

Fig. 1. The Middle Temple dial, signed and dated Baptista Sutton, 1627. Middle Temple Hall, east window. Even at this early date, Sutton had already adopted the cross patée to represent midday.

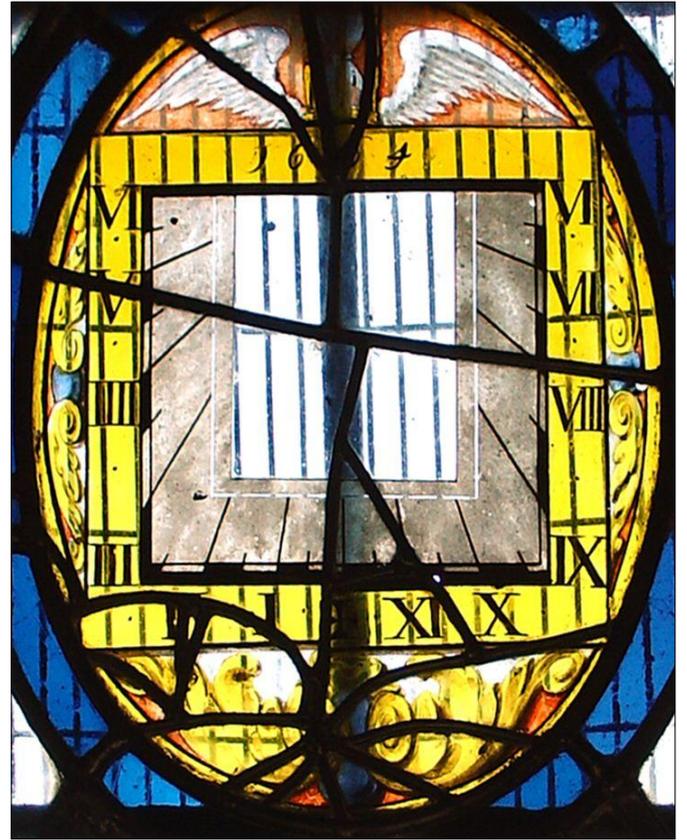


Fig. 8. The Widdington dial, 1664, showing the narrow band of unadorned matt paint inside the hour-lines, which appears on London dials after about 1656. The fly is damaged by repairs, but its head is visible just left of centre.

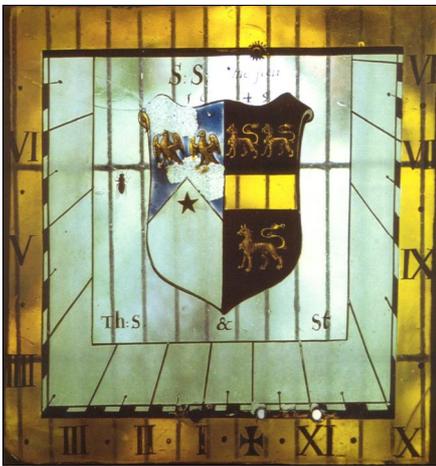


Fig. 4. The Bucklebury dial, made in 1649 probably for a member of the Stephens family, now in Bucklebury church, near Newbury.

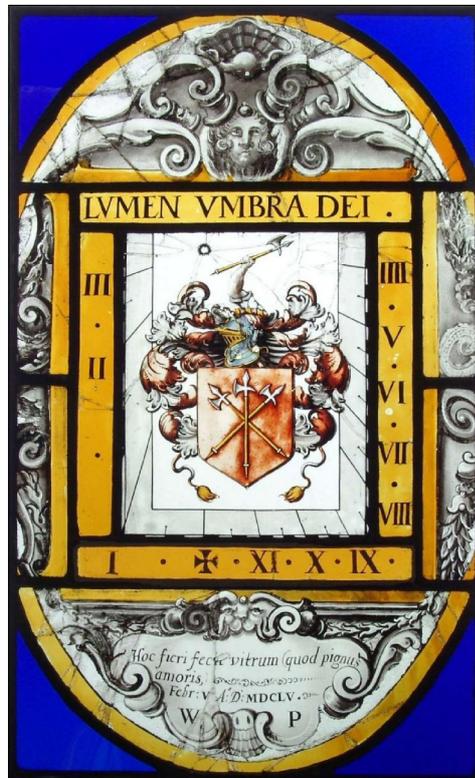


Fig. 5. The Blue (or St Clement's) dial made in London in 1656 (Private collection).



Fig. 6. The Non Sine Lumine dial, a direct west dial designed like a mathematical scale; the style of the inscription appears on a number of dials attributed to John Oliver. (Private collection).

