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Stained and Painted Glass

by G. S. Bazley
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PRESIDENT'S ADDRESS ON "STAINED AND PAINTED GLASS."

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Ladies and Gentlemen,—A study of the presidential addresses which have been delivered from time to time at your Annual Meetings discloses not only the eminence of the gentlemen who have hitherto been selected for that office, but also the diffident and apologetic tone in which they have respectively approached the task before them. But what is to be said when an archæologist of only three months' standing ventures to address a learned Society on one of their special subjects (Stained and Painted Glass), his own acquaintance with that subject being of extremely recent origin? I think that such an undertaking can only be warranted by the confidence that the circumstances justify, to an unusual degree, an appeal to your indulgence.

Let me disclaim, however, any intention of anticipating the extremely valuable and interesting lecture on the Fairford windows which will shortly be given by the Vicar, to whose energy and enterprise the windows may be said to owe their preservation, and who is, therefore, better qualified to speak on that subject than any living man. But it may be interesting simply as an introduction to the subject if we refresh our memories on one or two points. First, in the history of stained and painted glass; and secondly, in the modern art of making a window.

Another way to describe the subject is: "How a Stained Glass Window differs from a Picture"; for to the uninitiated I think that a stained glass window is apt to appear a somewhat roughly-drawn and crudely-coloured *picture*, disfigured by staring black lines as if it were badly-mended china. But when one discovers the meaning of such expressions as "brilliancy" and "translucency" applied to

VIRTUES, BY SIR J. REYNOLDS, NEW COLL., OXFORD.

early glass, it becomes evident that the art in question has certain special qualities, as well as special limitations, all of which are more easily understood after acquiring some knowledge of the technique. It has been well remarked, "In order to appreciate windows one must have developed a *glass eye*." Now, as to the history of the art, Pliny's story of the discovery of glass by certain fishermen will always be attractive; but there is another theory, for which we are indebted, not to Pliny, but to *The Times*' reprint of the *Encyclopædia Britannica*. It is, that straw and reeds contain in a crude form the chief component parts of glass; that when a rick is burnt down lumps of coarse glass are occasionally found in the ashes, and that the ancient Egyptians who used much fuel in the shape of reeds for their smelting furnaces, may have thus made the discovery of glass.

However, once discovered, colouring in imitation of precious stones was a natural step. A well-known instance is that of Aventurine glass, which was made by Venetians in very early times in imitation of the stone of that name, and the effect of which is due to the reflection of crystalline spangles of oxide of copper, produced by exposing glass treated with copper to a reducing agent. Again, blue glass in windows was for centuries known as "sapphire," and red glass is still technically called "ruby." So the origin of coloured windows may have been due to the idea of jewellery, set in plaster or stone instead of in gold.

Or the idea may have been taken from Cloisonné enamel, an art which was practised as early as the eighth century. As Mr. Westlake says, "Place a cloisonné enamel vertically, substitute lead lines for the copper cloissons, and transparent for opaque glass, and you have a coloured window." But whatever may have been their origin, the world is ultimately indebted for them to Western civilisation, for in the Italian churches side windows were unnecessary, owing to the very different quality of light in those latitudes (thus one sees how in the Pantheon at Rome a small circular opening in the roof lights the whole vast interior), and the opaque mosiac

pictures of Italian churches were naturally replaced by coloured windows in more northern climates.

Now, if we watch, in imagination, the methods of a glazier about a thousand years ago, we see that he has before him a number of small pieces of coloured glass (for it was as yet produced only in small pieces) of about seven different colours only, and that he fits them together like a puzzle, each colour, or even shade of colour, being represented by a separate piece, and joins together the whole with lead strips. He has two chief difficulties to overcome: first, to prevent, so far as possible, the lead lines from interfering with the design, and secondly to avoid weak points in the construction. For instance, if any piece of glass had to be cut into the shape of an hour-glass, it would be strengthened by a lead joint at the waist. It has been said that the earliest glaziers "thought in lead, and designed in lead." And as an Irishman once defined a net as "a number of holes, joined together with pieces of string," so an early window consisted, in the artist's mind, of a number of coloured spaces connected with lead lines.

