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EDITORIAL

I noted in the Editorial of the June 2020 issue of the *Bulletin* that the University of Cambridge had closed its doors to the computing facilities that Christine Northeast and I normally use for desktop publishing. John Davis came to our rescue; he completed the June issue and undertook the lion's share of this one. We are most grateful to him.

The easing of the Covid-19 restrictions enabled me to set up a new computer room, which Christine is now using. It is good to be back to some semblance of normality.

In the pages that follow, I particularly commend the article by Tony Moss which describes what he claims is his last sundial. A photograph of this splendid dial features on the front cover.

Very sadly, this issue includes the obituaries of three very distinguished and long-standing members of the Society: David Young, Gordon Taylor and Alan Smith. To this list, I must also add Michael Lowne whose obituary will appear in the December issue.

Frank King

THE HARDY DIAL'S HOMECOMING

GRAHAM STAPLETON

In 1995, John Moir gave an account of a much-travelled horizontal slate dial in the possession of an acquaintance of his.¹ This dial belonged to the family of Vice Admiral Sir Thomas Masterman Hardy RN, who had served as Nelson's Flag Captain at the Battle of Trafalgar. It stood outside his house in the village of Portesham in Dorset, before a thirty-year round trip to Australia.

has received the detailed conservation treatment that it was in need of. A replica was also created so that the house would have a practical dial (see Fig. 1). Additionally, a look at the history of the Hardy family clarifies one aspect of the dial's inscription.

The dial is reliably dated 1767, but neither the delineator, G. Aislabie, nor the sculptor C. Nepecker were known to Jill Wilson, the compiler of the BSS *Biographical Index*. It is a well-made dial, unusual for being in slate, when the majority of horizontal dials are brass. Part of the inscription that John Moir transcribed reads:

Distance of Meridian from London 0.11

Joseph Hardy Esq.

Kingston Russell, Lat. 50 degrees 45 minutes

Kingston Russell House in Long Bredy, Dorset, is located at 50° 42' 15" N, 2° 36' 27" W. The quoted latitude of 50° 45' is then not as close as it might be, but the delineator, working in a time when latitude and longitude were not always given on maps, probably had to work to



Fig. 1. The replica dial nearing completion. Image by kind permission of Bruce Duckworth.

In his article, John analysed the inscriptions and summarised the dial's journeys between houses in Dorset, to and around Australia and a return to North London. Ever since then, the family, the dial's custodian and her Executor had been working to return the dial to its rightful place, or find somewhere other where it would be kept properly. It can now be reported that the dial is back where it belongs and

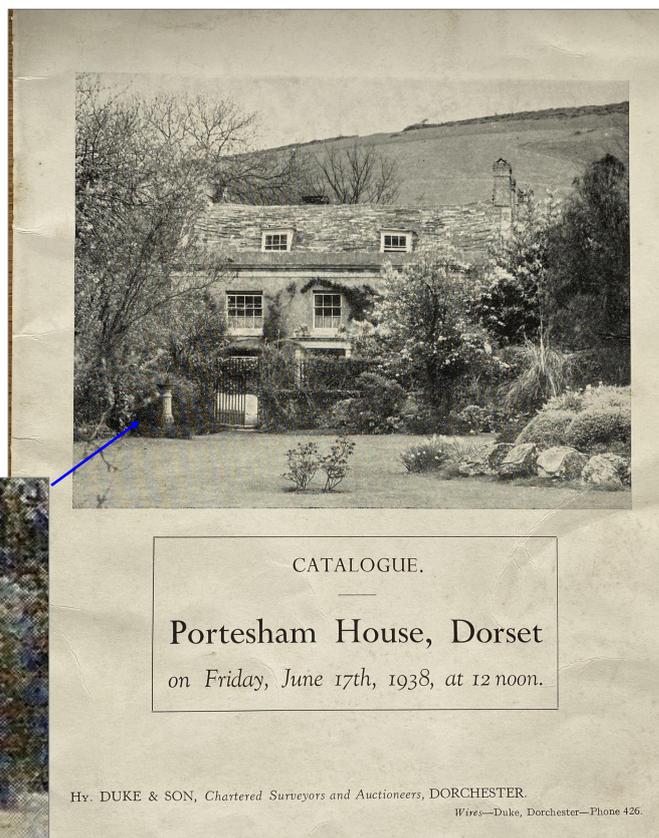


Fig. 2. Portesham House and the sundial illustrated in a 1938 sale catalogue. Image by kind permission of Bruce Duckworth.



the nearest quarter of a degree. By the same token, the longitude time difference of eleven minutes is fractionally too great, but such precision may not have been a concern of the user.

From sources available at the time of the last article, it was uncertain whether the Joseph Hardy Esq. was Thomas's father or grandfather. Searches now being easier, it is possible to say that it is much more likely to be the father. Online records indicate that Joseph senior was buried 16 January 1778 'aged 88 on affidavit'.² In this and other records of him, the style Esquire is never used, nor is any place other than Portesham mentioned.



Fig. 3. The conserved original dial, positioned inside the house. Image by kind permission of Bruce Duckworth.

Joseph junior married Nanny (Ann) Masterman and lived at Kingston Russell House with her family, who had the house as tenants of the Duke of Bedford.³ Thomas was brought up here until the age of nine, when the family moved to their inherited house in Portesham, taking their dial with them. In dialling terms the relocation was a change of about two arc minutes for both latitude and longitude. So there on the roadside, right by the garden gate – as illustrated by a 1938 sale catalogue – the dial reposed for 170 years, serving the household and village (see Fig. 2).

Later, when the village doctor J.W. Thornton, who lived in the house, decided to emigrate to Australia in 1948, he reasoned that the only guarantee of avoiding the dial being lost in anticipated housing developments was that it should come with his household effects. Hence it crossed the equator and spent thirty years being repeatedly relocated around the Northern Territories and Western Australia. Although possible – with much difficulty – to use for finding the time, it more likely just stood as a reminder of the 'Old Country'.

After Thornton's death in 1977, his family resolved that the dial ought to be returned to its original location. When his son eventually had business in London, he heroically carried it as cabin baggage (allowances must have been more generous then) and left it with a relative in North London. His plan had been to drive down to Portesham and present it to the owners of the house. This was frustrated by heavy snow storms that left the West Country all but cut off beyond the date of his return flight. So there the dial remained, safe and correctly aligned, but very awkward for either party to complete the intention. The usual distractions of life intervened and the project fell into abeyance. Then three years ago, charged with finding an appropriate home for the dial, the Executor of the relative acting as 'temporary' custodian approached the BSS for help.

Thinking in terms of public access and benefit we considered Hardy's ancestral homes and the National Trust at the Hardy Monument, but they did not promise security for the dial. Approaches to the National Museum of the Royal Navy's two branches at Portsmouth (who have a dial belonging to Nelson) and Hartlepool, together with the National Maritime Museum, all elicited a negative reply. Even less luck was had with the Navy dockyard museums of Woolwich, Deptford, Chatham and Plymouth. At this point we had to conclude that it would be confirmed as the most travelled fixed dial by a further journey to either Australia or Kenya.

The Executor, determined to achieve the original intent if possible, visited Portesham whilst in the area and realised the significance of Hardy to the village. He contacted the editor of the Chesil magazine who, in turn, passed details to the owner of Portesham House. Happily the new house



Fig. 4. The completed replica dial in position. Image by kind permission of Bruce Duckworth.

owners understood the significance of the gift, and undertook not only to have it restored, but also to commission a replica.

The dial was entrusted to stone carver and architectural conservator James Wheeler,⁴ who repaired the break in the dial plate, cast replacements for missing parts of the dial plate and mounted it on a piece of Portland stone (see Fig. 3). The dial now lives inside the house and hopefully its travels are finished.

In the grounds was a decorative but very distressed nineteenth century pedestal with a horizontal dial. Wheeler took considerable trouble to undo a series of poor repairs and to restore and adapt the pedestal for its new dial, keeping as much of the original as possible. Accurate moulds were taken from the original dial and a replica was cast in Jesmonite. This is a composite material of gypsum and acrylic resin, to which can be mixed pigments, mineral or metal powders, enabling a close colour match. It is widely used in architectural restoration and has good resistance to weathering (see Fig. 4).

This has been the tale of a fixed dial that was anything but fixed, and also of finding the right people determined to do right by history.

ACKNOWLEDGEMENTS

My thanks to Peter Finch for providing details of family correspondence and other information relating to Portesham House.

REFERENCES and NOTES

1. J. Moir: 'The life and times of a Hardy sundial', *BSS Bull.*, 95(iii), 39-40 (October 1995).
2. *Ancestry.com*. Dorset Parish Registers; Church of England Baptisms, Marriages and Burials, 1538-1812; Dorset History Centre; Dorchester Reference: PE/POR:RE1/3-4.
3. *Genealogy.com*. <https://www.genealogy.com/ftm/h/a/r/Rod-Hardy-Yalourn-North/WEBSITE-0001/UHP-0141.html>, and Dorset Ancestors website. <https://dorset-ancestors.com/?p=687>
4. James Wheeler Architectural Stonework. <http://www.architectural-stonework.co.uk/contact>
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St George's Chapel, Windsor Castle

John Davis



This watercolour painting of the South Front of St George's Chapel at Windsor Castle is shown courtesy of the Royal Collections Trust. The date is currently unknown but judging from the clothes being worn it is probably from the late 18th century. Of particular interest to us is the pair of dials over the entry porch—one a vertical south (or near to it) and the other declining on the south-west face, only visible by the profile of its gnomon. It is, though, possible that it is actually a waterspout. A similar gnomon may have been on the south dial.



The modern (2012) photograph of the east side of the porch shows that most of both dials have now been lost due to replacement of the stonework, possibly in the 10-year restoration started in 1920. The pictures show that there was also a dial on the south-east face, making a triplet. Only the bottom edge of the chapter ring is still



visible and only then in good light if you really look for it. At the time that the photos were taken (during the installation of a new dial in the cloisters¹) the existence of the watercolour was unknown to the architects and conservators at the Castle. Perhaps now a case could be made to reinstate them.

REFERENCE

1. John Davis and David Harber: 'A New Sundial for St George's Chapel, Windsor Castle', *BSS Bull.*, 25(ii), 14-17 (June 2013).

Postcard Potpourri 52: Friar Park, Henley-on-Thames

Peter Ransom

I have included this postcard, mainly because I have had some correspondence about the Hurley dial, which was featured in Postcard Potpourri 50,¹ from Sue Manston (who managed to find out that the dial had disappeared) and John Foad (who knew of two similar dials, one of which had been recorded at Friar Park). Hence I thought it time to dig out the card I had of Friar Park and include it here.

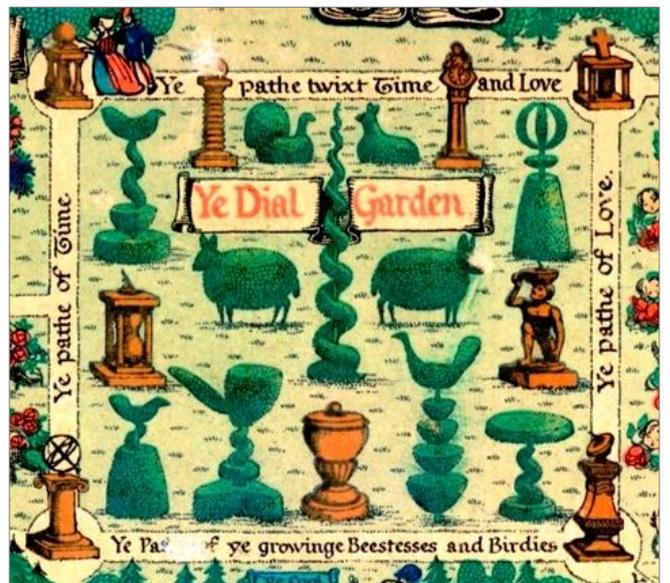
The postcard is used and the postmark is dated 4 July 1917. There is no detail about who produced it, but it was sent to someone in Calais. You can see the cross dial in the centre of the card and a multiple horizontal dial in the foreground. Partially hidden in the bushes, some other dials can be glimpsed: this park would have been a delight for the BSS to visit, methinks! John Foad's article² includes an excellent description of the Friar Park garden and contains a plan of the sundial garden published in 1914 (also pictured here).³ It is interesting to orientate the map with this postcard! John says, "The gardens were Grade II listed by English Heritage in 1984, when they were described as having 'formerly thirty-nine sundials'. The date of the disappearance of the dials is not known. The property is kept intensely private, and no attempt should be made to contact the owner."

For more details about Friar Park, see the very informative Wikipedia page: https://en.wikipedia.org/wiki/Friar_Park

References

1. Peter Ransom: 'Postcard Potpourri 50', *BSS Bull.*, 32(i), 9 (March 2020).
2. John Foad: 'Alfred Rawlings' sundial painting', *BSS Bull.*, 25(iii), 37-38 (September 2013).
3. Alan Tabor: *Plan for the Guidance of Visitors* (1914). A copy is held in the British Library, London.

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Ye Dial Garden, Friar Park. © British Library Board, Shelfmark Maps 1240 (123).

Yew Tree Sundial



The Yew Tree dial, designed by David Young and John Moir (R and L in the photo), in the Gardens of Easton Lodge. The gardens are near Great Dunmow, Essex, and were designed by Harold Peto, the Edwardian garden designer, for the Countess of Warwick.

Left-hand photo courtesy of Claire Matthews (Trustee), Easton Lodge Preservation Trust.



JD

MINOR MYSTERIES OF THE BROCKWELL PARK SUNDIAL

CHRISTINE NORTHEAST

Brockwell Park is situated in South London, near the eastern boundary of the ancient parish of St Mary, Lambeth. It lies about 4 miles south of Charing Cross, between Brixton, Dulwich and Tulse Hill, with its main entrance at Herne Hill.

The park covers some 50 hectares, and is Grade II listed, originally having been laid out in the early 19th century for John Blades, a glass manufacturer. It boasts a Grade II* listed mansion known as 'Brockwell Hall', dating from the same time. Also Grade II listed are the Hall's stable block and coach houses; an Art Deco lido from the 1930s; an ornate clock tower of 1897; and an early 19th century walled garden, one of the park's most attractive features. Within the Walled Garden is the vertical dial that is the subject of this article (Fig. 1). Dated 1775, it is probably the oldest man-made object in the park.



Fig. 1. The dial (SRN 8107).



Fig. 2. The Walled Garden. The walls can be seen as thin lines; the emphasised network of paths indicates the area that is open to the public, and which was laid out as an 'Old English Garden'. The smaller portion at the north-western end is used by the Park staff. The dial is near the northernmost corner of the public area.

The Walled Garden

The Walled Garden is about 57 metres long by 20 metres wide, with its walls being displaced about 30° from the cardinal directions (Fig. 2). Its high brick walls have brick piers at regular intervals; further buttresses have been added since it was first constructed, some between the piers, and some supporting the existing piers (Fig. 3). A folly known as 'the Temple' adorns the exterior of its south-eastern edge (Fig. 4). The Walled Garden was originally a kitchen garden, but by the time the London County Council acquired the land for a new public park in 1891, it was no longer in use, providing the opportunity for its remodelling as an 'Old English Garden', with flower beds, paths, a summer house, a fountain and a well. That design remains to this day, in contrast to the rest of the park, which consists mainly of open grassland with scattered trees.

The Sundial and its Motto

The dial is on one of the piers towards the northernmost corner of the public part of the garden, and for much of the time is hidden by wisteria (Fig. 5). The situation is only slightly better in winter.