# GLASS SUNDIAL MAKERS OF 17<sup>TH</sup> CENTURY LONDON

GEOFFREY LANE

This article is distilled from wider-ranging articles written for the *Journal of Stained Glass*, the first of which appeared in December 2005.

## INTRODUCTION

More than 30 glass sundials have come down to us from the century between 1620 and 1720. Add in lost dials known from documentary sources, and the British total for the period is nearer 60. By contrast only a single example from the Elizabethan age has been recorded so far – in 1585 Bernard Dinninkhoff included a tiny circular dial in an elaborate display of heraldic glass at Gilling Castle in Yorkshire. The boom in production coincided with greater availability of clocks and watches (the London Clockmakers' Company was founded in 1631) and tailed off as they gradually became more reliable. Understanding of English glass dials has been hampered by a lack of reliable data on the glass-painters who did (or didn't) make them. Only two makers have become at all widely known – John Oliver in London and Henry Gyles in York. London was the main centre of the trade, and recent research into the careers of its glass-painters has turned up fresh information on the dial-makers and the world in which they worked.<sup>1</sup>

Many of the surviving dials are now familiar from the excellent website operated by John Carmichael, with much input from Chris Daniel.<sup>2</sup> In this article they are identified by the catalogue number given them by Mr Carmichael, with the addition of the letter 'C' – thus Dinninkhoff's dial mentioned above becomes C-41. A page reference is also provided for dials illustrated in the recent *Sundials of the British Isles* (e.g. SBI-10).<sup>3</sup> What follows should, of course, be regarded as a progress report.

## BAPTIST SUTTON (by 1600-1667)

Sutton is the first known London maker. He first comes to notice as a glass-painter about 1621; by the later 1620s he had set up shop alongside an older colleague, Richard Butler, in Chancery Lane, Holborn, in the heart of 'legal London'. Both no doubt hoped to find clients around the nearby Inns of Court and Chancery. In 1627 Sutton worked a small but perfectly-formed rectangular dial into an otherwise routine armorial panel for the great hall of the Middle Temple, commemorating Sir Nicholas Hyde, the new Chief Justice of the Common Pleas (Fig. 1). He inserted the date and his Latinised signature, *Baptista Sutton*, on either side of the main inscription. The Hyde dial-panel was probably installed in the large south-facing bay window near the high table, where the resident judges and their guests could learn

to appreciate its usefulness in setting their watches – a fairly blatant piece of advertising. (At some later date it was banished to a high east window, over the minstrels' gallery, where it escaped notice until recently spotted by stained-glass historian Brian Sprakes.)

In 1639 the physician Dr John Wyberd published a slim volume on lunar dials, *Horologiographica Nocturna*. After outlining his method, and recommending Elias Allen (no less) as a suitable maker of horizontal dials, Wyberd added these words:

...it would be an excellent way to have a Lunar Dyall drawne on glasse and placed in a window after the manner of those Sunne Dyalls which are most accurately made by my loving friend M<sup>r</sup> *Baptist Sutton*, dwelling at the upper end of *Chancery Lane*, neere *Holborne*... who likewise will be able to perform these as accurately as the other, if it shall be required of him.<sup>4</sup>

Sutton had evidently made a fair number of dials since 1627. One was for the church of St Magnus the Martyr, at the northern end of London Bridge. The churchwarden's accounts (for 1638-39) neatly explain its purpose:

Paid Mr Sutton in full for the sunne dyall sett up in the church window, used to sett the clock by..... 20s.<sup>5</sup>

Up to this point Sutton's output had encompassed large Biblical scenes as well as armorials and sundials, but in 1641 Parliament banned 'superstitious images'. His career still had twenty years to run, and the fashion for glass sundials no doubt helped him survive the downturn in other work. Ironically, one of his clients that year was a Puritan Essex MP, Sir Thomas Barrington; Sutton made him a dial bearing the date 1641 and the arms of Sir Thomas and his second wife Judith, née Lytton (C-149 – Fig. 2). (It survived in a house, Highworth, near Swindon, which was demolished in the 1960s, but has not been seen since). It was almost certainly commissioned for the London house the Barringtons leased and furnished in fashionable Great Queen Street – a short walk across Lincoln's Inn Fields from Sutton's workshop. The London account book kept by the Barringtons' steward has this entry for February 1641:

It[em] paid for a glass dyall for my M[aste]<sup>r</sup> his chamber window 6s 8d.

