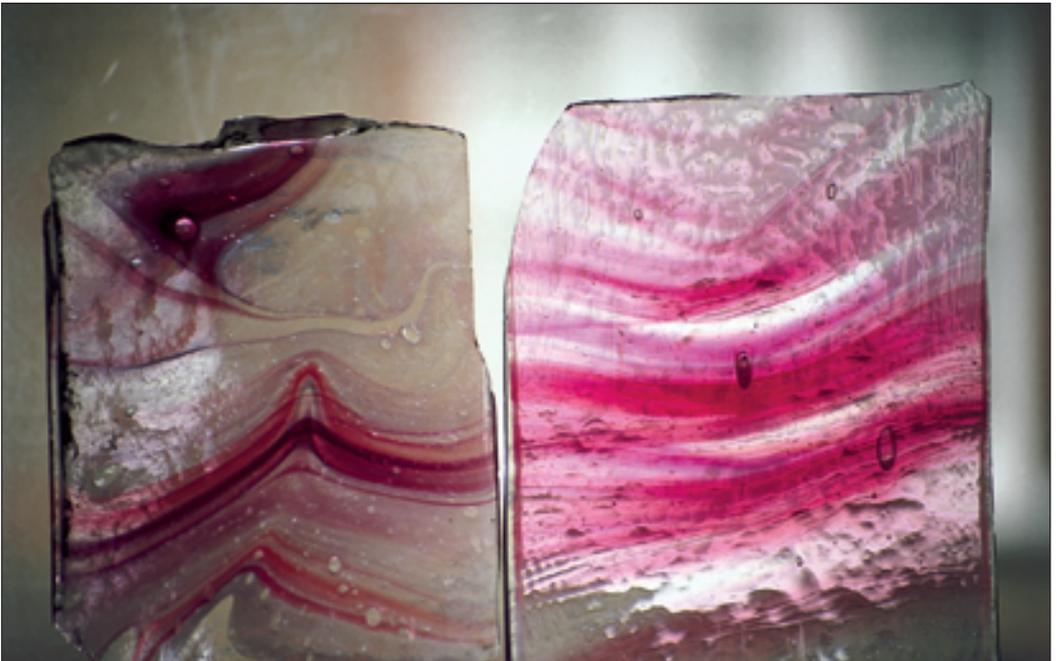




FIG. 6: 1970s Hartley Wood bottle presented by the firm to Carl Edwards for last large order of slabs manufactured for inclusion in the Great West Window, Liverpool Anglican Cathedral. The round top of the bottle was usually removed and thrown back into pot for re-use but on this occasion retained for sculptural effect.

too much with the metal, and the consequence is that the sheets for the most part come out all of a tint, instead of being streaky and clouded. What little does happen to possess the latter qualities, the firm naturally keeps for its own work, and thus the stained glass manufacturer cannot obtain what he wants most...²⁰

References to Winston's glass do not appear in the Order Books from 1862 until 1866, when a single reference was made to 'Winston's Antique' being sold and in the same year *The Builder* referred to the new 'Ward & Hughes' window at Lincoln Cathedral containing 'Winston's Antique Glass'.²¹ Harry Powell later confided in a letter to Christopher Whall that Winston's recipes had been lost by the time he began working at Powell's Glass House in 1875.²²