Fig. 3. Inside the Walled Garden.



Fig. 4. Outside the Walled Garden, with the Temple folly.



Fig. 5. The dial in summer, partly obscured by wisteria.



Fig. 6. The motto.

The dial, made of limestone and 675 × 570 mm, is fairly plain, but there are some features worthy of comment.

There are hour lines and half-hour lines, with further divisions into quarter hours; curiously, some of the hour lines extend into the chapter ring. In consequence, on the right-hand side the numerals IIII to VIII have had to be placed between these lines, so that they appear to label the half-hour lines, rather confusingly. On the left-hand side the 9 am hour line extends into the chapter ring and is unlabelled; the numerals are aligned with the hour lines.

The gnomon is square-sectioned and it may well be a replacement. The gnomon and the associated hour lines are offset to the west of the dial plate, which evens the spacing of the hour numerals. It is slightly too high and partly obscures the date of 1775, which is inside a square that serves as the inner margin of the hour lines. At the top there is a cryptic motto, most of it legible, albeit with some difficulty (Fig. 6); there is a full stop at the end.

It appears that in 1982 a member of the Park's staff approached a Mr Engering of the Greater London Council's Historic Buildings Division for an answer to the mystery of the motto. The inscription is, he was told,

“So Doc^t Ho In D.”,

to be expanded as

SOL DOCET HORAS IN DIE.,

meaning “The sun teaches the hour in the day”.¹ None of these versions appears in Mrs Gatty's *Book of Sun-Dials*, and the choice of verb seems a little odd to me.

At an early stage in my researches, the only information I had was a slightly incorrect transcription of the lettering on the dial (presented as “So: Doc: Ho: In: D”), together with its supposed translation, but no suggestion as to what the unabbreviated form might be.² I therefore consulted Max Drinkwater, a Classicist who has previously been able to shed light on snippets of sundial-related Latin presented to him by our Chairman, Frank King. He felt unable to give a definite answer to this particular problem as presented.

On returning to the dial for more photographs, it seemed to me that whilst the letter ‘o’ in “So” and “Ho” is well defined, the one in “Doc^t” is less so – could it perhaps be meant for “Duc^t”? Max was happier with this interpretation, and immediately responded that ‘duc’ would be a more natural fit in the Latin, as it would be restored to something like:

SOL DUCIT HORAS IN DIE

or “the sun draws the hours in the day”

He further commented, “The pun on the word ‘draw’ in English is intentional and would be present in the Latin too: the sun ‘leads’ the hours in the day as it moves across the



Fig. 7. The canted dial on its buttress, seen from below.



Fig. 8. The dial from the side.

sky with the shadows following it; the sun figuratively ‘brings’ (‘creates’) hours to the day i.e. without the sun there would be no way of creating time in the day; and the sun literally draws the time on the dial by casting the shadow.”

This seems more elegant to me, but the mystery remains.

The dial is canted, with an attractive corbel supporting the plate below the dial itself (Figs 7 and 8). If a vertical dial is canted, this is usually because it has been delineated as for direct south facing but placed on a wall that declines. However, it is clear that the delineation on the Brockwell Park dial is not for a south-facing dial: it appears to have been designed for a wall that declines approximately 38° west of south. There are more mysteries here – from where might this dial have originated, and when was it placed in the Walled Garden?

The dial is known to have been in the Walled Garden in 1891 when the London County Council procured land from John Blades’ great-grandson Joshua Blackburn to create a new public park. Lieut Colonel John James Sexby, the LCC’s first Superintendent of Parks, who was instrumental in the adaptation of the Brockwell Estate into Brockwell Park, and who designed the ‘Old English Garden’, wrote “... on one of the walls is an old sundial, which only needs an inscription to be complete”.³ One wonders why he wished for an inscription – perhaps the dial was obscured by wisteria, even then. Local historian Peter Bradley tentatively offers another explanation for this rather unexpected remark: “I suppose Sexby could have bought an old sun-dial with an inscription and put it in place of the sun-dial without an inscription”.⁴ For my own tentative suggestion for the solution of the dial’s mystery it is necessary to look at the earlier history of the area.



Fig. 9. Part of John Rocque’s 1741–5 map, showing Island Green (now Herne Hill). Circled: the original ‘Brockwell Hall’.

Brockwell Park in the Eighteenth and Nineteenth Centuries

John Rocque’s map of 1741–5, which predates the dial by three decades, shows that the area now occupied by Brockwell Park was for the most part farmland, near a small settlement called Island Green (now Herne Hill; Fig. 9).⁵ At that time the land was owned by Richard Onslow, third Baron Onslow (1713–1776), but by the beginning of the 19th century it belonged to Richard Ogbourne, a stationer of Bishopsgate Street. In 1809 Ogbourne sold 60 acres to John Blades (1751–1829), a wealthy and eminent glass manufacturer, who had premises at Ludgate Hill and who was Sheriff of London and Middlesex in 1812–13.⁶

With the help of John Buonarotti Papworth (1775–1847), John Blades set about transforming the farmland into the parkland that is still recognisable today. In 1811–13 he had a mansion designed by D. Reddell Roper (c.1773–1855) erected in a prominent position at the top of the hill, and named it ‘Brockwell Hall’. To supply fruit and vegetables to the Hall and workers on the estate, a walled kitchen



Fig. 10. Former entrance to the Walled Garden, thought by some to be designed by Roper, and now known as the Temple.

garden was constructed 200 yards northwest of the mansion, and was embellished with an elaborate entrance portico, and now known as the Temple (Fig. 10). Perhaps the dial was placed in the Walled Garden at this time as a further embellishment?

Delving further into the realms of speculation, it might be suggested that the dial, which predates even John Blades' estate, was originally made for the much smaller, possibly Elizabethan, manor house named 'Brockwell Hall' that existed beside the road at the foot of the hill (Fig. 11), but which he had demolished in favour of Roper's larger and grander mansion. It is hard to discern the orientation of this building on the Rocque map, but a later sketch map dated 1808, in an account of a perambulation of the parish boundary, hand-produced in pen and ink,⁷ more clearly shows a building labelled Brockwell Hall on that spot. One of the walls of Brockwell Hall in the drawing seems to decline about 30° west of south; could it be 38° in reality, the orientation for which the dial was designed?

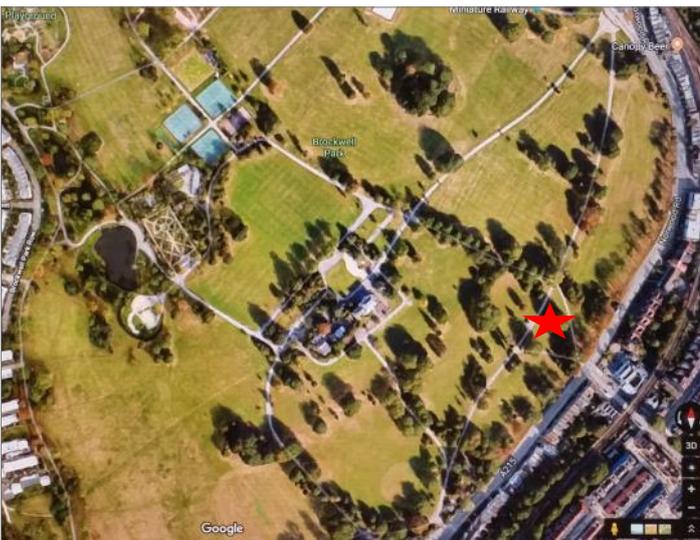


Fig. 11. Part of the park, showing the position of Richard Ogbourne's Brockwell Hall beside the road. John Blades' new Brockwell Hall and associated buildings are near the centre of the picture, with the Walled Garden to its north-west.

All this is conjecture, but, whatever the truth, it is an interesting sundial that deserves to be better known. A useful first step would be to remove the wisteria from this part of the Brockwell Park Walled Garden.

ACKNOWLEDGEMENTS

With thanks for their help in preparing this article to the Revd M.L.D. Drinkwater, John Foad, Bill Visick and Lambeth Archives, Knatchbull Road, London, SE5 9QY.

REFERENCES

1. Fragment of a letter to a Mr Saunders dated 5.11.82, held by Lambeth Archives.
2. Stephen Blanchard: text and photograph at <http://www.ipernity.com/doc/stephen.blanchard/31147935> (accessed 28 April 2020). The transcriber (see ref. 4), from whom the text had been copied, had added some separator colons that were clearly not part of the motto, but a quirk of the letter-writer.
3. J.J. Sexby: *The Municipal Parks, Gardens, and Open Spaces of London: Their History and Associations*, Elliott Stock, London (1898), p. 74.
4. Peter Bradley: *Ways into Brockwell Park*, p.51, Lambeth Archives with The Lambeth Local History Forum (2006).
5. John Rocque: *An Exact Survey of the Cities of London Westminster ye Borough of Southwark and the County Near 10 Miles Around / begun in 1741 & ended in 1745 by John Rocque Land Surveyor; & Engrav'd by Richard Parr*.
6. F.H.W. Sheppard (ed.): *Survey of London, Vol. 26, Lambeth: Southern Area*, London (1956). <https://www.british-history.ac.uk/survey-london/vol26/pp155-166> (accessed 28 April 2020).
7. Middleton and Bailey: *Perambulation of the Parish of Lambeth in the County of Surrey 1808*, handwritten in pen and ink, available at <https://boroughphotos.org/lambeth/lambeth-parish-boundary-herne-hill-3/> (accessed 28 April 2020).

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A Merman Gnomon



This unusual pierced gnomon features a merman and is on an 18th-century dial signed Edward Hunter Fecit and for the latitude 53;20. Hunter was in fact an Irish maker: see the *Biographical Index* for more details. The dial was sold by Christies in May 1996.

JD

CYLINDER DIALS IN THE HISTORY OF OTTOMAN ASTRONOMY

GAYE DANIŞAN

Judging from the number of surviving instruments and manuals on astrolabes and quadrants in Ottoman literature, these instruments were by far the most commonly used for determining the time in the Ottoman territory. In contrast, the place of the cylinder dial in the history of Ottoman astronomy is unclear. There are at least two reasons why the cylinder dial remained largely unknown. First, as far as we know, there are only two surviving dials. These dials are recorded in the Library of Kandilli Observatory and Earthquake Research Institute (hereafter KOERI) at Bogaziçi University in Istanbul, Turkey. The most examined one is currently exhibited in the Rahmi M. Koç Museum (hereafter RMK museum) in Istanbul, and some scholars have assumed that this is the unique surviving exemplar from the Ottoman period.¹ Another obstacle is about the terminology of the cylinder dial in Ottoman literature. It is well known that cylinder dials are called *al-ustuwana* (literally ‘the cylinder’), the most commonly used term in Islamic manuscripts. For example, there is a description of the cylinder dial with the term of *al-ustuwana* in *Jāmi’ al-mabādī wa al-ghāyāt fī ‘ilm al-mīqāt* (literally ‘collection of the principles and objectives in the science of timekeeping’) by Abū al-Ḥasan al-Marrākushī (*fl.* second half of the 13th century) which had been used among Ottoman scholars until the 19th century.² However, the Ottoman muwaqqit Ahmed Ziya Akbulut (1869–1938) pointed out in his book *Güneş Saatleri* (The Sundials, 1929) that other names for this instrument had been used by people in the past, such as ‘*Asâ-yı Mûsâ* (literally ‘the staff of Moses’), and *Batlamyus kuburu* (literally ‘Ptolemy’s tube’ or cylinder) although he also prefers to use the *üstüvânî* (literally ‘cylindrical’ in Ottoman Turkish).³ Our literature search showed that there are two Ottoman manuscripts in which the cylinder dial is called ‘*Asâ-yı Mûsâ* (the staff of Moses) and which describe how to make it. This paper aims to contribute to the historiography of cylinder dials in Ottoman Turkey by introducing a detailed study of them based on the two above-mentioned Ottoman manuscripts on ‘*Asâ-yı Mûsâ* and two surviving cylinder dials.

The Cylinder Dial Called ‘*Asâ-yı Mûsâ* (The Staff of Moses) in Ottoman Manuscripts

In the process of our research, we encountered two Ottoman treatises which concern the construction of the cylinder called ‘*Asâ-yı Mûsâ*. The first one is an anonymous treatise, the *Risâle-i tersim-i âlât-ı hey’et* (A treatise on drawing astronomical instruments) which is kept in the library of KOERI.⁴ Although it is catalogued under the title *Risâle-i tersim-i âlât-ı hey’et* in the *Kandilli Rasathanesi El Yazmaları* (Manuscripts of Kandilli Observatory), there is neither a title nor a preface that shows the author’s intention and his sources.⁵ The 17th-century treatise consists of 15 leaves. It mostly includes sketches of various sundials with some descriptions. It seems that the text might have been prepared as a preliminary work or just for personal interest. Thus the *risâle-i tersim-i âlât-ı hey’et* is a kind of notebook rather than a manual on portable astronomical instruments.

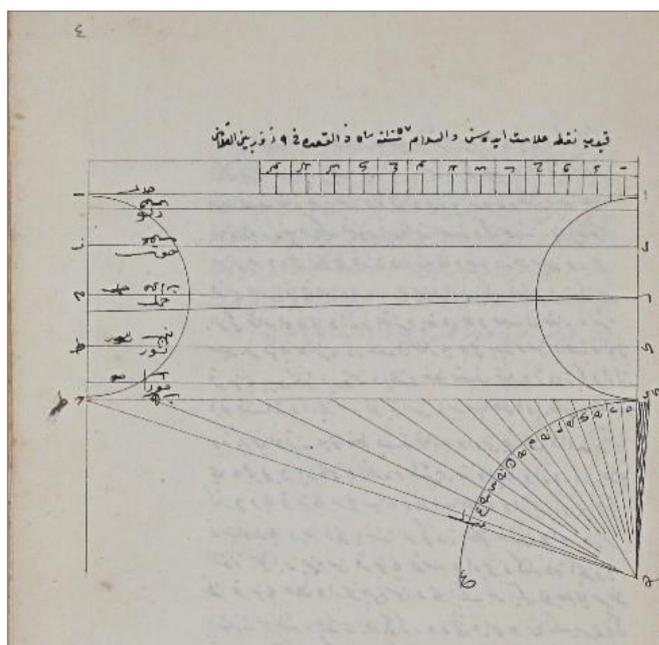


Fig. 1. Sketch showing how to produce a scale of the locations of the hour lines on a cylinder dial (fol.4r). Images courtesy of the Library of KOERI.

Because of this, the treatise does not fit the Ottoman literary tradition of portable astronomical instruments which describe the parts of the instrument with only a few or no illustrations and only explain how to use them in words.

Moreover, it is not obvious that the author was following an order or classification when he was describing all these instruments. At first sight, it seems that the author starts with the titles written in red ink and then describes the way of making the instrument and gives a sketch. However, after the examination, we also realised that sometimes there is no explanation for some of the sketches while sometimes there is no sketch for some of the explanations. For example, although there is a sketch of a universal ring dial, there is no description of it in the treatise. Further, we came across descriptions of some astronomical instruments with no title, which is a feature that makes the treatise challenging to understand.