Disappointingly, it fails to identify the maker. However the Barringtons' general cash book includes this a few months later:

It[em] p<sup>d</sup> to M<sup>r</sup> Sutton the dyall maker in full of his bill July 2<sup>d</sup> 1641, besides w<sup>t</sup> [?] for London £1 3s 4d.<sup>6</sup>

I suspect this second dial was commissioned for their country home in Essex. The dial illustrated declines about 41° E of due south, about right for Great Queen Street.<sup>7</sup>

Sutton made at least one other dial for a London church – St Giles in the Fields paid him £1 5s 2d in 1649/50 “for a Sunne Dyoll in the South wyndowe over the South church dore”.

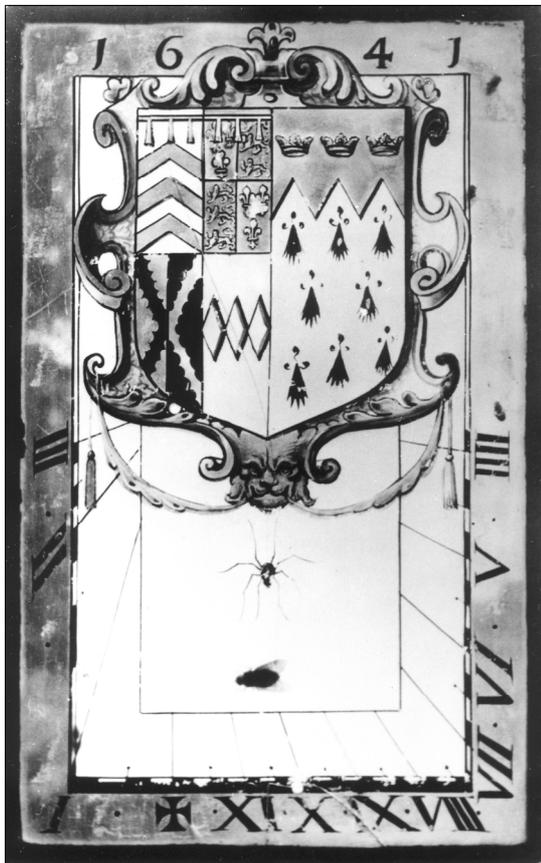


Fig. 2. The lost Barrington (or Highworth) dial, made by Sutton in 1641 for the Puritan MP Sir Thomas Barrington. Photograph: P.S Spokes, 1945, by permission of Mrs A Spokes Symonds.

### SUTTON AND HIS ‘LONDON DIALS’

Most of the surviving C17 English glass dials are drawn out in a way very similar to Sutton’s Barrington dial, and this is particularly true of those traditionally attributed to John Oliver. There is abundant variety in the ornamental details, but surprisingly little in the working parts, something which is easily taken for granted and therefore overlooked. It is therefore possible to speak of ‘London dials’ as a generic type. Here are the main features the bulk of south-facing dials have in common:

- 1) the chapter-ring is done in yellow-stain (to resemble a clock-face) and has black Roman numerals (normally Roman) interspersed with black dots marking the half hours.
- 2) the number XII, the meridian, is replaced by a cross of the type known in heraldry as a cross pattée.

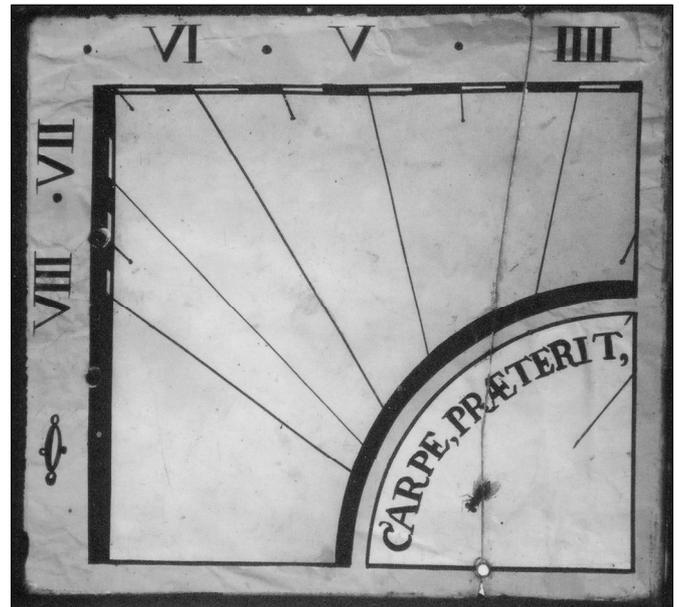


Fig. 3. Dial, possibly by Sutton, formerly in the collection of Dr William Cole (Private Collection).