In following the history of coloured windows, we ought to trace the course both of design (or treatment) on the one hand, and of technique, or workmanship, on the other. In other arts, such as painting and sculpture, the enquirer is, in a manner, solely concerned with the design. The materials and the methods employed are, I believe, of comparatively slight importance in determining the date of any particular work of art; but in glass painting the possibilities of variation in design are naturally very limited. Such variations have been due, generally speaking, to the influence of the contemporary schools of painting and of architecture. For instance the costumes of the figures and those representations of a stone canopy which are usually seen in the upper part of windows followed the current fashions in dress and in architecture; or, to speak more strictly, as the glass-painters were a conservative race, they often copied a style which had become old-fashioned. Thus glass of the

"Early Perpendicular" period would show a "Decorated" spirit in its architectural details.

To quote a few salient points in the history of style:

In the thirteenth century the design is very flat and conventional, in fact archaic; also medallion windows (a name which explains itself) may be generally ascribed to this period.

In the fourteenth century the drawing is already somewhat improved; there is more life and action in the figures, and conventional ornament is dying out.

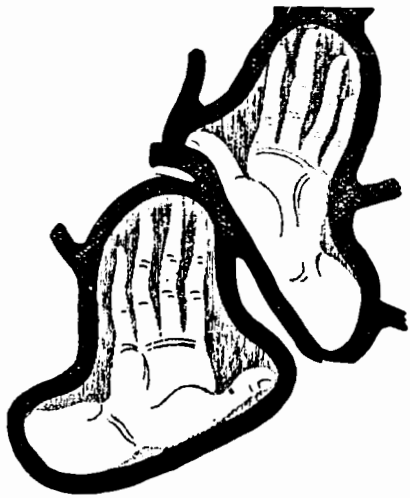
In the fifteenth century we find less colour in windows; white glass often preponderates; also this period is often recognisable by the exaggeration of the canopies. (To the end of this period belong the Fairford windows—about 1500. Regarding their authorship, one may just notice the statute passed in 1483, "on the petition of the glaziers of London and other large towns," against the importation of painted glass.—2nd Richard III., cap. 2.)

In Renaissance windows (about the sixteenth century) the subjects are frequently extended across several lights, disregarding the mullions; also, instead of the severity of early ornament, this style is often distinguished by festoons of flowers, ribbons, cupids and similar devices. Of the seventeenth century style, it may be enough to say that it became more and more like a picture and less like a window.

Now, as to the history of techique. At first, as has been said, the artist confined himself to piecing together bits of glass, each of one colour throughout (this has always been known as "pot-metal," from being coloured by the addition of certain substances while in the melting-pot). But he soon began to call in the aid of a certain brown enamel—not by any means as a pigment, but, in the first place, for drawing outlines, such as the eyes and nose (for which purpose the lead strips were not only too clumsy, but, if used to outline, say, the fingers of a hand, the narrow enclosures they caused would soon be choked with dust); also to obstruct light where shading was required, as in folds of drapery; and,

lastly, to correct, or, as photographers say, "retouch," the rough outlines given to the glass by his chipping-tool.

This enamel was, and is, composed of metallic colouring matter (iron, manganese, or copper) mixed with pounded glass. The effect was that on placing a piece of glass so painted in a furnace, the pounded glass fused, and the surface of the solid glass itself becoming slightly softened, the enamel was, as it were, welded to the surface, and therefore indestructible.



The shading required was produced, in different periods, by different modes of applying this brown enamel, such as stippling, scratching-out, and cross-hatching; but the general principle soon became "to take out lights instead of putting in darks"—like the system of line-engraving as opposed to mezzotint.