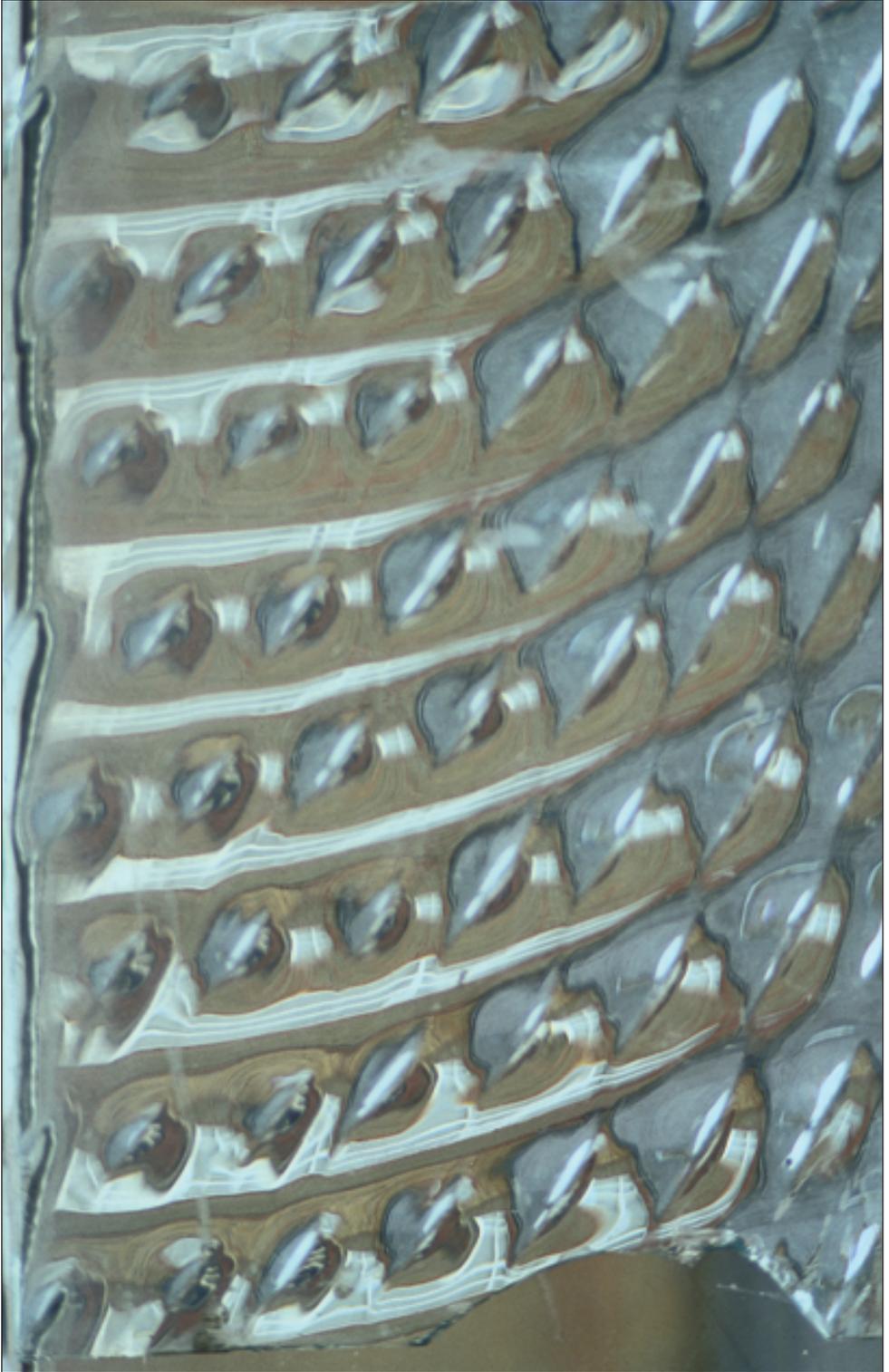
George Hedgeland, who was not an exponent of mosaic stained glass. In 1852, the year of Pugin's death, the first window to include Winston's glass was designed and made by the firm of Ward & Hughes and installed at the Temple Church, London.¹⁹

1855 marked the founding of three important Victorian stained glass firms: Clayton & Bell; Heaton & Butler (later with Bayne); and Lavers & Barraud (later with Westlake) – all initially employing a 13th-century style of linear glass painting supported with half tones and with some areas of glass left unpainted. However, there is no evidence that any of these studios used Winston's streaky glass – although they did use some variegated pot metals that must have been manufactured as a result of Powell's experimental glass-making.

Sales of 'Winston's' glass appeared in the Powell's Order Books until 1862, when they stopped abruptly. The fact may be explained by William Burges who wrote:

... the former has been made from receipts furnished by Mr Winston, who has devoted a great deal of time and care to the analysis of the old glass. Unfortunately Messrs Powell will persist in blending the colour

FIG. 7: Venetian glass first manufactured in the 1860s for secular decoration. The West window of Lecroft Church, Bridge of Allan (visited during BSMGP 2005 Conference in Scotland), designed and made by Alf Webster in the early 1900s, includes an exquisite range of Venetian glass in an extensive palette. Although he used the glass for drapery effects in this window, it was more usually included to highlight specific areas of the glazing.



Streaky muff glass, however, was manufactured during this same period by smaller independent manufacturers including Jesse Rust²³ whose glass was used by the architects John Pollard Seddon and William Burges, amongst others.

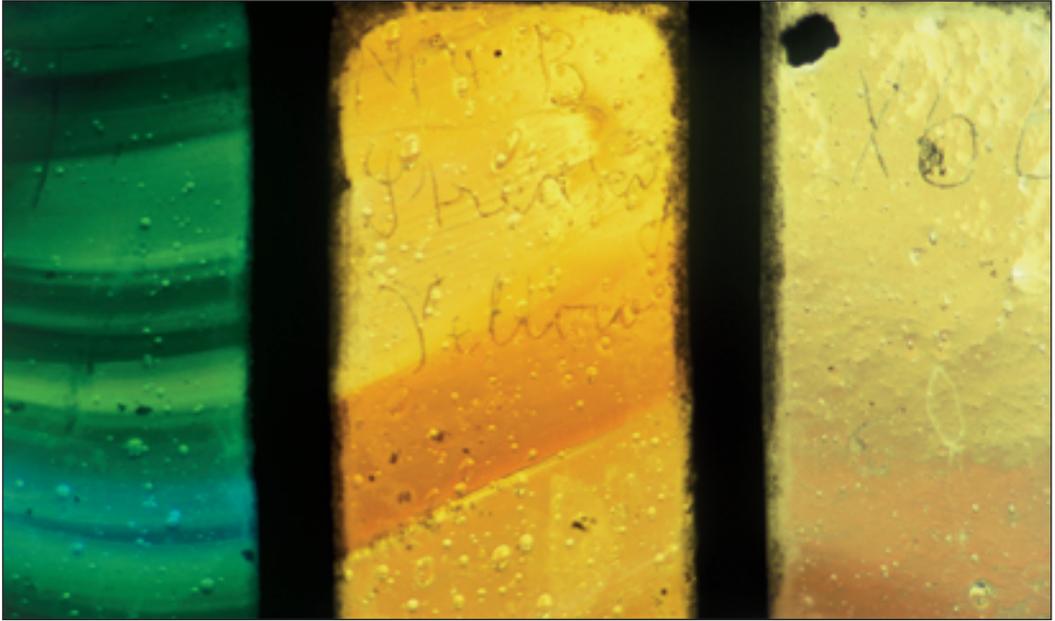
Prior to making Winston's glass, Powell's had begun to manufacture their own muff glass²⁴ soon after 1845 – apparently to be used in restoration as well as for new work; for example, in 1849 an order appeared in the Books for '2 Angels painted by J. T. Howell on Powell's Muff glass' for Cranoe Church in Leicestershire. Other orders included one in 1853 for 'Our own Muff Glass' and '50 sheets of Spread Tinted Green Muff' in 1857 for Joseph Bell.²⁵ The evidence suggests that Powell's muff glass and Winston's glass were two separate products and that Powell's appears to have been the main producers of both types of glass – until W. E. Chance of Birmingham²⁶ began manufacturing his own muff glass.