- 3) the central area is painted matt white or a pale shade on the back (a method borrowed from inscription panels) to show up the hour-lines and the shadow of the gnomon.
- 4) the hour lines are interspersed with very short half-hour lines drawn against the outer edge of this zone.
- 5) the quarter-hours are marked by a black-and-white scale along three sides just inside the chapter-ring.
- 6) the gnomon (on the outside) is directly attached to the dial by holes drilled in the glass – normally one near the top and three below. The lower holes are hidden in a black strip painted alongside the quarter-hour scale, or on the outer edge of the chapter-ring.
- 7) the inner field is usually enlivened with a fly, spider and fly, or other small creature, painted on both sides of the glass to increase its lifelike effect (see e.g. Fig. 7).

An attempt to work out a chronology, based on dated dials, suggests that only two important changes were made to this specification over the course of the century:

- a) in earlier dials the short half-hour lines have dots on their inner ends, echoing the dots on the chapter-ring and giving the lines a lollipop-look; later these dots disappear.
- b) in later dials a second line is drawn around the central field, marking off a narrow strip which is left completely blank, possibly to help the eye catch the gnomon shadow (see e.g. Figs. 8, 9 & 11).

These changes both seem to have occurred about 1655-60, with a slight overlap between the two. Only the four dials attributed to Henry Gyles, and a handful of others, deviate to a marked degree from this regular pattern. Obviously the

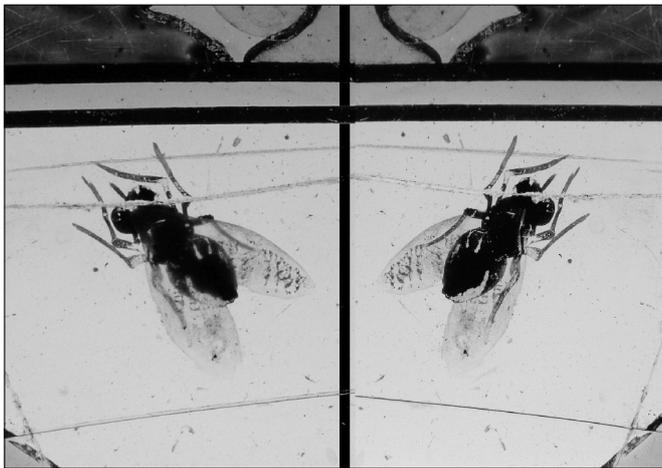


Fig. 7. *The Non Sine Lumine dial, detail showing a typical 'London' house fly; the wings are painted on the inside (left) the body and legs on the outside (right) creating a lifelike three-dimensional effect.*

full specification can only be expected in south-facing dials resembling clock-faces, but those made for other orientations also tend to conform as far as possible. (Fig. 3) This includes due east (or due west) dials which are designed like mathematical scales (see e.g. Fig. 6 – here the gnomon-mountings were hidden in two black strips, each concealing three holes).

Where Sutton himself acquired his working method is unknown – possibly from printed sources, perhaps a friendly dial-maker. His London successors, it seems, were not particularly adventurous diallists, and content in most respects to follow his example. Since their careers overlapped, this makes it difficult to tell their work apart.

#### 'PHANTOM' DIAL-MAKERS

One dial that may well be by Sutton is the Bucklebury dial, 1649, probably painted for a house or memorial chapel in south Gloucestershire (C-73, Fig. 4). Like the Barrington dial, it commemorates a married couple – Thomas Stephens of Little Sodbury and his wife Elizabeth Stone – but posthumously this time, since Stephens died in 1613. The inscription, *S:S: me fecit 1649*, has sometimes been taken for the maker's signature, but no maker with these initials has been identified, and in any case it seems unlikely the Stephens family would have allowed a mere artisan to place his initials in large letters over their arms. The historian E A Greening Lamborn, solved the problem by suggesting that the panel might have been *painted* by a Stephens descendant, but I think this underestimates the technical challenge involved.<sup>8</sup> In fact, the inscription should probably be read as "SS had me made". Whoever did paint it, the dial, now in Bucklebury church near Newbury, Berks., is a thoroughly professional piece of work.