The next improvement in technique was the introduction, early in the fourteenth century, of a new process, called yellow stain. By painting the surface of glass with a solution of silver (either oxide or sulphuret) and firing it in the kiln, it was found that a delicate yellow tint was produced in the part so painted, and not only on the surface but *in* the glass, and absolutely permanent. Lapse of centuries has shown that this stain has also the great advantage of preserving the glass. It will be noticed how the outside of the Fairford windows is honeycombed almost all over with thousands of little pits (due to the gradual dissolution of the alkali in the glass by the action of the weather). Now, one of the specimens of early glass kindly lent by Mr. Bazeley from his collection shows in a most interesting manner how

the portions of glass which were treated in this way are practically free from pits. I fancy, however, that this result is either entirely confined to, or much more marked in, cases where the stain was applied to the back of the glass. This was generally done where much brown enamel was used on the front, otherwise the two applications would "run" into one another.

Now this new process, neither an enamel nor a pot-metal colour (and it can generally be distinguished from pot-metal yellow by its cooler and purer tint), was a godsend to the glass-painter, for it enabled him for the first time to have two colours next to each other without a strip of lead between One has only to look at the halo of a saint, and the hair of almost all figures in windows, to see what awkward lead lines were thus avoided. Again (though this discovery came later), blue glass could thus be stained green, and red glass orange, etc., enabling, for instance, the foliage of a tree to be represented on the same piece of glass as the blue sky, or green grass against the edge of a blue robe, without the necessity of a separate piece of glass for each colour.

A third great resource, also discovered in the fourteenth century, was due to the use of "coated" or "flashed" glass. Ruby and blue pot-metal were often made with a backing of white glass. The ruby, especially, is so intense and deep a colour that if it went right through the effect would be almost black: so ruby glass is only white glass veneered with red. As Mr. Day describes it, "The colour is only the jam upon the bread." Now, an ingenious person discovered that by grinding away the film of red, a white spot of light showed through, which could be enlarged, of course, to any size. (This is illustrated by another of Mr. Bazeley's specimens, where white pin-holes appear in red glass—the ruby film evidently being in this case on the *back*, and attacked by "pitting.") So, where the glazier wished to represent, say, pearls on a red robe, or a white centre in a scarlet flower, he could accomplish it without "leading in" the white separately from the red; if he chose, he could go

a step further, and after abrading a patch of the ruby coating, he might apply the yellow stain to part of the white ground so obtained, thus actually producing three separate colours with a single piece of glass, instead of three pieces joined together, which his predecessors would have used. It is obvious that other variations would result from using, say, ruby glass "backed" with blue, or yellow "backed" with purple. Modern glaziers escape the tedious abrading process by the use of fluoric acid, which dissolves away the coloured film like magic.

Here the legitimate methods at the disposal of the glass-painter end, and they are practically those in use at the present day. But it is plain that all these improvements tended in one direction—namely, dispensing with the leads; and whereas the early makers of windows designed primarily in lead-work, which by itself, without any colour at all, would give a fair idea of the picture, the glaziers after the fifteenth century began to consider leading as a necessary evil to be avoided as far as possible. Forgetting the special qualities of glass and the purpose of windows, they tried to make them resemble oil-paintings, and with this object introduced a wholly new and most pernicious method—the use of coloured enamels, which were necessarily opaque or nearly so. It became the practice towards the end of the sixteenth century to glaze windows in large rectangular panes, to discard all coloured glass, and deliberately to set to work to paint a picture on the

window. It is evident that this method, known as the "Enamel Method," is as different as possible from the "Mosaic Method" hitherto described, and it had three great defects:

First.—The lead strips, being no longer used for the outlines of the drawing, now became ugly black bars running across it, and making the figures look as if they were in a cage; and as the bars were kept as far apart as possible (to make them less obtrusive) the glass was less strongly supported than in the old method. *Secondly.*—The glass lost its special quality of translucency or brilliancy, it assumed a dull, cotton-woolly aspect, all the "jewelled" effect was gone, and the light struggled through in one monotonous blurr. *Thirdly*, and worst of all, the colours rapidly deteriorated and decayed; they flaked off, sometimes in large pieces, and visitors have been known to gaze reverently at a much-dilapidated window, thinking it is old, whereas it is comparatively modern, but instead of growing mellow, like early glass, has merely become shabby.