W. E. Chance has been credited with making an antique glass as early as 1862,²⁷ when he would have been only eighteen, but there is no evidence to support this claim. He was certainly manufacturing glass after 1869 and dominated the market by 1879, when James Hetley of Soho²⁸ became his agent for London and the South East of England. He was able to do this by supplying the large studios with the glass they specifically requested. His glass at this time had a soft appearance and included many of the secondary and tertiary colours that formed the palette of the 'aesthetic' designer (FIG. 2).

In 1934 John Thomas Hardley, a glass blower who worked with Chance, recalled that from 'the very first pot of Antique made' it was a standing joke that Chance had 'only one customer and that was Hardman's'.²⁹ But the Hardman

FIG. 8:
Powell's 'Pressed
Slab', first
manufactured in
the late 19th
century. Usually
well annealed and
easily cut,
although they
undulate to a
depth of approx.
1cm in places.
They lack the
clearness of
colour that
mouth-blown
slabs possess, but
their diffusing
quality allows
them to be used
unpainted
(although they
can be re-fired).
Primarily glazed
with the
undulating surface
on the exterior of
windows to
exploit the ever-
shifting positions
of the sun. White
pressed slabs were
often included by
Arts & Crafts
designers like
Paul Woodroffe
in areas of
glazing requiring
the purest
radiating light.





firm's early windows show no evidence of a glass that has the qualities of Jesse Rust's or Winston's glass, and by the time of Hardley's recollections all British mouth-blown pot metals used for stained glass windows were called 'Antique', and 'Streaky Antiques' and 'Flashed Antiques' were variations of this range. They would have fulfilled Winston's demand that:

... if the glass, held at arms length from the eye and at the distance of more than a yard from an object does not permit of the object being distinctly seen through it, the glass will be sufficiently opaque: and when held at the same distance from the eye, and at a distance of not more than a yard from the object, it permits the latter being distinctly seen through the glass, it will be sufficiently clear and transparent.³⁰

George Wood (b. 1823) assisted Chance from 1870-1880 in 'the initial years when the difficulties of furnace construction and the making of special colours and rubies was largely overcome'.³¹ An experienced colour mixer, he had previously worked for Lloyd & Summerfield of Birmingham. His son, Alfred Wood, also worked with Chance as a colour mixer until he departed with his recipes in 1893 to become a partner in Hartley Wood & Co. of Sunderland by 1895. On his arrival they made an Antique muff glass for the first time.

Importantly, the quest of Pugin and Winston to find a glass that possessed similar qualities to medieval glass had focussed on discovering a good 'Streaky Ruby'. In 1849 Pugin had used John Hardman to mediate with James Hartley, who sent him a variety of samples including a ruby sheet with a stain applied that needed to be fired in the kiln to 'bring the colour out'.³² Winston was aware of Hartley's endeavours because Thomas Ward had also been encouraging Hartley to produce a streaky ruby for restoring medieval glazing and had shown the resulting samples to Winston. In 1850:

FIG. 9:
A detail of samples of Antique sheets and slabs produced by the firm of May & Baker in the early twentieth century (the initials M and B engraved on the glass could also stand for Miller and Beale, SEE note 28). The special manner in which these few samples were leached up and the distinctive colouring and texture of the glass sets them apart from other glass samples found in the Fulham Glass House.

Charles Winston called attention to a piece of modern ruby glass, made by blowing, in express imitation of some ancient glass of the thirteenth century and early part of the fourteenth century, in March last year by Mr Hartley of Newcastle [*sic*], at the instigation of Mr Ward, the glass painter. This was Mr Winston believed, the first instance of such an imitation; and although the glass produced was not identical with the original model, yet it certainly came nearer to it than any other substitute.³³

Thus, the ruby glass³⁴ sold by Powell's could be the same as that found in windows by Clayton & Bell or Morris & Company. However, although it may have been bought from Powell's, this glass could have well been made by James Hartley. The problem of copper ruby was resolved by George Bontemps³⁵ on behalf of Chance Brothers in 1857, by making one 'that did not darken when fired in the kiln'.³⁶ Bontemps was also the first manufacturer in the nineteenth century of a flashed ruby – made in 1826 while he was at the Choisy-le-Roi factory in Paris.³⁷