We encountered such a problem in the section on '*Asâ-yı Mûsâ*' in the treatise. This section begins with the following title in red ink: '*Asâ-yı Mûsâ resm etmek beyan* (3r) which means 'the explanation of drawing of '*Asâ-yı Mûsâ*'. After that, there is no title until folio 8v. Because of this, the *Kandilli Rasathanesi El Yazmaları* indicates that the section of '*Asâ-yı Mûsâ*' is between folios 3r and 8r.⁶ However, analysis of this section shows that the method of drawing of '*Asâ-yı Mûsâ*' is given between 3r and 4r, then the author gives the information that the treatise was copied on AH 9 Zilkade 1057 [6 December, 1647 CE]. Finally, the author finishes with the sketch of '*Asâ-yı Mûsâ*' in folio 4r, which

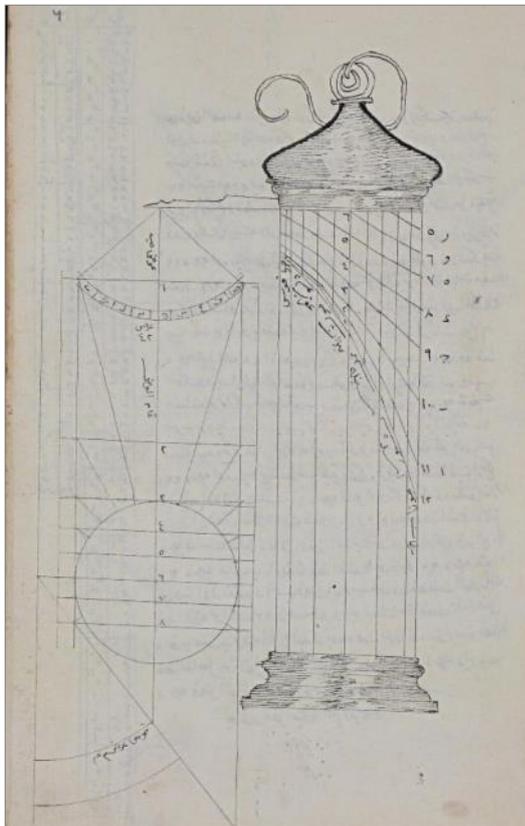


Fig. 2. The sketch of cylinder dial in the *Risâle-i tersim-i âlât-ı hey'et* (fol.6r). Images courtesy of the Library of KOERI.

corresponds to the method of drawing of '*Asâ-yı Mûsâ*' as described in folios 3r-3v (Fig. 1).⁷ Then, there are different descriptions for different instruments without any title, and after a further two folios we come across a sketch of the cylinder dial (Fig. 2).⁸

The author uses a graphical method for drawing the seasonal hour lines on the cylinder dial for a specific latitude.⁹ Interestingly, he gives examples to explain drawing hour lines for the latitude of 48° (Paris?) instead of 41° (Istanbul). However, it is debatable whether this text is sufficient or not for drawing a cylinder dial. For example, although the author mentions the astronomical table which is needed to draw hour lines on a cylinder dial for a particular location, the text does not include the table. So these values must be taken from a *zij* (astronomical table). Additionally, there is no explanation of the zodiac signs, each corresponding to a month of the year on the cylinder dial in the text although the signs are indicated in the sketch.

The second treatise is a part of the *Mecmû'a-i resâil-i nâdire fi el-'ulûm el-felekiyye* ('A rare corpus of treatises on the science of the spheres') which is found in the Princeton University Library of Islamic Manuscripts.¹⁰ This corpus includes about 85 treatises in Arabic, Persian, and Ottoman Turkish, on geometry, astronomy, astronomical instruments, mathematics, and divination, with illustrations, tables, and figures. One of the texts in this collection is on '*Asâ-yı Mûsâ*'.¹¹ There is no information about its date, the place of writing, or the author in it. However, several texts in this collection are dated around AH 1060–61 (1650–1651 CE) Besides, in one colophon, the location of the copy is mentioned as being Constantinople (Istanbul). The treatise also bears the seal of Mustafa Sıdkı (d.1769), and the date of 15 Ramadan 1153 AH (4 December, 1740 CE). Mustafa Sıdkı was trained in the administrative division (*kethüda kalemi*) of the corps in Istanbul. After he left this post, he went to Egypt for an unknown mission and worked there between 1727 and 1747. During this period, he reproduced many mathematical and astronomical texts.¹² So it is possible that he compiled all of the *Mecmû'a-i resâil-i nâdire fi el-'ulûm el-felekiyye* by himself when he was in Cairo. However, in the treatise about '*Asâ-yı Mûsâ*', the tables for drawing hour lines have been provided for the latitude of Istanbul.

The section on '*Asâ-yı Mûsâ*' consists of six leaves. The first folio begins with the title *Kaide der vaz-ı 'Asâ-yı Mûsâ* which means the 'rule for the making of '*Asâ-yı Mûsâ*'. On the same page, there is a note in red ink as *resm-i 'Asâ-yı Mûsâ* which means the 'drawing of the '*Asâ-yı Mûsâ*'. In this text, one of the problems is that there is no illustration of '*Asâ-yı Mûsâ*'. So at first glance, it is not clear which device is being described. However, when the two manuscripts were considered together, the puzzle was partially solved. As I mentioned before in the *Risâle-i tersim-i âlât-ı hey'et*, the author does not give any



Fig. 5. Ottoman cylinder dial from 18th century (?). Image from *Endüstriyel Mirasın Aynası / Mirror of the Industrial Legacy*, Rahmi M. Koç Müzesi / Museum by B. Kovulmaz (ed.), İstanbul, p. 29 (2010).



Fig. 7. The Ottoman cylinder dial, which Hâfız Hüseyin designed in AH 1232 (1816 CE). Courtesy of KOERI, inventory number ID 77.

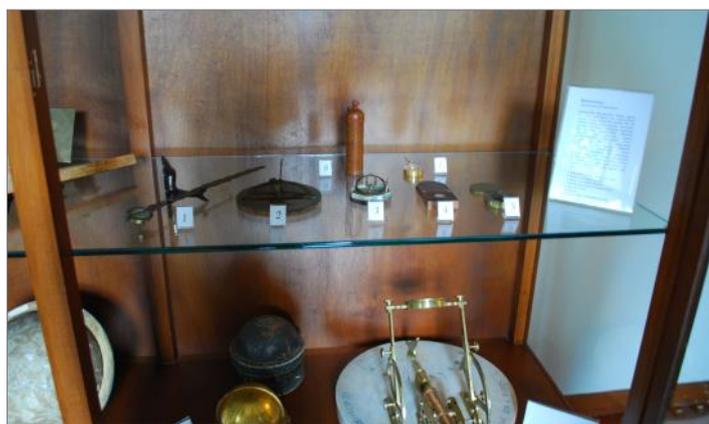


Fig. 6. Hâfız Hüseyin's cylinder dial is exhibited at the Library of KOERI. Courtesy of KOERI, inventory number ID 77.

are hard to read. There is information on the surface of the cylinder that it was drawn by Hâfız Hüseyin at the beginning of Hijri year 1232 (*gurre fi 1232*; 21 November 1816 CE) for the latitude of 41° (İstanbul; Fig. 7).

This second cylinder dial is about 12 cm high and 12.5 cm in diameter. The moving upper cap of the cylinder is provided with a hole to attach a gnomon, but the gnomon is

missing. There is also a ring on the top of the cap for hanging the cylinder dial while measuring the time. The outer surface of the cylinder carries the curved lines and vertical lines which are inscribed directly on the surface of the cylinder. The curved lines represent the hour curves that reflect the changes in the Sun's position in the zodiac throughout the year. Three-hour curves such as the noon (*zevâl*), first mid-afternoon (*asr-ı evvel*), and second mid-afternoon (*asr-ı sânî*) lines are drawn in black ink while the others are in red.

In contrast, vertical lines on the surface of the cylinder, which intersect with the hour curve lines, represent the zodiac-scale. The names of the zodiac signs are written in pairs with black and red ink below the noon curve (see Table 1). Six vertical lines, which represent the beginning of pairs of zodiac signs, are marked off in black until the noon curve, and then continue in red, whereas the others are only only in red. The solstitial points are the first points of Capricorn (*el-Cedî*), and Cancer (*el-Seretân*) marking the shortest ($\delta_{\text{Sun}} = -\epsilon$) and longest ($\delta_{\text{Sun}} = +\epsilon$) days of the year, and they share the same vertical line in black ink on the cylinder. Besides, Aries (*el-Hamel*) and Libra (*el-Mizân*) are marked off with gilt because the first point of Aries and Libra are the locations of the vernal equinox ($\delta_{\text{Sun}} = 0$) and the autumnal equinox ($\delta_{\text{Sun}} = 0$), respectively.

<i>el-Cedî</i> (Capricorn)	<i>el-Kavs</i> (Sagittarius)	<i>el-'Akreb</i> (Scorpio)	<i>el-Mizân</i> (Libra)	<i>el-Sünbüle</i> (Virgo)	<i>el-Esed</i> (Leo)
<i>el-Seretân</i> (Cancer)	<i>el-Delv</i> (Aquarius)	<i>el-Hût</i> (Pisces)	<i>el-Hamel</i> (Aries)	<i>el-Sevr</i> (Taurus)	<i>el-Cevzâ'</i> (Gemini)

Table 1. In the table, names of the zodiac signs on the cylinder dial are shown in their order on the instrument with their transliteration and Latin names. On the cylinder, *el-Delv*, *el-Hût*, *el-Hamel*, *el-Sevr*, and *el-Cevzâ'* are written in reverse order with red ink.

When the revolving head of the cylinder is placed on the proper date related to the zodiac sign and the cylinder dial extended towards the Sun, the shadow of gnomon on the cylinder shows the local time for Istanbul.

Concluding Remarks

The Ottoman muwaqqit Ahmed Ziya Akbulut's book *Güneş Saatleri* (The Sundials, 1929), and the examination of two above-mentioned manuscripts, showed that the cylinder dials were called not only *üstüvânî* but also '*Asâ-yı Mûsâ*'. However, it is not clear *who* used the term '*Asâ-yı Mûsâ*' for the cylinder dial, or why they preferred this term instead of *üstüvânî*. Besides the information on latitude in the texts, the surviving cylinder dials might give some clue because of the latitude underlying the markings for the seasonal hours. The MS in Princeton University Library and both of the surviving cylinder dials show that these instruments can serve for the latitude 41°, and local astronomical works usually used the latitude of Istanbul. So we can say that all of them are intended for use at the latitude of Istanbul. However, in Kandilli Library MS 39, interestingly, the author used the latitude of 48° (Paris?) instead of 41° (Istanbul) in his worked examples.

For now, although it is difficult to arrive at a definitive conclusion, it is necessary to point out that scientific activities were coming not only from the Islamic scientific tradition but also from that of the Jews and various Christian subjects, including Greeks, Armenians, Bulgarians, Serbs, Romanians, and Hungarians.¹⁷ For instance, the treatise on three kinds of sundials in the Hebrew language by Mordechai ben Eliezer Comtino, who flourished in Constantinople (Istanbul) in the 15th century, is an example associated with our topic as the second sundial described is the cylinder dial.¹⁸ As well as this example, there are various treatises on astronomy and astronomical instrumentation in the Ottoman literature in Arabic, Hebrew and Turkish, and translations from Latin into Arabic and from Arabic into Hebrew. On the other hand, there were many translations of Western scientific works in the Ottoman Empire by the beginning of the seventeenth century, especially from French sources.¹⁹ Keeping these notes in mind, we can ask the following questions: is it possible to suggest that '*Asâ-yı Mûsâ*' (The staff of Moses) indicates the name of the maker of the instrument? If that is so, is it possible to make a connection between the name and identity of the author? How can we explain the reason for the examples of drawing hour lines for the latitude of 48° in Kandilli Library MS 39? Is it possible that the author used a French source for describing the method of the marking hour lines on the cylinder dial? Curiously, we now

have another term, *Batlamyus kuburu* (Ptolemy's tube or cylinder), for the cylinder sundial. Therefore, these findings provide a starting point for discussion and further research.

On the other hand, as far as is known, the 18th-century Ottoman wooden cylinder dial is the unique surviving exemplar from the Ottoman period. Now, we can add another item to our list from the 19th century. Both of them indicate the location at the latitude of 41°. So we can say that these instruments serve for Istanbul. However, neither the above-mentioned treatises on cylinder dials, nor the surviving cylinder dials themselves, are sufficient to say whether they were manufactured by the Ottomans or imported into Ottoman Turkey (particularly the city of Istanbul) for the Ottoman market.

Additionally, it is unlikely that cylinder dials were used as often by Ottoman astronomers and timekeepers as astrolabes and quadrants. Nevertheless, new sources mentioned above and the two surviving cylinder dials let us reconsider the historiography of cylinder dials in Ottoman Turkey. Although it is hard to make a direct connection between the above-mentioned surviving cylinder dials and treatises, it is at least possible to study the history of cylindrical sundials in Ottoman Turkey from the 17th to the 19th centuries, not only from surviving objects but also from the written sources that contain information about how these instruments were used. We hope that further attempts could prove quite beneficial to the literature.

ACKNOWLEDGEMENTS

Thanks to Mahmoud Shahidy for drawing my attention to *Mecmû'a-i resâil-i nâdire fi el-'ulûm el-felekiyye* (A rare corpus of treatises on the science of the spheres) which is found in the Princeton University Library of Islamic Manuscripts.

REFERENCES and NOTES

1. N. Çam: *Osmanlı Güneş Saatleri*, Kültür Bakanlığı Yayınları, Ankara, p.18 (1990); D. A. King, *In Synchrony with the Heavens: Studies in Astronomical Timekeeping and Instrumentation in Medieval Islamic Civilization*, Vol. 2. *Instruments of Mass Calculation*, Brill, London & Leiden, p. 149 (2005).
2. Abū al-Hasan al-Marrākushī: *Camîu'l-l Memati ve'l Gayat fi ilmi-l Mikat-u Merrakuşi*, Istanbul, Süleymaniye Library, Ayasofya MS 2599, fols. 91v-94r.
3. Ahmed Ziya (Akbulut): *Güneş Saatleri Yapım Kılavuzu*, (eds.) Atilla Bir, Mustafa Kaçar, Şinasi Acar, Biryıl, Istanbul, p. 51 (2010).
4. Anonymous author: *Risâle-i tersim-i âlât-ı hey'et*, Kandilli Observatory, MS 39, copied in AH 1057 (1647 CE).
5. G. Kut, H. Aynur, C. Üçer, F. Büyükkaracı Yılmaz (eds.): *Kandilli Rasathanesi El Yazmaları, I- Türkçe Yazmalar*, Boğaziçi Üniversitesi Yayınları, Istanbul, pp. 171-172 (2007).