Another possible Sutton dial is the recently-rediscovered 'Blue Dial' (C-11, Fig. 5). It not only shares decorative

features – fantastic masks set amid scrolls – with the Barrington dial, but also many of its dialling details, while the hour line angles indicate that the design latitude and wall declination of the two dials is virtually identical. Its companion-piece was made for the west London church of St Clement Danes, and commemorates repair work of 1655-6 in which the windows were reglazed by William Pollicott, a glazier who lived in the parish, but is not so far recorded as a glass-painter. It's not clear if the dial was made for the church, or for a nearby house, but the two must have been paired early on and have remained together ever since. The initials WP, which appear prominently on the dial, appear to be associated with an unidentified coat of arms displaying three halberds, or pole-axes. These could possibly be 'read' as a heraldic pun on the name Pollicott (i.e. 'Pole-I-got'). The Latin inscription below makes it clear, however, that WP did not himself paint the dial. It says he "had it made" (*fieri fecit*) as a token of love (*pignus amoris*) in connection with a specific date, 3 February 1655 (i.e. 1656 in our terms). What this might have been is an unsolved mystery.

Whoever did paint the Blue Dial probably also painted the Marlborough Dial c.1656 (C-19). The similarities are striking – not only the decorative scrolls and masks, but the distinctive way the yellow chapter-ring is carried past the lead framing and then overlapped by the scrollwork. The dial, still in its original domestic setting, was probably commissioned by the wealthy mercer Thomas Bayly, following Marlborough's Great Fire of 1653 – the oldest part of his house, including the parlour, had been rebuilt by 1656, which is the likely date of the dial too. Bayly must have ordered it from London.

#### JOHN OLIVER (1616-1701)

Oliver has long been recognised as a maker of glass dials, and the number attributed to him is considerable. But only a handful can be positively identified as his work and they all date from after 1660. Examination of them shows that he scarcely deviated from the pattern already laid down by Sutton. This makes it difficult to tell his earlier work from Sutton's, and prompts speculation that Oliver may have been Sutton's apprentice in the 1630s, or at least learned dialling from him. Both men belonged to the Glaziers' Company, but unfortunately its apprenticeship records are lost. Our first definite trace of Oliver is his marriage to Grace Smith in 1649. They settled in the City parish of Holy Trinity the Less, where five children were baptized 1650-58, and Grace was buried in 1660. Oliver remained rooted in the City throughout his long career, presumably seeking his custom among the City merchants and the Livery Companies to which they belonged. His base in Trinity Lane (roughly where Mansion House underground station

now stands) was burnt out in the Great Fire of 1666. In 1668 he joined Robert Hooke and Peter Mills as a City Surveyor, measuring plots so that other fire victims could rebuild, and this led to further appointments in 1675-6 helping Wren rebuild the churches and St Paul's – all of which took Oliver away from active glass-painting.

Four glass dials can be reliably attributed to Oliver:

1 & 2) Two small quarry (diamond-shaped) dials at Northill, Beds. (C-96 & C-103; SBI-231), the first of which is almost imperceptibly signed J Oliver and dated 1664 (SBI-232); they were evidently presented to the rector when Oliver painted the imposing armorials in Northill church which also bear his signature and the same date.

3) The larger rectangular dial (C-57) painted for the Weavers' Company, who employed Oliver as their glazier when they were rebuilding after the Great Fire; a date of 1669 is often quoted, but 1672 – when the hall was completed – is more likely.

4) A lost rectangular dial in an oval setting painted for Lambeth Palace perhaps about 1669, known from a sketch by the artist Frederick Sydney Eden (C-31); this attribution goes back many years but its origins are lost; at one time the dial was apparently displayed alongside panels depicting the arms of Archbishop Sheldon and the Sheldonian Theatre in Oxford<sup>9</sup> – possibly Oliver's name appeared on one of these.

Working outwards from these, other dials have been given to Oliver on stylistic grounds – in the first place other very similar quarry dials at Groombridge (C-66) and Chicksands (C-154), the undated Hexagon dial (C-32) and perhaps the Oxford scale dial dated 1648 (C-44). Oliver was in dial production at a fairly early date if this last is accepted. Another group appear to share with the second Northill dial and especially the Groombridge dial a particular form of cursive handwriting; they include the privately-owned *Non Sine Lumine* dial (C-29, Figs. 6 & 7) and the Tredegar (or Welsh) dial of 1672 (C-62). A third group of rectangular dials in oval surrounds share the general appearance of the Lambeth dial, including several which include a winged hourglass – this device

appears on the Widdington dial (C-28, Fig. 8), dated 1664, which conveniently falls two or three years after Sutton is last known to have been active. Some 'Oliver' dials show markedly inferior workmanship, particularly in the lettering (e.g. C-56). If they really are from Oliver's workshop, it is possible they date from a time when he was preoccupied with other work. Presumably in such cases the Master (who alone knew the secrets of dialling) sketched out the working-parts but left it to an apprentice or journeyman to complete the decorative part of the job.