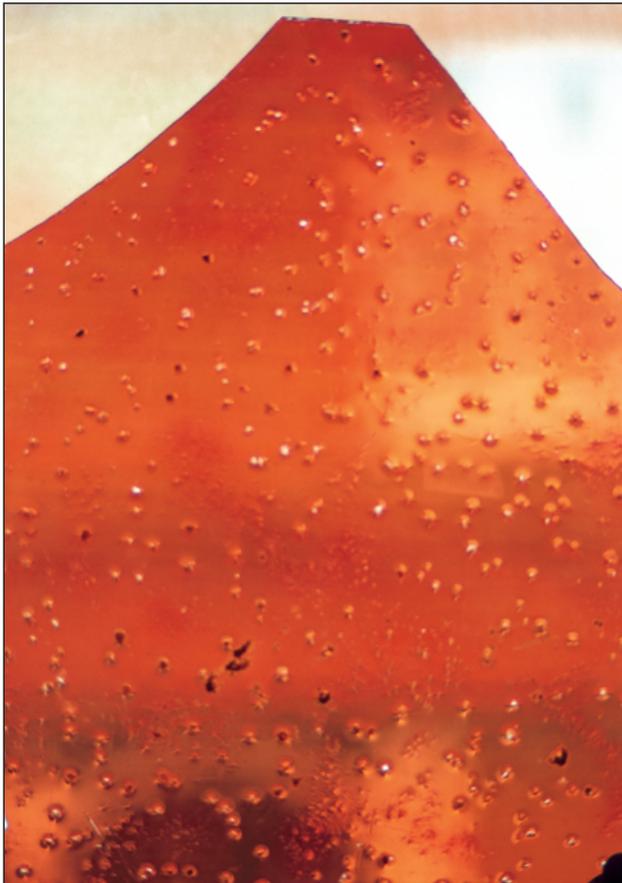
A new era

1889 marked the beginning of a new era of glass-making, just as 1845 had done. Britten & Gilson, of Southwark, London, drew up a contract with the architect E. S. Prior to produce a glass under his name called Prior's 'Early English' (FIGS. 3, 4).³⁸

This was a bottle glass made by blowing a ball of glass into an oblong metal mould, leaving a bottle that could be cut into four flat rectangular sides and a base, which became known as slabs. One of the men involved with the manufacture of this glass seems to have been William J. Blenko, an experienced bottle blower who later emigrated to America and founded a glass-making dynasty there.

Prior's 'Early English' had all the inherent bumps, variety of thicknesses, streaks, colour variegation and foreign bodies that Arts & Crafts designers needed for their windows, and led to a greater freedom in glass-painting techniques. The diffusive qualities of the glass allowed James Hogan in the 1930s to develop a linear style of glass painting that had no half tones – only supportive lines that strongly echoed the techniques of 13th-century painters.

The favourable response to Prior's 'Early English' gave an opportunity to other manufacturers to imitate it. Chance marketed their so-called 'Norman Slabs'³⁹ and Powell's and Hartley Wood produced



their own slabs as well as antique muff sheets that possessed many slab qualities (FIGS. 5, 6). The introduction of these slab glasses reduced the need for the small spun crowns described earlier, which declined in popularity, and the term 'Antique' after 1889 was applied to the new muff sheet glass, which was widely used by Arts & Crafts designers. It first appears in the Powell's Order Books in 1891,⁴⁰ ordered for Charles Spooner to be used in the glazing of a church in Ipswich. The second order was for Louis Davis.⁴¹

Arts & Crafts designers were also stimulated to work with heavy decorative glass such as 'Venetian' and 'Venetian Ripple' that had been made by Powell's as early as 1869, but had thus far only been used for domestic or secular schemes (the National Portrait Gallery in London has examples of Venetian in the entry hall, immediately on the right-hand side after entering the building.)

The end of the nineteenth century saw stained glass designers working with a variety of slabs, some thinner than antique sheet and just as easy to cut, and fancy glasses such as: 'Venetian Ripple', made by blowing a glass ball into a cone shaped metal mould with an internal screw pattern; 'Venetian' (FIG. 7), made by initially blowing a glass ball into the same mould as Venetian Ripple and afterwards into a similar shaped mould that had a reverse corkscrew pattern; and 'Pressed Slabs' (FIG. 8), made by pouring molten glass into a square wooden mould and then lowering a lid which impressed a softly undulating pattern into glass. Pressed Slabs were used by Henry Holiday (SEE PLATE 4, p. 183) and William Blake Richmond and others from the early 1890s, and designers such as Leonard Walker continued to have Powell's make bespoke pressed slabs for them well into the 1950s.