Perhaps the most striking instance is that of the well-known designs by Sir Joshua Reynolds in the great west window of New College, Oxford. Comparing these exquisite but rather woolly figures, disfigured by the straight black lines of the lead-work, with the rich and lustrous effect of the fourteenth century windows on either side, it is sad, on the one hand, to think of valuable window-space so unsuitably filled, and, on the other hand, to see such beautiful designs wasted by being executed in such a perishable medium and exhibited in such an ineffective manner.

It may be asked, Why should these coloured enamels flake off, if the old brown enamel was permanent? The answer is, that the early artists were not afraid to use good hard enamel, and a fierce heat to fuse it to the glass; whereas the user of coloured enamels feared to risk his delicate tints in a very hot furnace, and so was tempted to use borax as a flux, whereby the enamel fused more easily, but was imperfectly welded to the glass. Windows are naturally

exposed to extremes of temperature, under which the glass slightly expands and contracts; now, these coloured enamels not being so hard as the glass to which they adhered, had a different rate of expansion and contraction, and, so to speak, the paint and the canvas sometimes pulled in different directions, so the paint had to crack off. It may also be remarked that when brown enamel *did* perish it was not so noticeable.

Thus we find several rough-and-ready tests for criticising a window and determining its date, in workmanship alone, quite apart from the evidences of style; such are, brown enamel and the different methods of shading; yellow stain; abrasion of coated glass; and also the thickness of the film itself, which has varied from $\frac{1}{8}$th of an inch in the twelfth and thirteenth centuries to about $\frac{1}{100}$th of an inch in the present day; and, lastly, the use of coloured enamels.

[Since this address was delivered a further test for age in glass has been suggested to me by Mr. F. F. Tuckett, F.R.G.S., whose interesting paper, "On Some Optical Peculiarities of Ancient Painted Glass,"[1] deals with the curious fact that whereas modern windows throw patches of colour on the floor or walls of a building, early glass fails to do so.]

As regards the modern process of window-making, it may be interesting to notice that the glass used (crown and sheet glass) is still made by hand, with few more appliances than were in use two thousand years ago; consequently we get certain imperfections which are not found in mechanical processes, but which are most valuable artistically; as, for instance, variations in thickness, and therefore (in coloured glass) in depth of tint. These naturally-shaded pieces are much prized by the glazier, who sooner or later finds a use for every irregularly-tinted bit. In "coated glass" especially the film is liable to taper off, giving a range from dark red to palest pink on one piece of glass. An excellent example of this is the representation of the "Soul in Hell," at

[1] *Proceedings of the Clifton Antiquarian Club*, 1887-8.

Fairford, the red-hot bars rising to an almost white heat in the centre of the picture. Similarly, in King's College Chapel, a beautiful marbled effect is produced by using a piece of "spoilt ruby" in the representation of certain columns. There is *one* valuable quality in early glass which obviously cannot be reproduced; namely, the growth of lichens, which in the course of centuries gradually spread over the surface, and which undoubtedly contribute a soft and mellow effect. One is reminded of the question which is ascribed to an American tourist, as to the secret of the perfection of English lawns, and of the reply of the old gardener: "We rolls it and we mows it, and we waters it—for hundreds of years."