6. *Ibid.*, p. 171.
7. Anon.: *op.cit.*(n.2), ff. 3r-4r.
8. *Ibid.*, fol. 6r
9. For detailed information about the graphic method for drawing hour lines on cylinder dial see A. E. Waugh: *Sundials: Their Theory and Construction*, Dover Publications, New York, pp. 152-153 (1973).
10. Mustafa Sıdıqı (former owner): *Majmū'ah-yi rasā'il-i nādirah fī al-'ulūm al-falakīyah*, Islamic Manuscripts Collection, Manuscripts Division, Special Collections, Princeton University Library, MS Garrett 373, ff. 1r - 431v.
11. *Ibid.*, f. 114r-117v.
12. For detailed information about Mustafa Sıdıqı's biography and his studies see F. Günergun: "The Ottoman Ambassador's Curiosity Coffers: Eclipse Prediction with De La Hire's "Machine" Crafted by Bion of Paris", *Science between Europe and Asia: Historical Studies on the Transmission, Adoption and Adaptation of Knowledge*, F. Günergun and D. Raina (eds.), Springer, Dordrecht Heidelberg London New York, pp. 113-114 (2011); C. İzgi, *Osmanlı Medreselerinde İlim: Riyazî İlimler*, vol.1, İz Yayıncılık, İstanbul, pp. 302-306 (1997)
13. Mustafa Sıdıqı (former owner): *op.cit.* (n. 10), f. 114r.
14. See especially the following works: A. Bir, M. Kayral: "Bir on sekizinci asır silindirik Osmanlı Güneş Saati," *Osmanlı Dünyasında Bilim ve Eğitim: Milletlerarası Kongresi Tebliğleri* (İstanbul 12-15 Nisan 1999), ed. H. Y. Nuhoğlu (ed.), IRCICA, İstanbul, pp. 347-361(2001); W. Meyer: *İstanbul'daki Güneş Saatleri*, Sandoz Kültür Yayınları, İstanbul, pp. 77-78 (1985); M. Dizer: *Astronomi Hazinesi*, Boğaziçi Üniversitesi Yayınları, İstanbul, p. 33 (1986).
15. The Ottoman system of reckoning sunset as 12 o'clock was commonly known as *gurubi saat* (or *ezani saat*). For an overview of *ezani saat* see A. Bir, Ş. Acar, M. Kaçar: "The Clockmaker Family Meyer and Their Watch Keeping the *alla turca* Time," *Science between Europe and Asia: Historical Studies on the Transmission, Adoption and Adaptation of Knowledge*, F. Günergun and D. Raina (eds.), Springer, Dordrecht Heidelberg London New York, pp. 125-136 (2011); A. Wishnitzer: *Reading Clocks, Alla Turca: Time and Society in the Late Ottoman Empire*, The University of Chicago Press, Chicago & London, p. 32 (2015).
16. Its free translation is: An instrument to perfectly determine the time by measuring the altitude / It is a tube bearing curves, as well. / When this vertical [instrument] is placed opposite the sun / It informs about the time of the location [latitude] as well.
17. E. İhsanoğlu: "Ottoman Science: The Last Episode in Islamic Scientific Tradition and the Beginning of European Scientific Tradition," *Science, Technology and Industry in the Ottoman World*, E. İhsanoğlu, A. Djebbar, F. Günergun (eds.), Brepols, Turnhout, pp. 11-12 (2000).
18. B. R. Goldstein: "Description of Astronomical Instruments in Hebrew," *Annals of the New York Academy of Sciences*, 500(1), p. 123 (June 1987).
19. E. İhsanoğlu, *op.cit.* (n.17), p. 26.



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Summer Solstice and a Silver Sundial

Summer Solstice 2020 in Edinburgh was a day of beautiful sunshine. What could be a better time to show off Dihelion, the Macmillan Hunter dual sundial, which can read the solstice and the equinox seasons and the daytime hours? Shifting patterns of sunlight and shadow and petals of the sunflower show through so clearly. There is a lovely contrast with the silver finish (galvanising over-painted in silver) on the metal dial, which was done as a special commission for the new owners and their Kent garden.

The time is before 8 in the morning which sounds quite early but of course is solar time, or nearly 9 am in British Summer Time. It is still well before noon, when the horizontal rod is able to mark the passage of the four seasons by its shadow on the vertical curved scale on the side of the gnomon below the dial plate. The shadow once again did find its proper mark on this day of the solstice. It is fascinating to notice the shadow's daily progress, which slows down at the solstices and hastens through the equinoxes, during the course of the year.

Alastair Hunter



IN THE FOOTSTEPS OF THOMAS ROSS

Part 32: The West Lothian Sundials

DENNIS COWAN

West Lothian is not the most fertile ground for sundials, but in volume 5 of *The Castellated and Domestic Architecture of Scotland*¹ Thomas Ross included the examples described in this article. Of the first, he says:

“This is a massive square dial [Fig. 1], which probably dates from the latter part of the seventeenth century; it stands on a circular stone base, which is flush with the ground, beside the old mansion of Houston.”

Here Ross was referring to the sundial at what is now Houston House Hotel in the village of Uphall. Intriguingly there are a couple of inconsistencies in Ross’s account. He says that it is a massive square dial, but examination of his sketch at Fig. 1 shows that the dial itself is circular although the abacus is square. Furthermore, it is hardly massive as he suggests.

The sundial today is the same as in Ross’s time as can be seen in Fig. 2, even down to the circular stone base being flush with the ground. However, the dial plate is different. Today there is an octagonal dial (Fig. 3), but sitting within the original circular dial’s recess. It has Roman numerals viewed from the inside and running from 4 am to 8 pm. There is a noon gap but the gnomon is missing.

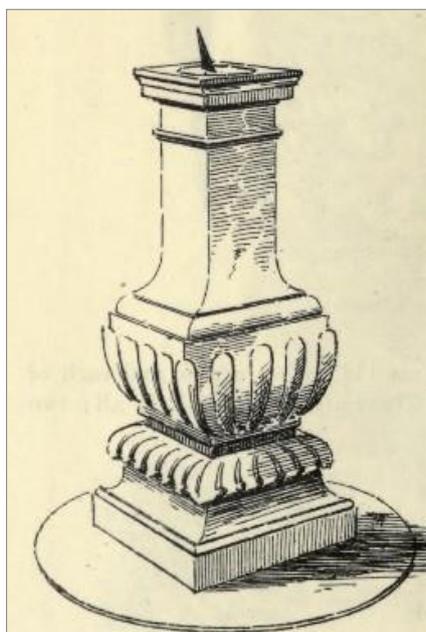


Fig. 1. Ross’s sketch of the Houston sundial.



Fig. 2. The Houston sundial today.

Near to the village of Newton, by the southern bank of the Forth of Forth, lies the late 17th century L-shaped house of Craigton. It was built for the Ewings of Craigton, but was acquired by the Hopes in the 18th century and added to the Hopetoun Estate. Of the sundial there Ross says:

“This dial [Fig. 4] is situated in the garden of the seventeenth century mansion-house of Craigton; it has a circular



Fig. 3. Close-up of the Houston sundial sitting within the original circular recess.



Fig. 4. Ross's sketch of the Craighton sundial.

Fig. 5. The Craighton sundial today.



Fig. 6 (below). The Craighton dial plate. Notice the large crack.



baluster support with boldly cut egg and dart enrichment supporting a square abacus, on which is placed the bronze dial-plate."

The sundial still exists in the garden and it is clearly the same as Ross saw, as can be seen by comparing Figs 4 and 5. Like the Craighton dial, it has Roman numerals from 4 am to 8 pm read from the inside. Its gnomon too is missing, but judging from the width of the noon gap, it must have been quite substantial (Fig. 6). Unfortunately there is a huge crack in the dial plate which is secured to the abacus by four crudely fixed screws.

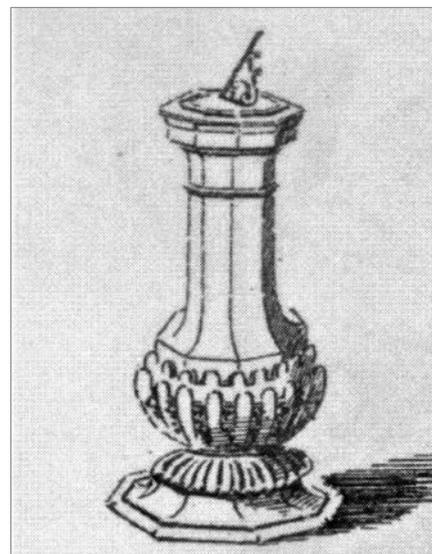
Staying on the Hopetoun Estate, there is a sundial situated to the rear side of Hopetoun House itself (Fig. 7). Ross did not provide a sketch of the Hopetoun sundial and he doesn't say much about it other than:

"The horizontal dials at Craigiehall [Fig. 8] and Hopetoun are almost identical. The carved work on the pedestals was probably wrought by the same hand."



Fig. 7. The sundial at the rear side of Hopetoun House.

Fig. 8. Ross's sketch of the Craigiehall sundial which he said is almost identical to the Hopetoun sundial.



Both of these great houses were constructed at the same time by the same master mason (Sir William Bruce), so perhaps it is not surprising that Ross thought that these two pedestals were made by the same hand. A full description of the Craigiehall sundial was given in a previous article in this series,² but although the pedestals are similar at first glance, there is a difference. Whilst the appearance and decoration of the two pedestals is almost identical, the Craigiehall pedestal is of an octagonal nature and the Hopetoun pedestal is square. It is not dissimilar to the pedestal at Houston described earlier.



Fig. 9. The Hopetoun dial plate.



Fig. 10. Close-up of the Hopetoun dial plate.

The dial plates of the two sundials are different, however. The Craigiehall dial is octagonal whilst the one at Hopetoun is circular (Fig. 9). They both have Roman numerals from 4 am to 8 pm read from the outside and both have Equation of Time details. Therein lies the main difference, as the Craigiehall dial's EoT is laid out in tabular form whilst that of Hopetoun is circular around the compass rose. Concentric arcs run around the rose and are labelled "Equation of Natural Days", "Watch Faster" and "Watch Slower" and the months run anti-clockwise (Fig. 10). Each day of the month is marked and the dial has a one-minute time scale.

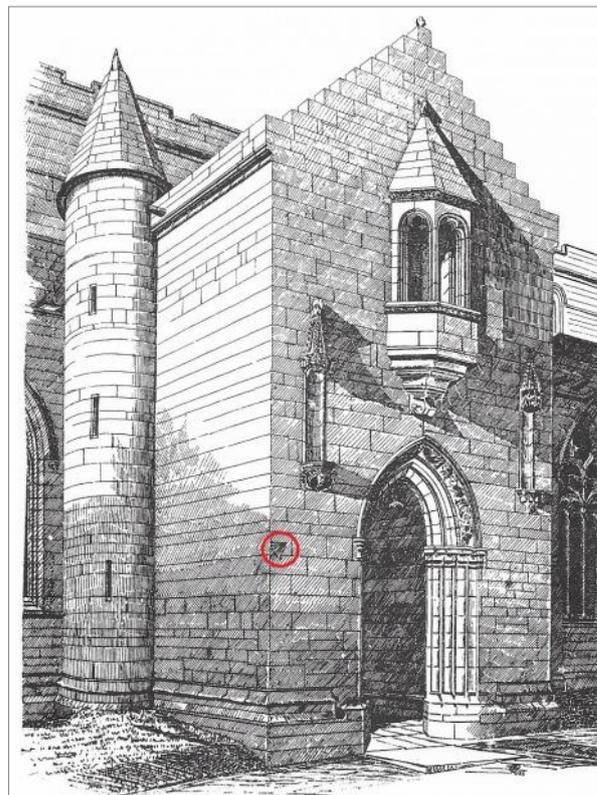


Fig. 11. Ross's sketch of St Michael's church at Linlithgow with the mass dial indicated by the red circle.

The details on the dial are fading and some of the detail is difficult to read. There is a coat of arms, but it is no longer legible. There is a noon gap but the gnomon is quite loose.

There are very few mass or scratch dials in Scotland but one of those is on St Michael's parish church situated next door to Linlithgow Palace, one of the main residences of the Scottish monarchs in the 15th and 16th centuries. Ross simply says:

"A dial similar to the foregoing has been cut on the south porch of this church, on the west side of the doorway. It is seen in the view in Volume 3³ [Fig. 11], but it is so very small and inconspicuous as hardly to attract attention. It has no date, but being of the same construction as the one at Melrose, it is doubtless of the seventeenth century."

Here Ross was comparing the dial at Linlithgow with that of Melrose,⁴ but he was wrong in comparing them favourably. They are quite different, the only similarity being that they are both cut into the stonework of the churches. The dial at Melrose is clearly a scientific dial with equal hours and numerals. It is dated 1661 which is presumably why Ross mistakenly dates the dial at Linlithgow similarly.

He was correct though in saying that the Linlithgow dial is small and inconspicuous, as when I visited my companion asked one of the church guides if he knew where the dial was. He was told that there was no sundial on the church, and he took great satisfaction in bringing the guide to where I had already located the dial! It was not surprising that the guide was unaware of it, as it is quite difficult to see, with only the hole clearly standing out to the left of the porch entrance (Figs 12 and 13).



Fig. 12. St Michael's church today. The mass dial is to the left of the doorway.

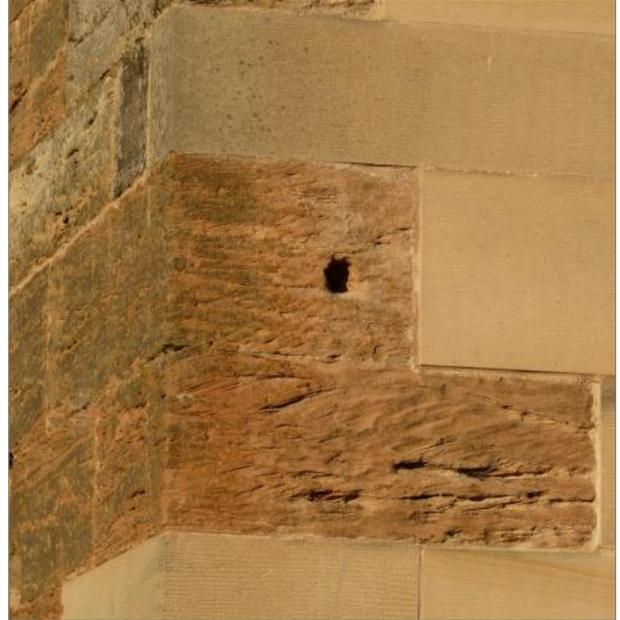


Fig. 13. Close-up of the mass dial at St Michael's church.

REFERENCES

1. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland. Vol. 5*, David Douglas, Edinburgh (1892).
2. D. Cowan: 'In the Footsteps of Thomas Ross Part 2: The Sundials at Craigiehall', *BSS Bulletin*, 24(iii), 16-18 (September 2012).
3. D. MacGibbon and T. Ross: *The Castellated and Domestic Architecture of Scotland. Vol. 3*, David Douglas, Edinburgh (1889).
4. D. Cowan: 'In the Footsteps of Thomas Ross Part 26: Sundials of Melrose and Nearby', *BSS Bulletin*, 31(i), 8-11 (March 2019).

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A French Motto



This rather unusual horizontal dial is dated 1644 and was noted for sale at a French auction house. When I first saw it, I thought perhaps that the motto was in Greek—it certainly contained some rather odd characters. So I approached our members John and Janet Wilson to see if they could translate it but they were of the opinion that it was French and in turn passed the puzzle to their friend, Emeritus Prof. Michael Jones of the University of Nottingham.



Michael's reading was that it was actually

CHEVER NOBLE

where it was the strange overlapping of the C and the H that gave it a Greek appearance. 'Chever' could be an abbreviation

of 'Chevalier' (a knight) but he noted that it is also a family name, found particularly in Brittany. Thus this could be a personal motto for the family, to go with the coat of arms to the south of the gnomon which can be blazoned as *a chevron between three ermine spots, on a chief a cross patée*. This has not yet been identified—our normal heraldic sources do not extend across the channel.