Plating⁴² was frequently used by Arts & Crafts designers, including Henry Holiday, Henry Payne and particularly Sylvester Sparrow, to achieve darker passages of colour instead of using applications of matts. When tone was applied it was often done so with a dry stipple allowing light to seep through. Black paint gave line work a dramatic impact when applied to silvery white slabs and the variety of rubies and gold pinks on offer created an intense and pyrotechnically vibrant palette that reached a peak in the work of Veronica Whall, Karl Parsons and Harry Clarke in the 1920s and 1930s. The acquisition of more interesting but expensive glass, and a more thoughtful treatment of it, always came at a price. For example, the Christopher Whall window of 1904 in Ashbourne Church, Derbyshire, was proportionately four times more expensive than the contemporary East window of C. E. Kempe's firm.⁴³

Conclusion

Winston is quite rightly regarded as a major figure in the development of 19th-century mouth-blown glass but, rather like Pugin, he was a compulsive writer and tended to exaggerate his own importance. James Hartley and his thoughts, ideas and achievements are not on record and thus his legacy is more difficult to establish and his importance more difficult to define. However, Winston's glass as made by Powell's was commercially available for no more than a decade before it mutated into a muff glass different from the one manufactured by Powell's prior to about 1860. It is

FIG. 10: (*opposite*)

A sheet of 'Sanded Ruby' c.1930s. One of the sides retains the indentations of the rough sand or grit on which the glass was laid while still soft. The resulting texture distorted and diffused transmitted light in a manner that reduced glare. Studios also fired individual pieces of cut glass that were placed on a bed of sand in the kiln, a technique which produced similar results to 'Sanded Ruby'. An example of this technique used on an unpainted white muff glass can be found in the Lavers & Barraud clerestory scheme (early 1860s) at Kingston Parish Church.

apparent that Winston's glass proved unacceptable to the majority of commercial stained glass firms⁴⁴ – indeed Winston blamed Richard Clayton for not buying his glass, and, as noted above, the rubies used initially by Clayton & Bell in the late 1850s and early 1860s may well have been made by James Hartley. However, the variegated pot metal blues which were often used unpainted must have been made by Powell's and today we would certainly describe these as being 'English Antique'.

Clayton & Bell were always a commercially successful company and Chance Brothers are reputed to have closed their window making department in 1865 because they could not compete with their prices. Cost might have made Winston's glass unpopular with some makers who may well have been paying more per square foot for the smaller, thicker sheets than for other larger, thinner sheets. J. R. Clayton supported the glass-making endeavours of W. E. Chance – not only because of his wish for a certain type of glass and a more extensive palette – but also because it came at a price he was willing to pay. It is perhaps no coincidence that William Burges's stained glass maker, W. Gualbert Saunders, who sourced a more expensive streaky glass almost certainly made by Jesse Rust, was forced to flee to the continent to avoid his debts.

Evidence does exist to show that the quality of glass improved and a wider palette became available to glass painters in the early 1860s.⁴⁵ The new glass had an impact on the appearance of contemporary stained glass, whose style was further altered by the availability of Barff's ready-made glass paint.⁴⁶

A decline in stained glass commissions began at the start of the First World War and naturally led to a steady decline in glass manufacturing. Chance ceased production in the 1940s, followed by Powell's in the 1970s. Hartley Wood dwindled slowly and inevitably towards liquidation in the 1990s. The truly golden period of glass-making extended only from 1889 to c.1914.

In the post-war years, the closure of many stained glass studios established in the nineteenth and early twentieth century meant that much information about the raw material of glass was destroyed. Although documentary archives were removed and preserved along with the remaining cartoons and sketches, glass samples were usually ignored. Fortunately, surviving glass stock from the Fulham Glass House revealed that Prior's 'Early English' slab bases had been stamped with the product name, enabling other slabs to be identified. Many extant smaller samples of Antique sheet had been collected over decades. Long since unattainable, these included Hartley Wood, Chance and Powell's, as well as the firm of May & Baker (FIGS. 9, 10). The latter produced trade samples of slabs and streaky Antiques which can be identified by initials scratched into the surface of the glass. In future, the glass samples and remaining glass stock of a studio facing closure should be treated with as much respect as its sketches and cartoons. Too much information has already been lost.

The development of 19th- and 20th-century mouth-blown glass played a major part in the evolution of stained glass design, with each continually reacting to the advancements of the other. The firm identification of glass from samples and other archival information is now essential for both historians, restorers and conservators, who continually handle material they are unable to identify. And, significantly, contemporary designers who complain about the price of today's glass should remember that an age never existed when the best glass was cheaper. In 1903, Sylvester Sparrow wrote 'Gold-ruby is confined almost entirely to "Early English", in which it reaches a price calculated to freeze your young blood, and make each particular hair stand on end'.

This paper is an edited version of an illustrated lecture presented at the BSMGP's conference Glass Painting 1800-1900: Aesthetics, History, Conservation held 28 February – 1 March 2005.

ACKNOWLEDGEMENTS

I am grateful to Dr Michael Kerney for his work on the James Powell & Sons Order Books and the information he has made available to me, also to Martin Harrison FSA and his book *Victorian Stained Glass*, Peter Cormack FSA, Neil Moat, and Keith Hill.

All photographs are by the author and show samples from the glass stock of the Fulham Glass House, with the exception of the pressed slab shown in FIG. 8, which is from the glass stock of Edward Woore.