### RICHARD DUTTON (bef. 1640-1686)

Baptist Sutton had ceased work by about 1662, and had died by November 1667, when administration of his estate was granted to his daughter Mary Dutton (1632-90). Her husband Richard had probably been Sutton's apprentice. He seems to have taken over Sutton's later premises near Leather Lane, erecting over them a Sign of the Dial to announce his trade. Besides inheriting Sutton's clients among the Inns of Court, Dutton obtained several commissions for City churches and company halls, when they were rebuilt following the Great Fire of 1666. He almost certainly painted a fine dial about 1671 for the Pewterers' Company (Fig. 9). With its motto *Sic Vita* ('so is life') and its motif

of a spider advancing on a fly, it might easily have been attributed to Oliver, but the company's records show that the company employed Richard Dutton in 1671, specifically to paint glass for its new hall. The sturdy-looking classical pediment behind the company's arms probably continued onto neighbouring panes on either side; if so, it was already incomplete in 1902, when this illustration appeared in a history of the company.<sup>10</sup> The south-facing dial was apparently destroyed in World War II.

In 1676/8 the Fishmongers paid Dutton £2 6s "for a Dyoll in the Court Room", and he probably painted another for the Girdlers' Hall, where rebuilding was not completed until 1681-3. This dial also fell victim to enemy bombing, and we only have an outdoor picture which was reproduced in *The Builder* in 1917 (Fig. 10). F S Eden wrote a brief description in 1935: "... the Company's arms ... in enamel colours and yellow stain are on a scrolled shield in the centre square with the proverb *TEMPUS*



Fig. 9. The lost Pewterers' dial, made in 1671, probably by Richard Dutton, as illustrated in 1902 (author's photo, courtesy of the Society of Antiquaries). The classical pediment may have extended onto neighbouring panes.

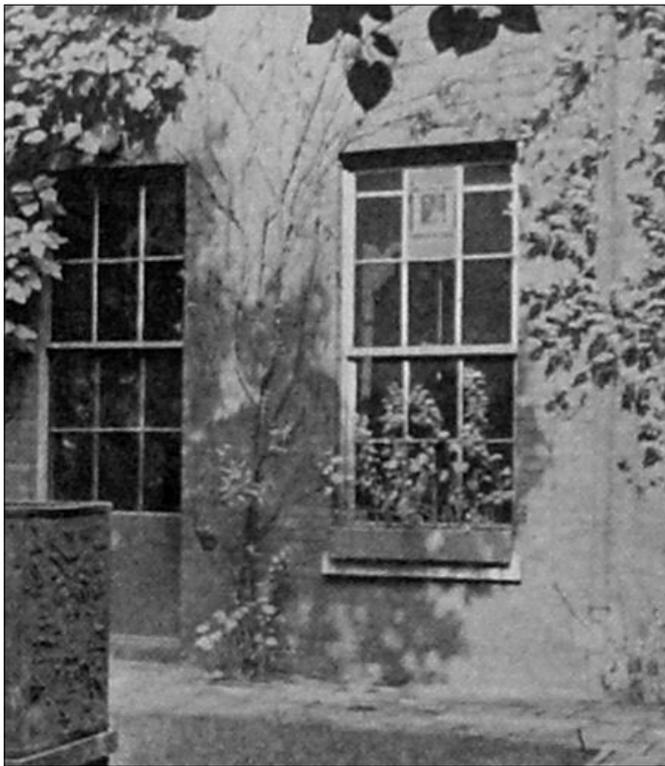


Fig. 10. The lost Girdlers' dial, made about 1683, seen in the upper sash of one of the Court Room windows. The photo (courtesy of the Society of Antiquaries) was published in *The Builder* to illustrate an article on Girdlers' Hall in October 1917.

OMNIA RUMINAT along the top", but unfortunately he did not supply an illustration.<sup>11</sup> There is no documentary evidence for the maker (which means it was probably donated), but Dutton's only rival, John Oliver, had almost completely given up this kind of work by the 1680s.

#### WILLIAM PRICE (c.1644-1710)

Price was a close colleague of Dutton's. There are few traces of independent work by him before Dutton's early death in 1686, but thereafter he flourished with little competition. In 1700 he advertised in the *London Gazette* as "William Price, Glazier and Glass-Painter, near Hatton-Garden in Holborn, London; where Gentlemen may have Church-History, Coats of Arms, Dials &c. Painted upon Glass, in what Colours they please, to as great a Perfection as ever".