JD

DAVID YOUNG 1927–2020



It is with regret that we report the death of one of our Vice-Presidents and founder members (membership no. 3), just one month short of his 93rd birthday. David, assisted by his wife Lilli, was an enthusiastic and committed member and leader of

the Society. In the June 2013 *Bulletin* he described how he had developed an interest in sundials and had made contact with Andrew and Anne Somerville, with their own interest in Scottish dials. He met the Somervilles in 1988 and later made contact with Charles Aked from the Antiquarian Horological Society and then Christopher Daniel who was looking after sundials and other instruments at the National Maritime Museum. On 5 May 1989 all except for Christopher Daniel (who was in touch by telephone) met at David's house and agreed on the formation of the Society. David subsequently became the Secretary for ten years and organised conferences from the first in Oxford in 1990 until 1999. In parallel with all this David was a very active member of the Chingford Historical Society, indeed a member for nearly 50 years. In that Society he is fondly remembered for organising many coach trips to places of historical interest and was made its President.

As an efficient organiser he ran week-long 'sundial safaris' to Scotland (2000), Wales (2001) and Cornwall (2003). These were well attended and memorable for events other than sundials! For the Welsh tour we were invited to ascend 700 feet from Betws-y-Coed to the Youngs' 300 year old cottage in the forest to enjoy a log fire and Welsh cakes. In Cornwall the hotel guests were able to observe early evening visits by badgers for their regular snack. In addition to the tours in the UK David also helped with the safaris in Germany and Austria. He also maintained contact with members through a number of short reports and articles.

Members will also remember his enthusiasm for 'assisting' at any auction that was being held, usually of dials and books on behalf of the family of a recently deceased member. A pet project was creating, with fellow Society member John Moir, a sundial trail of a dozen dials in the grounds of the Horniman Museum, Forest Hill. Another project was the creation of a 'yew tree dial', again with John Moir, at Easton Lodge, Essex.



Although David's attendance at Society events declined in later years he remained active by making donations to assist in three sundial restoration projects: the restoration and re-installation of the collapsed vertical dial at St Leonard's Church, Southminster, in May 2010; replacement of a decayed vertical wooden dial at All Saints Church,



David with Margaret Stanier and Bill May at Newbury.

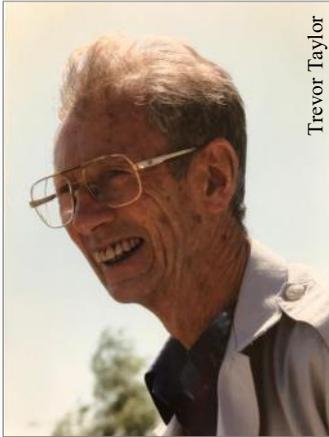
Nazeing, in August 2010; and replacement of a decayed vertical wooden dial at St Mary's Church, Mentmore, in May 2017. The last two restorations have been fully described by Ian Butson in the *Bulletins* for December 2014 and May 2017.

We know little of his early life, but one anecdote (via Margery Lovatt) is the story of how he spent his summer holidays, presumably before he met Lilli. Every summer he would travel from London to Sutherland, the most northerly part of the Scottish mainland, to run the Youth Hostel there. It took him seven days to cycle. Often a party of walkers, who hadn't booked in advance, would turn up. Thirty-six was the most he had to cook breakfast for and put camp beds outside for them to sleep on. The Hostel had been built to accommodate 12. Maybe that's where he gained his organising skills for BSS outings! Apparently he met Lilli at a CND rally. Professionally, his main job was as a laboratory technician at the University of East London, no doubt making full use of his practical skills. He was clearly a man of many parts.

We all owe David Young a huge debt for creating such a firm foundation for the formation of our successful Society, helped to large extent by his warm and generous personality.

Douglas Bateman

GORDON ERNEST TAYLOR 1925–2020



Trevor Taylor

Gordon Taylor was born in Birmingham where he attended Solihull Grammar School but, when he was 13 and following his father's early death, the family moved to Bristol where he took his School Certificates. In May 1941 their house was destroyed by a German bomb but luckily he was not home at the time. He had joined the Home Guard and was

involved with anti-aircraft rockets and was already interested in astronomy, reading a paper at what was to become the Bristol Astronomical Society.

He was called up in 1943 and joined the RAF, passing the required examinations to become a meteorologist in which role he was posted to the Gambia (West Africa). After the war, he continued as a civilian meteorologist, initially at Swansea where he started the Swansea Astronomical Society, later becoming its life president. In 1948 he transferred to the Meteorological Office and then to the Nautical Almanac Office, becoming part of the Royal Greenwich Observatory at Herstmonceux Castle (escaping the polluted London sky) in 1949.

Although initially his rank was Scientific Assistant (he described it as "one cannot get any lower!"), he made a name for himself in the field of Lunar Occultations, where a star disappears for a short period behind the moon. This later developed with occultations behind planets and their moons, and other small solar system objects. In the days of the earliest primitive computers, predictions of the timing of these events called for great skill and even a mechanical simulator. There was a healthy social scene at Herstmonceux as well, allowing Gordon to meet his wife Violet (Strong) and to play table tennis to a good level – for example winning the Eastbourne Men's Tournament on the Pier in 1953 – and playing chess. He was also an outstanding runner, competing in, and often winning, local 10 Kilometre races and Fun Runs from his 50s to his 80s.

Gordon retired from the RGO in August 1985, having won the British Astronomical Association's (BAA) Merlin Medal in 1962 and in 1979, and an 'Outstanding Contribution' award in 2009. He was the recipient of the David E. Laird Award of the International Occultation Timing Association in 2014. He also had Minor Planet 2603 named 'Taylor' after him in 1982.

Gordon was interested in sundials long before the formation of the BSS and published an early paper on the subject in



Kevin Karney

1967 (see Bibliography below). In a slightly later paper he described the sundial at Boughton Monchelsea with an unusual reversed stereographic projection and this was later to become SRN 0001 in the BSS Fixed Dial Register. In an important paper of 1975 he described the theory behind reclining equiangular sundials, thought at the time to be a new development but later found to be a re-invention of the Foster-Lambert dial. A large example of this design was fabricated in stainless steel (see photograph above) as a centrepiece to the Tercentenary Celebrations of the RGO and was opened by Princess Anne in July 1975. Although the dial followed the RGO to Cambridge for a period, it is now back at Herstmonceux.

Gordon joined the BSS in the first tranche of members (membership no. 146) and was soon given the role as the first dedicated Registrar. In the days before ready-made databases, he simply wrote his own – he had after all been the Director of the Computing Section of the BAA before his retirement. He contributed at least a dozen articles, letters and book reviews to the *Bulletin* on subjects ranging from the accuracy of using Polaris for gnomon alignment to checks on the delineation of the re-made Seven Dials sundial. One of his articles was on the 'Abbreviations and Symbols in Gnomonics' and he was later able to advise on this and on astronomical subjects when the BSS Glossary came to be written.

His considerable contributions to the BSS and astronomy will be missed.

Sundial Bibliography (excl. *BSS Bulletin*)

'A Mariner's 'Equinoctial Dial' of 1634?', *J. Inst. Navigation*, 20(3), 343-46 (1967).

'The Boughton Monchelsea Sundial', *J. Brit. Astr. Ass.* 84(3), 184-88 (1974).

'Equiangular Sundials', *J. Brit. Astr. Ass.* 86(1), 7-17 (1975).

John Davis (with assistance from Trevor Taylor)

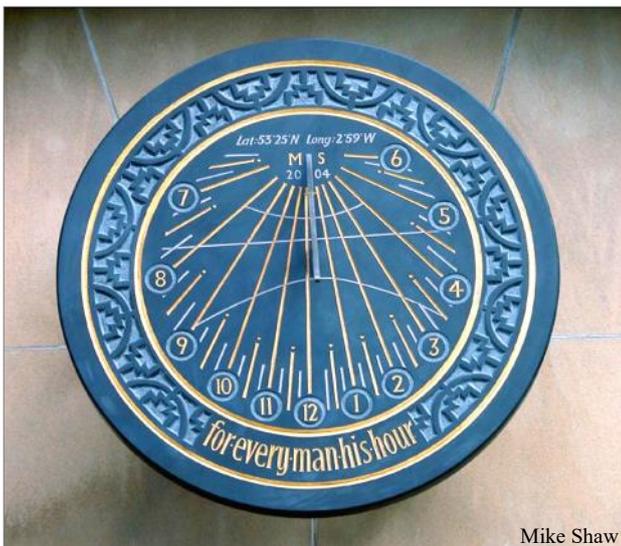
ALAN SMITH 1925–2020

Alan Smith (October 1925–April 2020) was born in Oswaldtwistle in Lancashire, England, accounting for his characteristic Lancashire accent. After finishing his training as an art teacher in 1946 he joined Strand Grammar School until 1954. He then moved into the museum world which was to be a major part of his career, starting in 1954 in the Education Services part of the Manchester Athenaeum Museum.

In 1963 he was at the Liverpool Museum as the Keeper of Ceramics and Applied Art where part of his



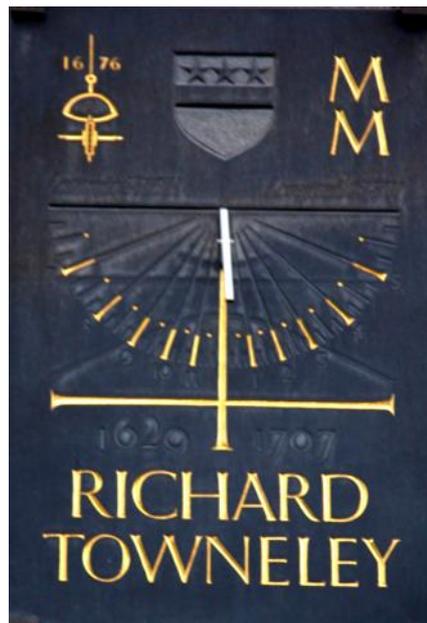
At home, he had workshops for both pottery and horology. He considered Richard Towneley's contribution to the dead beat escapement to be greatly overlooked so constructed a reproduction of one of the Tompion clocks originally installed at Greenwich in 1676. In addition, he designed and modelled a sundial for the Towneley Hall, Nr Burnley, Lancashire which prominently featured the escapement.¹ Later, he designed and personally made a circular sundial in Welsh slate in honour of a former curator at the Liverpool Museum (Martin Suggett). This too was written up in the *BSS Bulletin*, describing the design (based on a 7th century Saxon brooch with a border inspired by a Greek key design), letter cutting and gilding.² Altogether, he contributed seventeen items to the *Bulletin* on a wide range of dialling topics as well as writing/editing



Mike Shaw

remit was for horology. This allowed him to make a number of important purchases including a Mudge copy chronometer and even the complete workshop of one of the last remaining watch case makers.

By 1971 he was well-established as a museum professional and well suited to take a Senior Lecturer post at Manchester University where his role was to establish a postgraduate course in Art Gallery and Museum Studies within the Department of History of Art. His students were invariably complimentary; one called him “an inspirational teacher”. In October 1980 he was appointed Granada Professor of Art and Industry at the University of Salford where he remained until his retirement in 1987. He never ceased his involvement in horology and that had extended to joining the BSS very early in its existence with a membership number of 49.



extensively on horology and on ceramics.

When the Society held conferences in the north, Alan could be relied upon to help out and to be on hand (I remember his assistance when locked out of my room late at night!) with his ever-courteous manner. He chaired the judging of the 1996 and 2000 Sundial Design Awards.

His wife Deidre predeceased him. Alan is survived by his son Mark, daughters Julia and Helen,

and their families. More details of Alan's horological and museum careers can be found, respectively, in *Antiquarian Horology* (June 2020, 175-76) and at:

<https://www.museumsassociation.org/museums-journal/people/obituary-alan-smith>.

REFERENCES

1. 'The Making of Towneley Hall Sundial', *BSS Bull.*, 14(i), 20-24 (March 2002).
2. 'The Martin Suggett Memorial Sundial – World Museum, Liverpool', *BSS Bull.*, 18(i), 2 (March 2006).

John Davis (with extensive input from John Griffiths)

USING THE POSITION OF THE SUB-NODUS POINT TO DETERMINE THE DECLINATION OF A WALL

FRANK H. KING

On page 7 of the June 2020 *Bulletin*, there is a photograph of an Italian hours sundial on the Church of San Vincenzo Ferreri in Ragusa, Sicily, with accompanying notes by John Davis, who mentions *inter alia* that the base of the nodus support, the sub-nodus point, “seems to be slightly displaced from the equinox line.”¹

This displacement indicates that the dial does not face due west. Moreover, from the position of the sub-nodus point along the horizon line, one can very easily determine both the declination of the dial and the nodus height. Let us investigate.

The Sundial Atlas entry for the Ragusa dial includes the photograph which is reproduced in Fig. 1.² The entry also gives full location details of the dial and states that the wall declines 80° west of due south.

A Reproduction of the Ragusa Dial

With all the gnomonic information given above, it is easy to reproduce the Ragusa sundial, and a slightly adapted rendering is shown in Fig. 2. John Davis drew attention to the presence of only one solstice line so a second has been added. On Italian hours sundials it is quite common to have no solstice lines or both but having one does look like a mistake, perhaps a restoration error.

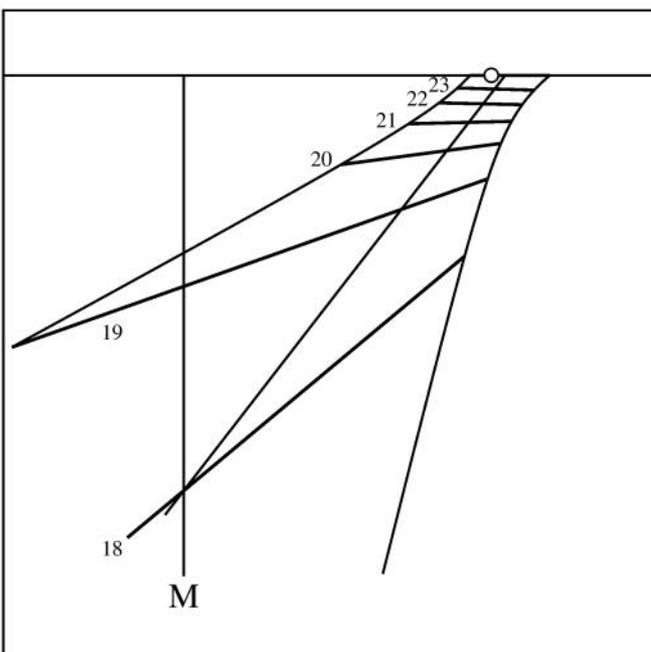


Fig. 2. Modified rendering of the Ragusa dial.

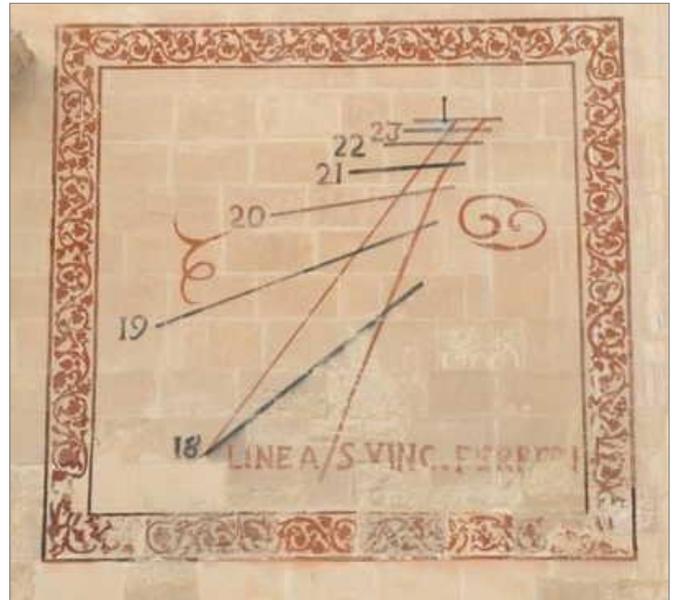


Fig. 1. The Ragusa sundial. Photo: Sundial Atlas.