NOTES

- ¹ Charles Muss was the son of Boniface Muss, an Italian artist who moved to Newcastle where Charles was born, and then to London. Charles worked with William Collins in London and trained many glass painters, including Joseph Backler, William and Alfred Essex, George Hoadley, John Martin and a Mr Jones who ran the glass painting department at Choisy-le-Roi (See 'Report of Meeting of Royal Institute of British Architects (18 May 1840) when Mr George Godwin read a paper on the present state of glass painting in England).
- ² James Henry Nixon became a partner of Thomas Ward until he was replaced by his assistant Henry Hughes in about 1850.
- ³ Thomas Ward's father established a business in Frith Street, London from 1822, when he advertised as 'Draughtsman, Decorative Painter, Paper-hanger and Gilder'. Thomas junior first worked on stained glass from 1825-1828 restoring medieval glass at Wragby Church on the Nostell Priory estate. Sophie Rakes, 'A Cultivated Eye for the Antique', *Apollo Magazine* (April 2003).
- ⁴ The proceedings of the Old Bailey, Ref: T18250407-230: 'William Hannell, theft, simple grand larceny, 07 April 1825. Indicted for stealing, on the 17th of March, 100 Lbs. weight of coloured glass, value 20L, the goods of Mary Muss, widow.' Giving evidence, John Pike Hedgeland stated 'I am in the employ of Mary Muss. I did not know the prisoner, and never saw him about the premises.' Benjamin Baillie, also a witness, stated 'I have seen the prisoner about our premises occasionally, but not often; our stock was taken, and we missed a quantity of glass.'
- ⁵ Flint glass also called 'Crystal', or 'Lead Crystal', is a heavy and durable glass characterised by its brilliance, clarity, and highly refractive quality. Developed by George Ravenscroft in 1675, it ushered in a new style in glassmaking and eventually made England the leading glass producer of the world. Flint glass can be so much denser than crown glass because it contains lead, a very dense element.
- ⁶ Kelp glass was manufactured from the 1620s when regulations stopped the use of wood ash during the glass-making process as a component part or for firing the kiln. The charcoal makers were damaging the woodlands and had to be controlled. Powell's had stocks of kelp glass specifically manufactured for them at the end of the nineteenth century by Britten & Gilson to use for restoration. A 'Staining Sheet' was available in the early twentieth century; this was a white Antique sheet flashed on one side with Kelp glass.
- ⁷ William Wailes employed china painters in 1848 after the closure of the Derby Porcelain Works. Edwin Prince remained with the firm as a glass painter for over twenty years.
- ⁸ In 1834 Robert Lucas Chance introduced an 'Improved Cylinder Sheet' with the assistance of George Bontemps and French glass blowers using a German process to produce finer quality and larger panes (the 1861 Census lists a number of French glass blowers working in Hartley's Sunderland works who had moved with him from Chance, including Louis Andre). This glass was used to glaze the Crystal Palace. The process was used extensively until early in the twentieth century to make window glass. From that period onwards machines were developed to automate the production of obscured glass and later, window glass. The repeal of the glass excise duty in 1845, by removing the financial advantages bestowed upon crown glass manufacturers, placed Chance of Birmingham, Hartley of Sunderland, Cookson of Newcastle

and Pilkington, all of whom had started to produce sheet glass by the cylinder process, in a stronger competitive position than those firms which continued to make only crown glass.

- ⁹ John Hartley married Margaret Stevenson in 1802 at St Peter's Church, Monkwearmouth, Durham (Margaret was related to a William Stevenson who married James Kyall's eldest daughter, Margaret, on the Isle of Man in 1766. James Kyall's grandson John James Kyall later became a partner in Hartley Wood). John Hartley and Margaret moved to Dumbarton, Scotland, where their son James Hartley (1811-1886) was born, and in 1812 the family moved to Nailsea, near Bristol, where John Hartley worked for Robert Lucas Chance who had recently bought the glass works. John Hartley was headhunted by Robert L. Chance for his expertise in manufacturing crown glass, and in 1827 he transferred to the Chance glassworks in Oldbury. In 1832 his son James Hartley and Robert Chance toured Germany, France and Belgium studying new methods in manufacturing cylinder sheet. With the assistance of George Bontemps and some French glass-blowers they began to manufacture a 'New improved cylinder sheet' alongside crown, plate and broad or spread glass. John Hartley died in 1833 and his sons James and John Hartley were made partners in Chance Brothers, but in 1836 they moved to Sunderland and by 1837 had founded the Wear Glass-Works. *The Illustrated News of The World* (6 December 1862), 357 described the immense size of the works and the range of products they were producing: 'The coloured glass, for which Messrs Hartley have obtained such a great popularity, is blown as in ordinary sheet glass, or rolled as in case of patent rough plate, the colouring material being placed in the pots during the melting or founding process.' In the 1861 Census James Hartley is listed as a 'Glass Manufacturer Employing 450 Men & 240 Boys'.
- ¹⁰ Jim Cheshire, 'Joseph Bell and the Revival of Glass-Painting in the Nineteenth Century', *The Journal of Stained Glass* XXII (1998): 31.
- ¹¹ Harry J. Powell: *Glass-making in England* ([Cambridge: The University Press], 1923).
- ¹² *West's 1830 Directory of Warwickshire, the Birmingham Index*, reveals that Chance Bros was called 'The British, Crown Glass Company, Smethwick' with Hartley as Manager.
- ¹³ Robert Lucas Chance managed the Nailsea factory in 1810, but in 1815 sold his share in the glass house and went to London where he worked as a glass merchant. In 1822 he acquired the Thomas Shutt glass works in Spon Lane, Birmingham, and built the firm up over the next thirty years. 'Chance Brothers & Co's extensive Glass Works, in Spon Lane, are the largest crown and sheet glass works in England, and employ about 1200 hands. Here was made nearly all the glass for the Crystal Palace, erected in London in 1851'. See William White, *History, Gazetteer and Directory of Staffordshire* (Sheffield: Printed for the author, 1851).
- ¹⁴ I am grateful to Dr Michael Kerney, who has searched the James Powell & Sons Order Books for this information.
- ¹⁵ Powell's Order Books reveal how they acted as agents for James Hartley from the 1850s, selling their tints and glass already stained and painted.
- ¹⁶ Sylvester Sparrow refers to spun sheets: 'Powell's also make their glass into circles of about 12 inches to 14 inches in diameter. These are richer than flat sheets, of which they seem to be a concentrated form.' See 'The Stained Glass of the Future Part 1', *The Art Workers Quarterly* 3, 7 (July 1903). By 1903 spun sheets were no longer called 'Antique', which had become a term only applied to muff sheet.
- ¹⁷ At this time Powell's already manufactured pressed flint glass quarries that were sold already painted and stained. The rough and obscure white glass was thought to have some of the qualities of medieval glass.
- ¹⁸ The Wolverhampton Chronicle (30 November 1853) contains a description of the restoration of Bushbury Church: 'The windows were all painted and restored by Messrs. Ward and Hughes of Frith Street London. An unusual degree of interest attaches to these windows in consequence of their having been composed of, or restored with, glass made by Messrs. Powell of Whitefriars from analyses of ancient glass, furnished them by Charles Winston Esq. and C. H. Clarke Esq. and made either by these gentlemen or Mr. Medlock, late principal assistant at the Royal College of Chemistry. The repeated experiments and untiring exertion of Mr. Winston are most praiseworthy, in as much as he has been mainly instrumental in producing a glass of entirely different kind from any used within the last five centuries; and the best proof of its identity with glass of that period is the fact that in the restored windows it is absolutely impossible to distinguish the new material from the old: the present is the first instance wherein the glass of two dates have been so strikingly and successfully used together.'