In 1702 Price painted an elaborate south-facing dial for Gray's Inn Hall, which has not been seen since it was taken down in World War II. F S Eden, who considered it "perhaps the finest specimen in London of a glass sundial", painted a careful copy to illustrate a *Country Life* article in 1935 – unfortunately it was only reproduced in monochrome (Fig. 11) and Eden's original ink-and-watercolour version has not so far been traced.<sup>12</sup> In the past this fine dial has been attributed to Henry Gyles of York (Price's exact contemporary), but the published Gray's Inn accounts



Fig. 11. The missing Gray's Inn Hall sundial, made in 1702 by William Price the elder, not seen since it was taken down in the Second World War; mono reproduction of a hand-painted illustration by Frederick Sydney Eden.

clearly show that Price took over Dutton's regular work there, and was paid £15 16s 6d in 1701-3 "for Glass-painting in the Hall and Chappell windows".<sup>13</sup> So far this is the only dial positively identified as the work of Price. If we compare it with Sutton's 1641 dial, we see that so far as the dialling is

concerned little has altered in over sixty years.

Price reissued his advertisement in 1705, jointly with his son Joshua. They claimed their firm could also work in other materials: "...and draws Sun-dyals on Glass, Wood, or Stone &c." Joshua Price (1672-1722) carried on where William left off, in 1719-21, when Gray's Inn had problems with its horizontal sundial in Coney Court, it paid the clock-maker Henry Smith £4 14s 6d for the repair and fitting a new gnomon, but "Price ye Glass-painter" was then paid £2 10s "for delineating 2 Sundials & fixing of an Horrizontal Brass dial in Coney Court"

#### HENRY GYLES (1645-1709)

Gyles lived in York; there is no evidence he ever worked in London, which the Glaziers' Company would have opposed, though friends kept him informed of developments in the capital. He is included here for completeness and to point up various ways in which he differed from the London glass dial makers. Gyles belonged to a group of Yorkshire *virtuosi*, who discussed dialling among other mathematical and scientific topics. His four known dials are quite distinct from their London counterparts: the half-hour lines are drawn on the chapter-ring and terminate in decorative finials, as on clocks of the period; he adopted the cross pattée only very late in his career, marking midday numerically at least until 1687, when he painted the fine Christ dial for University College, Oxford (C-46; Fig. 12).



Fig. 12. Dial donated by Henry Gyles to University College, Oxford, on completion of his altar window for the college chapel in 1687. His method of marking midday and the half hours differs significantly from London practice.

In the Gray's Court dial (1690 – C-5) he used a cross fitchy (pointed at the base), and secured the gnomon by only two holes, both drilled in the central picture. Gyles is not known to have enlivened his work with flies, spiders or similar creatures. Decoratively, his work is much more sophisticated and literary in tone – this is particularly clear if one compares his early Nun Appleton dial (signed and dated 1670 – C-6) with, say, Oliver's Weavers' dial of 1672.

### MATHEMATICAL PRACTITIONERS

In the 1950s, the geographer Eva Taylor compiled an extensive directory of instrument-makers and other practical mathematicians whose collaborations (often across barriers of class and culture) played such an important part in the early development of modern science. Prof. Taylor included Sutton, Oliver and Dutton for a variety of reasons, although she knew little of their glass dial work or the connections between them.<sup>14</sup> The following summarises her findings, with added comments in square brackets:

**Baptist Sutton** wrote a learned article on logarithmic scales – e.g. Oughtred's Circles of Proportion and Gunter's Line of Numbers – which Wyberd appended to his 1639 book on moon-dials mentioned above.<sup>15</sup> [Taylor concluded from

this that Sutton was a scale-maker, apparently overlooking Wyberd's recommendation of him as a maker of glass dials]. He later assisted Wyberd in experiments to obtain precise measurements of liquids.<sup>16</sup> Sutton was the original owner of a fine copy of the *Compleat Surveyor*, by the printer turned surveyor and diallist William Leybourne, now in the British Library; his signature: *Baptista Sutton: liber ejus 1653* is on the title page.<sup>17</sup>