Another addition is the vertical line labelled M which is the noon line. This feature is also common on Italian hours sundials. The M stands for *Mezzogiorno*, which can be translated as ‘the middle of the day’ and ‘south’. Both translations are appropriate here. The shadow of the nodus crosses this line when the sun is due south at noon. Italian hours show the number of hours since the most recent sunset and, at an equinox, noon is 18 hours after sunset. Accordingly there is a triple point where the equinox line, the 18 hours hour line and the noon line intersect.

Fig. 2 can be regarded as an architect’s drawing of the sundial in elevation. The nodus is represented by the little circle; this aligns with the nodus support which is therefore hidden. There is an implicit assumption that the dial is vertical and that the nodus support is perpendicular to the dial face. For completeness, this drawing is for a dial which declines 78° west, two degrees less than the value given in Sundial Atlas. The revised figure was obtained from Google Maps and a two-degree error cannot be ruled out.

The Gnomonic Triangle

Fig. 2 incorporates an important triangle whose three sides are the horizon line, the noon line and the equinox line. This triangle is, arguably, a feature of the majority of nodus-driven wall sundials that are not direct south-facing. If one or two sides are missing it is usually easy to sketch them in on a photograph or drawing.

In the Ragusa photograph, hour line 24 shows where the horizon line should be, so extend this and then mark in the noon line by extending a vertical line upwards from the intersection of the equinox line and hour line 18. Try to allow for the distortion due to perspective!

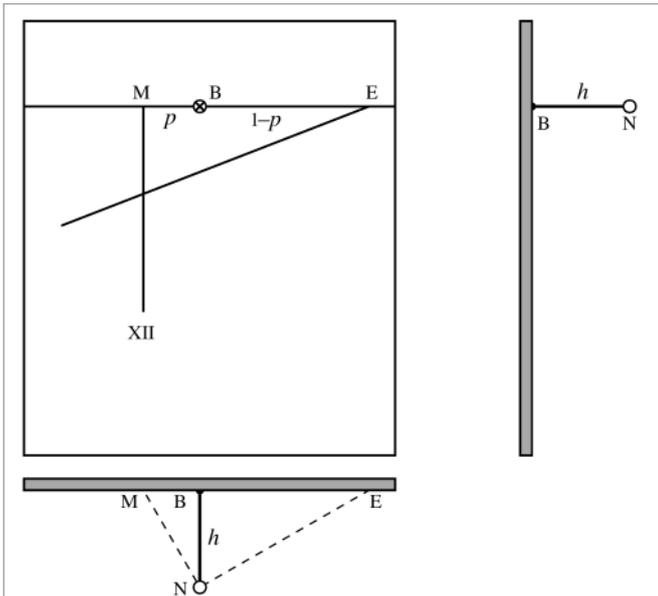


Fig. 3. Three views of a dial plate.

Exploiting the Gnomonic Triangle

Fig. 3 shows three views of an embryonic vertical sundial. The principal view shows the dial in elevation; the dial furniture has been reduced to the gnomonic triangle. The sub-nodus point B is marked on the horizon line with a cross. The enclosing circle represents the nodus which is out of the plane of the figure.

On the right, there is a vertical cross-section through the nodus, N, and its support, BN. BN is the nodus height, h . The dial is imagined to be marked out on a demountable plate, and the shaded region of this view shows a section through the plate.

At the bottom, there is a horizontal cross-section through the nodus and its support. This section runs along the horizon line. NM and NE are construction lines in the horizontal plane and are used below.

Three points are labelled on the horizon line: M is where the noon line intersects the horizon line and E is where the equinox line intersects the horizon line while B marks the sub-nodus point. The portion of the horizon line between M and E is taken to have *unit length* and this is partitioned into two parts: p and $1 - p$. Think of the sub-nodus point being a fraction p of the distance from M to E. There is a very simple relationship:

$$p = \sin^2(d) \quad (1)$$

where d is the declination of the wall. In Fig. 3, $p = 1/4$ so $\sin(d) = 1/2$ and $d = 30^\circ$. The wall declines 30° west of south. For an east-declining dial, the gnomonic triangle is on the west side of the noon line but the calculation is the same.

There are two special cases. First, if $p = 0$ then the dial is direct south-facing; B coincides with M and the equinox line is horizontal so E runs to infinity. At the other extreme, if $p = 1$ then the dial is direct west-facing; B coincides with E and the noon line is at infinity.

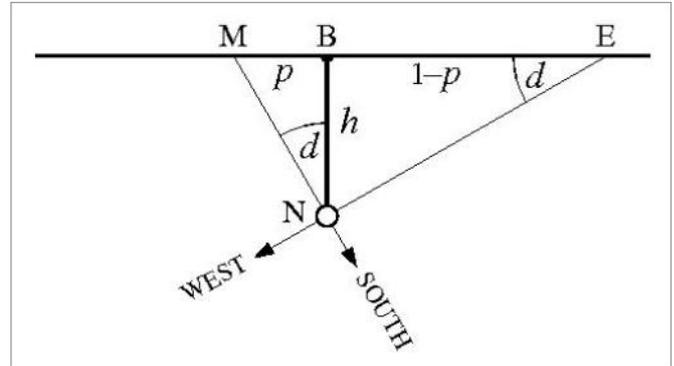


Fig. 4. Details of the horizontal cross-section.

Derivation

Fig. 4 shows an enlarged and augmented version of the horizontal triangle MNE. M, B and E are three points on the horizon line. The nodus N and the noon line define a meridian plane so the line MN points due south. On the day of an equinox the sun sets due west so EN points due west. Accordingly, MNE is a right-angled triangle. The two angles labelled d are the same; d is the angle by which the wall declines from due south.

The nodus height, h , can be expressed in two ways:

$$h = p/\tan(d) = (1 - p) \times \tan(d)$$

So:

$$\begin{aligned} p/\tan^2(d) &= 1 - p \\ p(1/\tan^2(d) + 1) &= 1 \\ p(\sin^2(d)/\tan^2(d) + \sin^2(d)) &= \sin^2(d) \\ p(\cos^2(d) + \sin^2(d)) &= \sin^2(d) \\ p &= \sin^2(d) \end{aligned}$$

Also:

$$\begin{aligned} h^2 &= p^2/\tan^2(d) \\ &= p^2 \cdot \cos^2(d)/\sin^2(d) \\ &= p^2 \cdot (1 - \sin^2(d))/\sin^2(d) \\ &= p^2 \cdot (1 - p)/p \\ &= p \cdot (1 - p) \end{aligned}$$

This gives us a second useful relationship:

$$h^2 = p \cdot (1 - p) \quad (2)$$

This is the nodus height, h , in terms of p . In the example in Fig. 3, $p = 1/4$ and $1 - p = 3/4$ so $h^2 = 3/16$ and $h = \sqrt{3}/4$. Note that the relationship fails if $p = 0$ or $p = 1$.

Reclining and Proclining Dials

Intriguingly, relationship (1) still applies even if the wall is reclining or proclining. Imagine that the horizon line in Fig. 3 is somehow treated as an axis of rotation and that the

top of the dial plate is pulled forward and the bottom pushed back but *the plane of the triangle MNE is kept horizontal*.

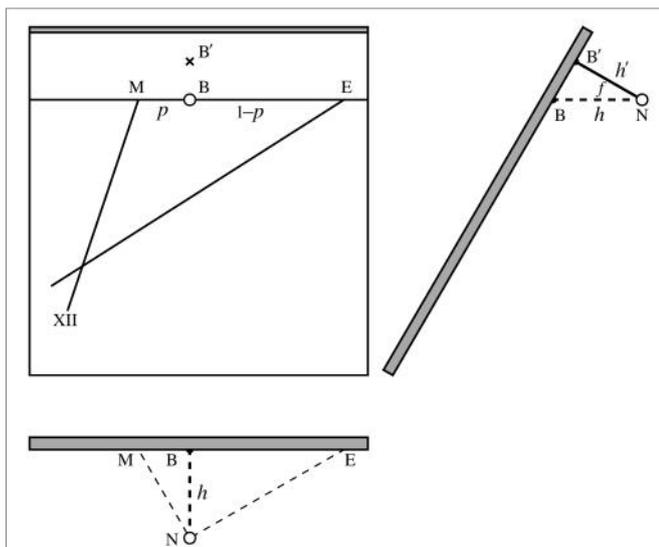


Fig. 5. Three views of the proclining dial plate.

Most of the dial furniture will need redrawing but the points on the horizon line are left undisturbed.

Fig. 5 shows three views of the redrawn sundial. The principal view again shows the dial in elevation; we are not looking at it square on so the apparent height is reduced and we can see the top edge of the demountable plate. A significant consequence of having a declining-proclining sundial is that the noon line is not vertical.

Even more significantly, while the nodus is necessarily on the same horizontal level as the horizon line (and is shown at B) the sub-nodus point is *above* the horizon line (and is shown at B'). In a photograph there will probably be no evidence of point B but one can readily extend a vertical line downwards from B' and estimate the position of B.

The vertical cross section on the right shows the dial plate leaning steeply forward, at an angle shown as f , and while the nodus, N, is still on the same horizontal level as the old sub-nodus point at B, the new sub-nodus point, the foot of the perpendicular from the nodus to the dial plate, is at B'. BN, now shown as a broken line, is the old nodus support where the nodus height was h . B'N is the new nodus support whose nodus height is h' .

The horizontal cross-section at the bottom is unchanged except for BN being a broken line. The plane of the horizontal triangle MNE was held horizontal and points M, B and E are exactly where they were in Fig. 3. Accordingly, relationship (1), $p = \sin^2(d)$, still holds; this example sundial still declines 30° west of south.

Given a photograph of a reclining or proclining dial that has been taken from a viewpoint which is as square on as possible, one can usually make a good estimate of p and $p-1$ but any estimate of the *horizon offset*, the offset of the sub-nodus point above (or below) the horizon line, is likely to be suspect. In Fig. 5, the horizon offset is B'B which is foreshortened in the principal view.

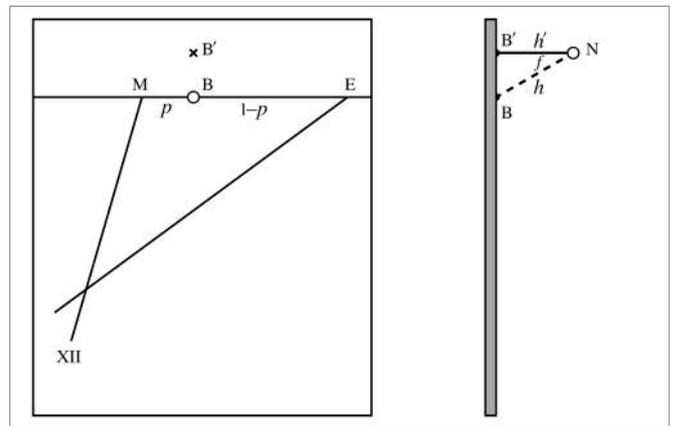


Fig. 6. The proclining dial seen square on.

Relationship (2), $h^2 = p(1 - p)$, gives the old nodus height h which is now the horizontal distance of the nodus from the horizon line; it is no longer the true nodus height h' .

A Workshop Drawing

Fig. 6 shows two views of the dial plate which are more useful to someone setting out the sundial in a workshop. The principal view is truly square on and is clearly taller than the corresponding view in Fig. 5. The noon line and the equinoctial line are now both a little steeper and the horizon offset B'B is now the same in both the principal view and the edge-on view on the right.

With p and $1 - p$ unchanged from Fig. 3 we know from relationship (2) that h (the old nodus height) is $\sqrt{3}/4$ but this gives us only the hypotenuse BN of the vertical right-angled triangle BB'N. To solve this triangle we need also to know either the angle of lean f or the horizon offset B'B. The designer will know the angle of lean which in this case is 30° . Given f , it is then easy to determine the other two sides of the triangle. Calling B'B, the horizon offset, ho , we have:

$$ho = h \sin(f) \quad \text{and} \quad h' = h \cos(f)$$

If we are recording the sundial from a photograph and can trust an estimate of ho then we have:

$$f = \sin^{-1}(ho/h) \quad \text{and} \quad h' = h \cos(f)$$

Summary

With a photograph of a vertical sundial or a proclining or reclining dial, the horizontal displacement of the sub-nodus point along the horizon line from the noon line towards the equinoctial line is sufficient to determine the declination of the dial plate to the west or east of due south. With a vertical dial one can also determine the nodus height but with proclining or reclining dials determining the nodus height also requires knowing the horizon offset; this is very difficult to estimate reliably from a photograph.

REFERENCES

1. John Davis: 'Holiday snaps', *BSS Bulletin*, 32(ii), 7 (June 2020).
2. In Sundial Atlas, www.sundialatlas.net, this dial has the reference number IT004728. The coordinates given are: 36.9257691° N and 14.7476086° E.

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READERS' LETTERS

Joshua Mann

John Davis in his enlightening article ‘Thomas and Joshua Mann, engravers and York virtuosi’ (*BSS Bulletin*, 32(ii), June 2020) cites in note 3 information from the forthcoming 3rd edition of J. Wilson, *Biographical Index of British Sundial Makers*... “The portable dial in the form of a walking stick” there mentioned is not to be attributed to Joshua Mann but is signed “J Mann 1679”. The dial and handle are made of silver in the form of a shepherd’s crook, the tipped point of the crook acting as the gnomon. These are mounted on a walking stick. I first saw this dial in 1970 or 1971 and subsequently published it in my *Early Scientific Instruments, Europe 1400-1800* (Philip Wilson Publishers), London 1987, p. 175 No. 179 (pictured). It was later sold at Sotheby’s, 30 September 1997, lot 9 in their sale of *Important Instruments of Science and Technology, 1550-1950*. As well as the hour grid, a Morland-type perpetual calendar is engraved on the silver sleeve that can be rotated on the cane, which is made of briarwood.



The silver mount carries the punch mark “WE” conjoined beneath a crescent, which is probably the mark of William Elsey, a silversmith free in York in 1674 for whom Mann would have engraved the scales and calendar. Whether he also calculated the scales or followed a pattern supplied to him is a question for future investigation.

The Butterfield-type dial shown in Figs 9a and 9b of the article was offered for sale by Trevor Philip & Son c. 1999 and appears on the first page of their *Newsletter* No. 2 of that year (I think – it is not properly dated). One notes on this dial, well made though it is, that as on the 1683 horizontal dial (Fig. 3), the spacing of the signature is a little uneven, the ‘8’ in particular being squashed between the two larger ‘6’s.

Anthony Turner

Thornton Sundial

I enjoyed Irene Brightmer’s article on the sundial¹ at Thornton in the June *Bulletin*,² and was particularly interested in the association with the stocks. I know of only one other place where time-serving and time-telling are so closely related: at Ripley in North Yorkshire (SRN 2438). In both cases the dial is high above and behind the stocks so the miscreants can hardly watch the hours of their sentence creeping away.



Thornton stocks and dial. Above, from a 1910 postcard. Left, in a lantern slide.



The dial and stocks at Ripley, N. Yorks., SRN 2438 photographed in 1994 by Doug Bateman.

The postcard illustration shows the Thornton dial and stocks in 1910, and the photograph from an old lantern slide probably dates from the same period. An expert in young men's fashions and early bicycle styles might be able to date it more accurately!