- ¹⁹ *The Ecclesiologist* (February 1853): 178. One of the windows of this scheme still exists (furthest west in the round of the church) and the quality of the unpainted background blue glass is clearly visible.
- ²⁰ A letter to *The Builder* (3 August 1861): 529.
- ²¹ I am grateful to Dr Michael Kerney for this information from the Powell's Order Books.
- ²² I am grateful to Peter Cormack for this information.
- ²³ Jesse Rust was born in 1816. In 1861 he was a 'Glass maker employing 10 men & 7 boys' and was still manufacturing glass for windows and for mosaics in 1881. A report of the Ecclesiological Society meeting (5 April 1865) stated: 'among items laid before the society... [were Jesse Rust's] mosaics and glass for stained glass.' I am grateful to Peter Cormack for the information that Jesse Rust's glass continued to be manufactured by the firm of May & Baker after he ceased his involvement with glass-making.
- ²⁴ Muff refers to a cylinder blown to half the size of what is blown to make cylinder sheet. (The term muff presumably derived from the name for an article of women's clothing – a type of tubular glove that hands could push into from opposite ends.) Examples of old muff sheets measuring 12 by 14¹/₂ inches were shown at the BSMGP's conference *Glass Painting 1800-1900: Aesthetics, History, Conservation* held in London 28 February - 1 March 2005. The height of the sheets matched the distance from the inside of the elbow to the fingertips. The samples came from the studios of Joseph Bell of Bristol and the Fulham Glass House, London, and were smaller than standard Antique sheets which measured 23¹/₂ by 15¹/₂ inches.
- ²⁵ I am grateful to Dr Michael Kerney who has thoroughly researched the Powell's Order Books for this information.
- ²⁶ The 1861 Census records that William Edward Chance was an 18-year-old 'Glass Manufacturer Clerk' living at home with his American mother, Cordelia Chance, and his father, George Chance an 'Annuitant', who was the brother of Robert Lucas Chance.
- ²⁷ In *English Stained and Painted Glass* (London: Oxford University Press, 1954), 61, Christopher Woodforde gives the date for W. E. Chance making 'Antique glass' as 1863, but this date is taken from Stokes's article of 1934 (see note 29), and he appears muddled over the quotes of Alfred Wood in the same article.
- ²⁸ James Hetley continued to be the agents for Chance until the firm ceased glass making, after which they became the agent for Hartley Wood & Co. who had previously been represented in the South East of England by the London glass merchants Miller, Beale & Hider (previously Miller & Beale). Harry J. Hider (described in the 1901 Census as a Lead Glass Merchant, b.1867) joined the firm some time before 1902. See Harold T. Broad, 'Reminiscences of Miller Beale & Hider LTD', *The Journal of Stained Glass* XVII, 2 (1978-1979): 73.
- ²⁹ Thomas Stokes, 'W. E. Chance and the Revived Manufacture of Coloured Glass', *The Journal of the British Society of Master Glass Painters* V, No 4 (October 1934): 170. John Hardman quoted the glass blower John Thomas Hardley (aged 82 in 1934) who worked for W. E. Chance from 1869, as saying that Hardman had been the only client of W. E. Chance 'at the beginning'. A James T. Hardley is listed in the 1881 and 1901 Census as born in 1842 in Smethwick, Staffordshire, and working as a glass blower.
- ³⁰ Letter from James Hartley to John Hardman, quoted in *The Journal of Stained Glass* XXI (1997): 7.
- ³¹ Stokes, 'W. E. Chance And The Revived Manufacture', 170.
- ³² *Ibid.*
- ³³ Stanley Shepherd, 'A.W.N. Pugin and the Making of Medieval-Type Glass', *The Journal of Stained Glass* XXI (1997): 5. Shepherd refers to *Proceedings at a Meeting of the Archaeological Institute* on 3 May 1850 which contains this quote. His article is essential reading for those interested in this subject.
- ³⁴ The Powell's Order Books show half a sheet of 'Hartley's Ruby' sold by them in 1849 and in the same year 'Hartley's Tinted, Stained & Painted'. It would seem they were willing to sell whatever they couldn't make better or cheaper themselves. Keith Hill has recorded the use of ruby glass, treated with acid to provide an Antique streaky appearance, in an 1860 Henry Hughes window in Ruthorall Church, Kent, and in other locations, suggesting that sheets of flashed ruby were sold pre-acided, mainly to be included in borders.