[Taylor speculated that Baptist was either father or uncle of the fine instrument-maker **Henry Sutton**, and by implication of Henry's supposed brother or kinsman William, who followed the same trade, and belonged to the same livery company, the Joiners. The ages are about right, but no Henry or William appears among Baptist's children christened at St Andrew's Holborn 1624-40. In any case, when **William Sutton** was apprenticed in 1642, he was recorded as the son of Henry Sutton, yeoman, of Kingston-on-Thames.<sup>18</sup> This older Henry could perhaps have been Baptist's brother, but no evidence of any link has come to light so far, and Sutton is after all a fairly common name].<sup>19</sup>

**John Oliver** caught Taylor's eye because he became a professional surveyor, working with Robert Hooke [and probably William Leybourne]. Taylor knew Oliver was a glass-painter and dial-maker but [oddly] placed him in the Painter-Stainers' Company. She discovered that he also practised map-engraving in his later life [but incorrectly gives the selling-addresses of his maps and other prints (various establishments around Ludgate Hill) as his home address].<sup>20</sup>

**Richard Dutton** made a series of slides [in December 1672] for the Scottish astronomer James Gregory to project with his dioptric lantern. [This was an early magic lantern, a device only invented about 1659 – the London optical instrument makers Richard Reeves and Christopher Cock were selling them from about 1663. Cock, who made Gregory's lantern, told Gregory's London contact, John Collins, that Dutton was "the sole Glasse Painter we have", suggesting that Dutton was the only London maker of such slides].<sup>21</sup> Dutton later displayed proposals for William Leybourne's 1682 book *Dialling, plain, concave, convex etc.*, at his shop "at the Sign of the Dial" in Holborn. [Taylor concluded that Dutton was "probably a dialmaker", though she did not know of his relationship to Sutton].<sup>22</sup>

NOTE: Most of the photos are the author's own, a few reproduced by permission. All are copyright.

### REFERENCES AND NOTES

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6. Essex RO D/DbA A14& A2; for the background see A Searle: 'Sir Thomas Barrington in London 1640-44' in *Essex Journal* Vol II pp 35-41 & 63-70.
7. My thanks to John Davis for calculating this.
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21. Gregory and Collins: letters Sep 1672-May 1673, in H W Turnbull (ed): *James Gregory Tercentenary Volume*, London, G Bell for Royal Society of Edinburgh, 1939, 243-270. I am indebted to Deac Rossell, historian of the magic lantern and early cinema, for guidance in this unfamiliar field.
22. Taylor (*op cit*), 246,250.

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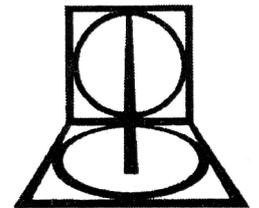
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## SIS INVITATION LECTURE EVENING

### DESMOND QUINN



On 18 November I was invited, together with John Moir, to represent the BSS at the 13<sup>th</sup> Annual Invitation lecture of the Scientific Instrument Society. The lecture, entitled 'Artist and Engineer - Saga of the French instrument industry in the 19<sup>th</sup> Century' was given by Dr. Paulo Brenni. The august headquarters of the Society of Antiquaries of London, at Burlington House was the venue for the talk, after which we enjoyed a very good buffet supper and chatting with new found friends.

Dr Brenni charted the development of scientific instrument production from its early days before the French Revolution until the end of the 19<sup>th</sup> century, when there was a relative decline resulting from intense competition from outside the country. Before the revolution, scientific instrument production was poorly organised, perhaps partly because of a preoccupation with elegance in whatever they produced - something which happily continues to this day. The result was that much of France's requirement had to be imported from Britain. Following the Revolution however, an impetus was provided by the new Republican government to rationalise all forms of measurement, also to examine the subject of meridians and astronomy generally. Most instrument production was now centered around Paris, and by the middle of the 19<sup>th</sup> century international trade fairs were

showing France as an important producer of scientific instruments. Not only had the production much increased but the development of many branches of science was being pioneered. High quality French optical instruments for example were displayed at the Crystal Palace International Fair, as were wireless and electrical goods, engineering equipment and associated measuring instruments. The Bourdon tube for measuring pressure was produced at this time. Towards the end of the century, inevitably, subcontracting and mass production crept in, as with other nations. With the rise in German precision manufacture and also competition from America, France tended to lose some of its prestige. In Dr. Brenni's museum in Florence, however, the instruments are mostly French, which says much for the importance of French manufacture.

Whilst Dr. Brenni's talk was primarily about instruments, he also spoke at length on the people who made them - their working conditions and family orientation. This latter was probably an influencing factor in the emphasis on elegance - 'artist and engineer'.

The evening was altogether most interesting and enjoyable and showed the merit of the association between our two Societies. Our grateful thanks are due to the Scientific Instrument Society.