REFERENCES

1. BSS Fixed Dial Register SRN 8159.
2. Irene Brightmer: 'A Village Sign and a Sundial in Lancashire', *BSS Bulletin*, 32(ii), 8-9 (June 2020).

John Foad

IVORY SUNDIALS IN FRANCE, A NOTE

ANTHONY TURNER

The diverse forms of ivory sundials made in Dieppe in the 17th century are well known, and a link has been postulated with similar dials made in Paris in the late 16th century.¹ To these, however, it is necessary to add a production elsewhere in Normandy. There, at Lisieux in 1598, Marin le Bourgeois produced a remarkable diptych dial for his patron Ruzé de Beaulieu (Figs 1 and 2),² and there in Rouen manufacture and an export trade in dials are well-attested in the first half of the 17th century. According to export declarations in the port, on 21 February 1631, Jacques de la Roche shipped forty-eight ivory dials, and there is mention also of Charles Regnault 'maitre cadrannier et tabletier' (master dial- and tablet-maker). Tabletiers originally made writing-tablets. In Paris they were subject to rule from the mid-13th century onwards. By the early 16th century they had associated the trades of comb- and dice-making to themselves to form a single corporation of 'comb-makers, tablet-makers, turners, and carvers of images in ivory'.³ Other small works in ivory or precious woods were subsequently added, and they even obtained the right to make false teeth in ivory. That in Rouen, as in Paris, ivory dial-making and painting was domiciled among the tabletiers was therefore normal.

On 9 June 1631, the name of another 'dial-maker', Nicolas Dufour, rue Malepu, is mentioned as are seventy-two 'compass dials in ivory' on 19 September. More dials are mentioned the following year on 1 March 1632.⁴ The exports here mentioned were destined for Spain and Portugal. Where other dials were sent from Rouen we do not yet know, but a local manufacture seems to have been well established. More dials could have been supplied to the city from Paris to supplement such exports and, from the second quarter of the 17th century, from Dieppe.⁵ Although a precise picture cannot yet be delineated, it seems reasonable to postulate that ivory dial-making was established in Paris and in Normandy, centred on Rouen, in the later 16th, and early 17th centuries, but that both were displaced by the ivory workers of Dieppe from the mid-17th century onwards, only for all to disappear in the aftermath of the Revocation of the Edict of Nantes in 1685.



Figs 1 and 2. Front and back of the ivory diptych dial created by Marin de Bourgeois for Ruzé de Beaulieu.² Private Collection. Rights reserved. Photo: Pierre Schmit, CCS-SAF, 2016.

REFERENCES

1. A.J. Turner: 'French diptych dials: historical introduction', in Steven A. Lloyd, *Ivory diptych sundials, 1570-1750*, Cambridge (Ma) & London (1992), 99-103.
2. Eric Mercier & Paul Gagnaire: 'Le cadran de Ruzé de Beaulieu', *Cadran-Info* (hors-série) (2016), 32-3.
3. Alfred Franklin: *Dictionnaire historique des arts, métiers et professions exercés dans Paris depuis le treizième siècle*, Paris & Leipzig (1906), 669-70.
4. De Beaurepaire: 'Notes sur d'anciennes fabriques de Rouen d'après les déclarations d'exportation', *Bulletin de la Commission des Antiquités de la Seine*, xv (1905), 420ff.
5. Turner (ref. 1), 102.

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SUNSHINE IN BEDLINGTON

On the Last of the Very Last

TONY MOSS

My career as a designer/maker of sundials came to an end with the dismantling and disposal of much of the heavy machinery in my workshop.¹ I did, though, retain certain smaller items to satisfy my ageing creative fingers. One problem that faced me was the disposal of quite a large quantity of expensive dialling metals such as CZ120 engraving brass and stainless steel in large pieces. Thick phosphor bronze chunks were left over from previous large gnomons. Before the larger machine tools departed to new homes, five 8" universal equatorial dials were designed and made as eventual 'parting gifts' for each of my five grandchildren. They will eventually receive these with an individualised instruction book telling how to set up and use them wherever life takes them.



Fig. 1. The Equatorial dial—last 'homemade' production.

For much of my dialling career it has been in my mind to design and project-manage a sundial for my adopted hometown of Bedlington in Northumberland. This small, picturesque, town – ten miles northeast of Newcastle – has a history steeped in coal mining and engineering as seen on the dial plate where the hour line structures are hauling 'black diamonds' from the earth. Some of the very first steam locomotives in the world were made here as were the first-ever rolled wrought-iron railway lines. When I



Fig. 2. The installed Bedlington Terrier dial.

moved to Bedlington 55 years ago it was a vibrant mining community with sights and sounds to match. The old industries have gone and much of the town has become a 'dormitory' area for nearby Newcastle. Perhaps the visual references in the sundial will stir old memories and invite enquiries from more recent inhabitants. Within hours of its installation I heard youngsters saying "There's nothing moving." "But how does it work?" and I was happy to fill in those gaps. There is certainly a role for BSS members here.

Many ideas for the gift dial for Bedlington were considered over the years, often in consultation with local individuals. My own preferred idea was for a 'vandal-resistant' plain horizontal dial on a local stone base with a cast stainless steel plate and extra-sturdy gnomon buried deep in the masonry. An 'overhung' gnomon would be supported by a 'Bedlington Terrier Rampant' all to be made by local engineering companies with myself simply as designer and project coordinator.



Fig. 3. The finished dial plate. Note the overlap at noon and the inclusion of Summer Time.

challenge, but almost impossible to approach and read safely. After spending some time trying to accommodate placement on a busy roadside, the recently-laid sandstone market place was finally chosen after undergoing lengthy planning and underground ‘services’ avoidance. The final location in a north-east corner of the area gives good southern exposure but high building will limit the overall range. This is a ‘mean time dial’ with 1 pm at Solar Noon on the plate with inter-laced scales in the solar noon gap to allow for the overhanging gnomon.

Actual production of the metalwork by flame and water-jet cutting began with the support base.

This consists of stylised colliery winding gear surrounded by a large ‘contrate’ gearwheel (crown-like): it is my ‘secret weapon’ to deter climbers and edge-sitters. All the base was flame cut from 20 mm steel and the 1 metre diameter plate was water-jet cut from 8 mm S316 stainless steel. The digital engraving of the plate was guided by a simple PDF file. The Bedlington Terrier gnomon was assembled from three 20 mm pieces of water-jet cut stainless steel. The local companies involved are named on the finished plate and support structure.

The dead-level concrete base was guarded past midnight until firmly set. Two days later the local meridian line was set out and cross-checked using two ex-military compasses adjusted for local magnetic variation. The dial was finally installed on 16 June 2020 when the built-in adjustable feature was hardly needed as the first result was closer than one minute. The engraver was reluctant to texture the polished steel dial plate with a coarse random-orbital disc sander but this paid off in a clear dark shadow. Final finishing with conservator’s wax will protect and allow slow natural patination. A formal inauguration will be arranged after the current lock-down restrictions are ended.



Fig. 4. The dial in its surroundings.

At this stage the project began to take wings and I was besieged with all sorts of symbolism to be incorporated somewhere in the design from famous names and local icons to historic locomotives. The design stage faltered when the company used previously for photo-etching large stainless steel dial plates no longer offered this service. Wider searches nationally ran into many problems and eventually digital rotary engraving by a local company took over. My fears that this would produce a very pedestrian result were ill-founded although some of the ornamental design elements had to be simplified or omitted altogether.

The final siting of the sundial has had a complex passage in the three years of its inception. The middle of a large road island at the entrance to the town was suggested at an early stage. It would certainly have been a deterrent for the vandals, who always seem to regard sundials as a special

REFERENCE

1. Tony Moss: “The very last scratchings of an old bird”, *BSS Bulletin*, 30(ii), 24-27 (June 2018).

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Pilkington & Gibbs Type 6 Heliochronometer



This P&G was offered for sale by Christies Ltd in May 1996. It carries the name JULIO. A. GARCIA who was probably the original owner. Geoff Parsons informs me that it is a rare, early Type 6 Tropical with the stronger and more substantial base covering a full 90° of latitude. There is (or was) one in the Khyber Pass officers’ mess which was the subject of a BSS article many years ago.

JD

SUNDIALS IN NORTH ISLAND, NEW ZEALAND

DOUGLAS BATEMAN and ROSALEEN ROBERTSON

The article about the wonderful dial from Glamis Castle in the March 2020 *Bulletin*¹ reminded Douglas (DB) of a modest collection of photographs of dials arising from a tour of New Zealand. The story goes back to 2008 when he was planning a trip to New Zealand and Australia, and the then Chairman, Christopher Daniel, recommended that he make contact with Rosaleen (RR) and Peter and Sandra Altmann. In New Zealand a sundial interest network was being formed, and it was planned to meet in Auckland. A dial was visited in Auckland and several were seen in other parts of the North Island. Whilst the visit to Australia was well recorded, that to New Zealand was not, and this report partially rectifies the omission.^{2,3}

The Auckland tour began very well, with transport provided by RR in an MGB convertible to visit a fine memorial dial in Lynfield College; this was followed by, with the convertible's soft-top down, an open view of some dozen or more of Auckland's volcanic field of 53 volcanoes, and a tour of a couple of craters. The Auckland dial is shown in Figs 1 and 2.

This memorial to Lionel Warner, MBE, ED, MSc, FRAS, LRSM (Fig. 3) requires some investigation, especially with such a number of awards, and with a strong connection to the school. Warner was born in 1903 and died in 1986. Given that his parents may have been immigrants in 1870-80, he could qualify as a first generation New Zealander. His mother was a primary school teacher supporting nine children, and at the age of 16, he too was teaching as a probationer. Education was a theme throughout his life, leading



Fig. 1. Rosaleen Robertson and the Principal Steve Bovaird at the Lynfield College memorial dial.



Fig. 2. The Lynfield College dial, engraved with a graph of the equation of time, signs of the zodiac, and an inscription: "Presented by staff & pupils, 1961". Note the cast bolt-on gnomon. Maker unknown.



Fig. 3. Memorial inscription on the Lynfield College dial that states: "In memory of Lionel Warner MBE, ED, MSc, FRAS, LRSM, 1960 - 69".

to an MSc. An interesting qualification is the ED, a military honour called Efficiency Decoration. We assume some military service although he was probably too old to serve overseas in the Second World War. Following enquiries, we were lucky to receive information from Stephen Hovell who was at Lynfield College as a student in the 1960s. Warner was a science and music teacher⁴ and he and Hovell set up an astronomy club. Warner established the sundial and it was presented to the College in 1961 by pupils and staff: his rapport with the pupils is clearly shown in Fig. 4.

Warner was in fact a very enthusiastic astronomer with a large telescope. He wrote several popular books on astronomy for the Southern Hemisphere, and was elected a Fellow of the Royal Astronomical Society of New Zea-



Fig. 4. Lionel Warner with the sundial and pupils in a 1964 photograph from Lynfield College Archive. After his death the sundial was given a new base and the commemorative plaque.

land. Records give special credit to the Auckland Astronomical Society and Warner for preparation of the first talking book for the blind on astronomy. It is known that he was a talented violinist, and under his co-leadership the School Orchestra is reported as flourishing, explaining, no doubt, his qualification as LRSM (Licentiate of the Royal Schools of Music). The citation for the MBE is for services to astronomy, Warner having been an active President of the Auckland Astronomical Society and moving force behind the establishment of the Auckland Observatory, and having authored numerous books, articles and TV programmes.⁵ It is not surprising that Lynfield College wished to honour Warner, covering his period of teaching from 1960 until his retirement in 1969. General affection for Warner is expressed in a signing off in the obituary that appeared in the journal *Southern Stars* with the charming and traditional Māori – “haere rā”, farewell Lionel (said by one staying to one going).



Fig. 5. Te Whare Rūnanga meeting house, whose decoration reflects Māori stories and carving styles of iwi, or tribes, from across New Zealand.

The DB tour then continued around North Island and visited the nationally important Treaty of Waitangi Grounds, some 230 km north of Auckland and adjacent to the Bay of Islands. The Treaty of Waitangi is New Zealand’s founding document. It takes its name from the place in the Bay of Islands where it was first signed, on 6 February 1840. This day is now a public holiday in New Zealand. The Treaty is an agreement, in Māori and English, that was made between the British Crown and about 540 Māori rangatira (chiefs).⁶ Te Whare Rūnanga (the House of Assembly) is a beautifully carved meeting house (Fig. 5) designed in traditional Māori form and built from timber and other natural materials. The meeting house was opened in 1940 and stands facing the Treaty House on the upper grounds of Waitangi. The Treaty



Fig. 6. The sundial outside the Waitangi Treaty house commemorating a Royal visit.



Fig. 7. The Waitangi sundial. Note the quill pen and scroll in the gnomon, the ‘filled in’ Roman numerals and the decorated gallery. It has a simple tabular equation of time. The gnomon has a shallow angle for its location 35° 16’ S.

House is an original British Residency built in 1833-34. Together the two buildings symbolise the partnership between Māori and the British Crown on which the nation of Aotearoa New Zealand is founded.⁷

A commemorative sundial was installed outside the Treaty House, as in Figs 6 and 7. The inscription on the panel reads:

This sundial is the gift of Viscount and Viscountess Bledisloe to commemorate the visit of Her Majesty Queen Elizabeth and H.R.H. the Duke of Edinburgh to Waitangi on 28 December 1953.

The tour continued to Whangarei for the Claphams Clock Museum where they have a large dial at the entrance, quite delicate and elegant for its type, as in Fig. 8.

The next port of call on the tour was Waikanae, some 60 km north of Wellington, to stay with former colleagues who had emigrated to New Zealand some 40 years previously. The small town has two sundials, both with some damage and also in the antipodean 'tradition' of cast in relief (Figs 9-12).



Fig. 8. The elegant horizontal dial outside the Claphams Clock Museum, which contains a very large collection of clocks.



Figs 9 and 10. The Waikanae dial in Aputa Place. There is no dedication and it appeared to be anonymous.



Figs 11 and 12. The Horticultural Society's dial in Waikanae Park. In addition to having been bent, the gnomon appears to have been re-attached by some rather crude welding. In the UK this is referred to as a 'bodge', whereas in the local slang it is 'Kiwi DIY'.

A trip to Masterton and the wine growing area of the east of the North Island was next on the informal tour. Just off Queen Street is a dial erected in 2001 for the 75th anniversary of the Masterton Rotary Club (Figs 13 and 14). Aside



Figs 13 and 14. The Masterton dial, sadly missing its gnomon.

from sundials, DB could not help noticing, particularly while touring the wine growing area, that towns would have a traditional war memorial. On these would be inscribed the names of the many who had travelled half-way round the world to die in the two World Wars.

Finally the DB tour ended in Wellington, and one stop was at the Botanic Garden. The Garden has three sundials, one of which is a fine armillary sphere by Folkard and Ward, Sundials Australia, as shown in Figs 15 and 16. Wherever possible Sundials Australia like to incorporate flowers in the design.⁸ The flower depicted here is *Brachyglottis*



Figs 15 and 16. The centennial armillary sphere in the Botanic Gardens Sound Shell lawn (used for open air events). Note the Sundials Australia hour-glass logo and the flower.





Figs 18 and 19. The analemmatic dial adjacent to the Carter Observatory (continued). The analemma is marked with the months and every day of the year! Compared with the more traditional versions, the bronze panel can carry such fine detail.