- ³⁵ Georges Bontemps (1799-1884) was the director of the Choisy-le-Roi glass factory from 1823-1848. Here in 1827 he began the production of opal glass and later opened a stained glass workshop directed by 'Edouard Jones', an Englishman, who returned with Bontemps to Birmingham in 1848 to work for Chance (see 1851 Census).
- ³⁶ Powell, *Glass-making in England*.
- ³⁷ M. Grimbolt founded the Choisy-le-Roi glass manufacturing factory in Paris in 1821; it closed down in 1851.
- ³⁸ Sylvester Sparrow refers to Prior's 'Early English' in 'The Stained Glass of the Future Part 1' *The Art Workers Quarterly* 3, 7 (July 1903). 'In flukes and accidents... it is particularly rich. When the heavier chemicals sink to the bottom of the pot, the last few bottles that are made from it of it are streaked and varied in colour in a most wonderful and beautiful way... The moment "streakies" appear, up goes the price fifty percent'.
- ³⁹ *Ibid.* Sparrow notes: 'The retailers of 'Norman' boast that although many architects specify 'Early English' they do not get it. When I mention that you can get 'Norman' for 3¹/2d. per slab, and the lowest price of 'Early English' is 6d. per slab, the reason of the substitution is obvious.'
- ⁴⁰ *Ibid.* Sparrow claimed that Powell's made the very finest Antique glass: 'Although it has not the brilliance and body of "Early English", it has those qualities in a much higher degree than other makers of Antique... "Early English" has more light, Powell's "Antique" more tone; so that one would use "Early English" for effects of light and brilliant objects, and Powell's "Antique" for the parts requiring tone.'
- ⁴¹ I am grateful to Dr Michael Kerney for this information from the Powell's Order Books which refers to Powell's own manufactured glass being ordered in house – to be used in windows manufactured in their own workshops.
- ⁴² 'Plating' is the technique of inserting layers of different pieces of glass into a single lead. A blue piece of glass, for example, could be doubled up with a ruby to produce a dark purple. Henry Holiday began using this technique in the early 1890s after meeting La Farge, in New York, who freely plated layers of glass. The liberty Holiday experienced after leaving James Powell & Sons and establishing his own workshops meant he could use these more expensive techniques. They were relevant, for example, to Rose windows, allowing the glass to achieve darkness without excessive applications of matts. Harry Clarke plated flashed glass that had been etched with hydrofluoric acid almost compulsively for decorative effects, while Leonard Walker achieved notoriety by plating as many as three slabs in a single lead.
- ⁴³ I am grateful to Dr Michael Kerney for this information.
- ⁴⁴ *Ibid.*, Sparrow refers to William Morris as a '...tradesman who buys in the cheapest market, and sells in the dearest' and admonishes him for only using Powell's Antique at the beginning of his career and abandoning it '...In favour of inferior and cheaper sorts of Antique...'. However, for a more objective discussion of Morris's interest in glass manufacturing, see Peter Cormack, 'Le Nouveau à la recherche de l'Ancien: le Style et les Matériaux dans les vitraux Arts & Crafts de 1880 à 1930' in *Dossier de la commission royale des Monuments, Sites et Fouilles*, 7. *Art, Technique et Science: la Création du Vitrail de 1830 à 1930* (Liège: Commission royale des Monuments, Sites et Fouilles de la Région wallonne, 2000), 57-64.
- ⁴⁵ See comments on the 1863 glass in the West window of Kingston Parish Church included in Dr Michael Kerney's article in this issue (p. 78).
- ⁴⁶ Christopher Whall in his *Stained Glass Work* (London: John Hogg, 1905), 226, states: '... red-lead-coloured pigments, started by Barff's formula... could not be used on pure white glass, and therefore pure white glass was discarded and greenish white used instead.' Frederick Settle Barff (1823-1887) was from 1871-1879 professor at the Royal Academy (Chemistry) and a Fellow of the Chemical Society of London.