In the production of the different pot-metal colours, again, modern science has not very materially improved upon early methods. The fine sand, before it goes into the melting-pot, is saturated with the required metallic solution (such as copper for red, iron for yellow, cobalt for blue, gold for pink, manganese for violet) and then dried, leaving the metal in the sand. "Coating" is simply effected by dipping the white-hot bulb of glass, before it is blown, into a pot of coloured glass in a liquid state. And here may be noticed a somewhat new departure, of recent date, originating in America. Mr. Tiffany, whose exhibition this summer (1899) at the Grafton Gallery, in London, attracted much interest, carries the dipping process above described a step farther. In his method, the molten bulb is "charged" or dabbed with spots of colour of various shades and sizes; then, as the bulb is expanded by blowing, these patches of colour expand with it into streaks and veins of every conceivable form. It is claimed that by this means can be produced every marking and outline required for foliage and flowers, sea and sky, and that the use of brown enamel is unnecessary, and is, indeed, wrong in principle, for Mr. Tiffany considers that a window should be composed of glass in the state in which it leaves the glassblower's hands. With this object in view, when the leadwork does not suffice

for all the outlines required, he resorts to such devices as modelling in the glass before it hardens by cooling, producing a kind of bas-relief; by this means he represents, for instance, folds and wrinkles of drapery; or he joins several thicknesses of glass together, sometimes to a depth of two or three inches, in such a manner that the edges of the inner pieces, when seen from in front, show a faint outline through the outer surface. It may, however, be objected that by the use of this variegated and opalescent and extra thick glass much light is lost, and that a church with such windows would be extremely dark; and though in theory the use of brown enamel may be wrong, still it appears to actually enhance the brilliancy of glass by the force of contrast. In other words, shading "throws up" the light parts. Nevertheless, Mr. Tiffany's windows are the only ones which resemble the earliest glass, in that they are strictly neither "stained" nor "painted."

We are now, perhaps, in a position to say something about what can and what cannot be done in this art; in other words, how a coloured window differs from a picture.

Plainly, the *material* is different: glass derives its effect from transmitted, not from reflected, light; indeed, a building should have all its windows coloured or none, since reflected light kills the glass.

And the method of *production* is different, for in windows the range of colour is limited and they must be constructed like a mosaic, whereas a picture is painted all in one piece.

And the *purpose* is different, since the function of a window is, or should be, to admit light; here, therefore, are further limitations as to amount of shading and deep colour, and also as to size and shape, which do not apply to a picture.

And the *position* is different, for windows are seldom "hung on the line;" often, as in the case of the clerestory, they are "skied," so what is wanted is a rich or, as it is often called, kaleidoscopic effect, at a distance.

If I may say so, the fault of many modern windows is that their subjects are too conspicuous, often to the point of aggressiveness; their figures are too distinct, and stand out too sharply from the background. Thus such windows lack the mystery and the dignified reserve of early glass; they are in such a hurry to tell their story that they seem to shout it at you as soon as you enter the church. Much of the charm of windows like those at Fairford consists, I think, in "the pleasure of surprise." There is almost the fascination of a child finding faces in the fire or castles in the clouds. One is always discovering some new feature, some new fancy of the artist (often merely indicated by symbol); and meanwhile, even if one makes no effort to interpret their story, the colour-effect is both satisfying and restful. On the other hand, certain modern windows seem to assert themselves and challenge attention almost like a pictorial advertisement in a London thorough fare; and whatever may be the qualities most appropriate to a church window, surely it should not resemble a poster!

And if it be objected that the windows at Fairford are "grotesque," the answer would be that so are the gurgoyles, and that a certain rude force and monumental character are more in keeping with the severity of Gothic architecture than to the more ornate and florid beauty which distinguished later schools of glass painting.

NOTE.—The materials for this address are largely borrowed from the works of Judge Winston, Mr. Westlake, and Mr. Lewis Day, to whom I am much indebted; and I have to thank Mr. B. T. Batsford of 95 High Holborn, for the four illustrations from *Windows*, by Mr. Lewis Day.—G. S. B.