Figs 20 and 21. A panel, clearly planned for a vertical dial. The gnomon is very fine, but the hour markings appear to have been painted over.

records. A chance encounter whilst strolling around the commercial area led to spotting the panel on the Logan Brown Restaurant which was previously The National Bank of New Zealand building (Figs 20 and 21). This dial also features in the Wellington Sundial Trail.

This was a fascinating tour of New Zealand, and the country has many sundials waiting to be reported! RR will welcome news of other sundials in New Zealand.¹¹

ACKNOWLEDGEMENTS

For additional research about Lionel Warner: Dr Grant Christie, Robert Evans FRASNZ, Stephen Hovell, and Jennie McCormick.

REFERENCES

1. John Davis and Rosaleen Robertson: 'A long way from home: a dial for Glamis Castle now in New Zealand', *BSS Bulletin*, 32(i), 14-20 (March 2020).

2. Douglas Bateman: 'Folkard and Ward, Sundials Australia: a visit report', *BSS Bulletin* 21(ii), 5-8 (June 2009).
3. Douglas Bateman: 'Four sundials in Adelaide, South Australia', *BSS Bulletin*, 22(iv), 12-16 (December 2010).
4. Lynfield College Silver Jubilee Commemorative Magazine 1958-1982.
5. Lynfield College Silver Jubilee Commemorative Magazine 1958-1982.
6. <https://nzhistory.govt.nz/politics/treaty/the-treaty-in-brief>
7. <https://www.waitangi.org.nz/discover-waitangi/te-whare-runanga/>
8. Bateman, ref.2.
9. <http://www.friendswbg.org.nz/newobservatories.html>
10. <http://sundials.co/~wellington.htm>
11. www.sundials.co.nz

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A BENOY SUNDIAL AT THE BRITISH HOROLOGICAL INSTITUTE'S MUSEUM OF TIMEKEEPING

JOHN WILSON

My wife and I are Friends of the British Horological Institute's Museum of Timekeeping at Upton Hall, Nottinghamshire. Last year, we went to a 'winding day' at the Museum. Several hundred clocks take some winding, and two members of the Museum staff undertake this task on Wednesday mornings. Occasionally, people are invited to watch the winding and hear the staff talk about the clocks in their care.

Whilst at the Museum, I noticed an unusual sundial in the garden of the hall (Figs 1 and 2). I had not seen anything like it before. The Collections Officer at the Museum knew nothing of the dial and was unable to find out anything for me. The dial is labelled 'Summer Time' and has a set of fairly standard hour markings, but the gnomon is unusual in consisting of a glass cylinder filled with liquid. When the sun shines, the cylinder of the dial would focus a beam of sunlight on to the dial face to show the time, rather than the usual shadow. The general principle of the cusp-shaped light pointer, as seen in this design, was explained by Michael Lowne in the February 1998 *Bulletin*.¹ Unfortunately, this dial is in poor condition with algae growing in the glass cylinder, and much weathering of the dial face. When it was photographed in 1999, its condition seems to have been excellent but it is now sadly in need of refurbishment. The dial bears a registration number 967979 (registered with whom?).

On checking the BSS Fixed Dial Register at home, I discovered that the dial was a Benoy dial, and that there are two dials by Gordon Benoy in the Register at Upton Hall. There is a picture in the Register, taken by Tony Wood in 2006, of a second one (SRN 6677) which is connected to a clock face via optical fibres. The description in the Register states 'A remote reading Benoy dial, made of glass, plastic and wood. It is connected by optical fibres to the display box (300 × 300 × 300) which shows a 12 pointed star, as per clock dial, with illuminated dots at 5 minute intervals'.

It would seem that this particular Benoy dial has vanished. I would be interested to find out more about the Benoy dials at the BHI Museum of Timekeeping.

Architect and former BSS member W. Gordon Benoy, OBE, RIBA, died in 2004 in his 98th year. In the 1960s, inspired by light shining through a glass on to a table, he invented this new form of sundial and named it the 'New Optical Sundial', which he made and sold through his 'Sunlocks' business in Collingham, Nottinghamshire, 1960-75.² In addition to the two examples at Upton Hall, four more appear in the Fixed Dial Register, of which one



Figs 1 and 2. The Benoy dial SRN 4074 in the gardens of Upton Hall.

was owned by Tony Wood, and described by him in the September 2003 *Bulletin*,³ with additional information he had received from David McKendrick in the following issue.⁴ Also in 2003, Chris Daniel wrote about his own Benoy dial in the Sundial Page of *Clocks* magazine.⁵

REFERENCES

1. C.M. Lowne: 'Reflecting sundials', *BSS Bulletin*, 98.1, 30-35 (February 1998).
2. <https://collection.sciencemuseumgroup.org.uk> (accessed July 2020).
3. A.O. Wood: 'The Benoy dial, Part 1', *BSS Bulletin*, 15(iii), 108-109 (September 2003).
4. A.O. Wood: 'The Benoy dial, Part 2', *BSS Bulletin*, 15(iv), 175-176 (December 2003).
5. Christopher Daniel: 'Time for tea', *Clocks*, 26/7, 39 (August 2003).

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TWO METAL DETECTING FINDS

SUE MANSTON

At the beginning of July we received two sundial enquiries from metal detectorists. The first enquiry was addressed to John Davis: Christian Allen was hoping to find out more about the maker of his father's sundial and he also wanted to know what the missing gnomon might have looked like.

The second enquiry was addressed to the Help and Advice Service: Joanna Webster wondered if we could tell her the age of her sundial. She had found it in her garden whilst using her metal detector.



Fig. 1. The octagonal sundial. Photo courtesy of Christian Allen.

Christian's Sundial

This octagonal sundial (Fig. 1) actually belongs to Christian's father. It sits on a very attractive granite pedestal (Fig. 2) and is signed 'W O Reynolds 1935' (Fig. 3). Christian had discovered that W O Reynolds was an artist noted for his work during the First World War. At the house where the sundial once stood, Reynolds had set up an old-fashioned printing press where he used to cut plates for the press. Did he perhaps make this sundial?

The *Biographical Index of British Sundial Makers*¹ only runs up to 1920 so is no help in finding W O Reynolds. It is possible that the name refers to the owner rather than the



Fig. 2. The granite pedestal. Photo courtesy of Christian Allen.



Fig. 3 (below). The signature 'W O Reynolds 1935'. Photo courtesy of Christian Allen.

maker. It is also possible that the name and date have been inscribed by a different hand. The style of the dial predates 1935, something which a lot of commercial dials did in the first half of the 20th century. The dial could be a one-off variant of a commercial design made to special order.

The dial is 25 cm across. It has a noon gap and Roman numerals read from the outside. The flat-bottomed, broad strokes of the Roman numerals are not what would be expected for a hand-engraved item, but the dial looks too crisp for a casting. Two possible methods for its manufacture are chemical photo-engraving or mechanical milling, the former being the most likely.

The sun face is unusual. While a sun face is typical of commercial dials of the period, in this case it is inverted — the top of the face is at the South — and there are only 12 rays, instead of the usual 16 rays arranged like compass

points. The rays are alternately straight and wavy, representing the light and heat of the sun respectively.

The motto 'Sole orto spes; decedente pax' is not very common; it translates as 'At sunrise, let there be hope; at sunset, peace'. The same motto appears on two other known dials:

- the pedestal of a dial at Worcester Cathedral (SRN 6127)
- a dial in St Mary's Churchyard, Broomfield, Essex (SRN 4669)

The dial in Essex (Fig. 4) is virtually identical to Christian's sundial, with the same inverted sun face and rays. But it is square rather than octagonal, and the spacing of the motto is slightly different. Again, this suggests a commercial design with some variants.



Fig. 4. SRN 4669, Broomfield, Essex. Photo courtesy of Ian Butson.

The unusual motto warranted some further investigation. A search of the Internet found a detective novel called *Mr. Pottermack's Oversight*² written by R. Austin Freeman and published in 1930. The protagonist, Mr Pottermack, finds a "sun-dial" with exactly the same motto inscribed on the sides of the capital. Whilst digging the foundations for his sun-dial, Mr Pottermack gets into a spot of bother, and well, I shall not spoil the story; but suffice it to say that the last chapter is entitled 'The Sun-Dial Has the Last Word'. Literary references to sundials are rarely this detailed and I wonder if the author owned such a sundial himself, or even if the story is the origin of the motto.

Christian had originally contacted John to ask what the gnomon might have looked like, but, in the meantime, he took his metal detector into the garden and found a gnomon in the undergrowth — what a stroke of luck!

There are two pairs of holes for fixing the gnomon. The southernmost hole lies beyond the VI–VI hour line which



Fig. 5. The dial with its gnomon attached. Photo courtesy of Christian Allen.

would put the gnomon in the wrong position. This gnomon is not a standard commercial design and is possibly a replacement (Fig. 5).

Joanna's Sundial

Joanna was using her metal detector in the garden of her 17th-century cottage in Surrey when she found this sundial (Fig. 6). There is no date on it and Joanna wanted an idea of the dial's age.

When her parents moved into the cottage in the 1980s, just the stone pedestal was present, with no sundial on it. Then, about 20 years ago, the pedestal was stolen. So it was a surprise for Joanna to find the sundial; it must have been buried for at least 30–40 years. Initially the dial was very dirty and covered with earth, but after cleaning it is possible to make out a motto, maker's name and many other details.

The dial is 25 cm square and the inscription is 'Raymond Surrey'. There is no mention of a maker with this name in the *Biographical Index*¹ and it is possible that 'Surrey' refers to the county. The Roman numerals are read from the inside, clock-style, which suggests the dial could have been made by a local clockmaker. Loomes³ has around a dozen provincial clockmakers named Raymond, though none are in Surrey. The dial is probably a one-off, made in the late 19th century or early 20th century, perhaps by a relative of one of these Raymonds.



Fig. 6. Joanna's sundial. Photo courtesy of J. Webster.

The motto says 'The sun is the light and glory of the world'. The spandrels contain a pattern of squares filled with circles and fleurs-de-lys, and the unusual compass

design is made from two interlocking squares, perhaps reflecting the decoration in the corners.

Joanna is going to carry on metal detecting in her garden to see if she can find the gnomon. We wish her good luck!

ACKNOWLEDGEMENTS

Thanks to Mike Cowham, John Davis and John Foad for their advice.

REFERENCES

1. J. Wilson: *Biographical Index of British Sundial Makers from the Seventh Century to 1920*, Third Edition. BSS Monograph No. 12 (2019).
2. Reprinted in *The British Detectives Collection - 270+ Murder Mysteries, Crime Stories & Suspense Thrillers (Illustrated): The Most Famous British Sleuths & Investigators, including Sherlock Holmes, Father Brown, P. C. Lee, Martin Hewitt, Hamilton Cleek and more.* London, e-artnow (2017). Unpaginated. Available on GoogleBooks.
3. Brian Loomes: *Watchmakers and Clockmakers of the World. Complete 21st century edition*, London, N.A.G. Press (2006), 642.

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A SUNDIAL FACE MASK

FRANK H. KING

In the early stages of the Covid-19 outbreak in the UK, the principal instruction was "Stay at home". In the June 2020 BSS Newsletter, I suggested using this time as an opportunity to experiment with window-ledge sundial designs. Happily, the general lockdown has been eased but, at the time of writing, the use of 'face coverings' is becoming mandatory in more and more circumstances. I took this to be another gnomonic opportunity and the result is shown in Fig. 1.

The most common face coverings are masks. I thought about visors but a face mask is less bulky to store. For non-clinical users, there is no shortage of guidance and I followed the recommendation that face masks should be made from three layers of fabric. With some masks the fabric is pleated and with others the fabric is highly stretchy. I chose the stretchy version principally because it is more amenable to having a design printed on it.

I quickly found a company called Bags of Love¹ who sell face masks that purchasers can personalise. One simply visits their website and submits a JPG file for printing on the mask. The design can be scaled and steered around so you can place it exactly how you want it.

My first thought was to print the BSS emblem but I quickly decided that it would be more fun to have a working dial. I chose a stereographic sundial delineated for my latitude.



Fig. 1. The face mask in normal use (gnomon omitted).

This also has the merit of appearing as a smiley-face (though having six rows of teeth may be thought slightly over the top).

How Easy is it to Use?

Those who wish to use this as a high-precision sundial should note that the diameter of the black horizon circle is about 100 mm and that the diameter of a CD (compact disc) is a little under 120 mm. It is easy to clip the material to a CD using six or more bulldog clips and, with bit of a fiddle, arrange for the horizon circle to be concentric with the rim of the CD. You then have a reasonably flat dial plate.

With some loss of precision (!), it is possible to tell the time while wearing the mask. The photograph in Fig. 2 shows the face mask equipped with a gnomon, and there is a convincing shadow. The photograph was taken at 13:00 local sun time on the day of the summer solstice. On this day, time is read by noting where the shadow intersects the innermost of the seven red circular arcs.



Fig. 2. 13:00 on the day of the summer solstice.

The mask stretches over both nose and chin without touching one's lips. This means that the dial plate is reasonably flat for an hour or two either side of the 12 noon hour line except for a few weeks in the run up to the winter solstice and a few weeks afterwards.

Gnomon Design

Stretchy material is hardly ideal for mounting a gnomon and some light engineering design work was required. The components are shown in Fig. 3. The principal item is a used ball-point pen refill. This was held in place by a 'push pin' which I borrowed from my notice board. The pin is very sharp and goes through the interstices of the material without damaging it.

I used Blu Tack to plug the hollow refill. Blu Tack has the property that the more you work it the softer it gets and it is simple to roll a small quantity into a needle-like shape

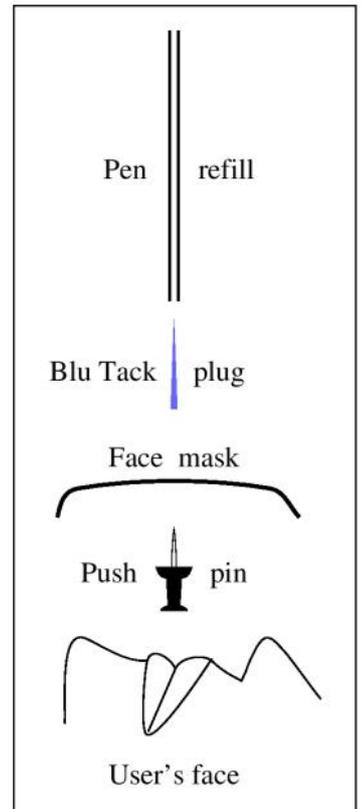


Fig. 3. Exploded cross-section of the components of the gnomon.

and insert this into the refill. Next, you push the pin through the marked centre of the dial and then lower the refill with its Blu Tack plug onto the pin. The result seems to be very secure, an important consideration since I had no wish to swallow a loose push pin!

Practical Considerations

Readers will be well aware that the obelisk element of the BSS emblem on the design must point due south. At the moment, the magnetic variation is close to zero in much of the UK, which is a help when setting out a line on the ground to lie on. Clearly you have to lie supine; normally, the tip of your nose will be higher than the tip of your chin, so you have to tilt your head backwards a little to ensure that the noon line on the design is horizontal.

You also have to ensure that the gnomon is vertical. I found I could align the gnomon with the corner of a building or the vertical edge of a window frame. I used a hand to orientate the refill and when I was satisfied that the gnomon was vertical I kept it steady by holding the blunt end of the push pin against my upper teeth using my lips. I acknowledge that this is not the easiest sundial to use for making observations!

It occurred to me that instead of a ball-point pen refill, one could use a clinical thermometer. This modification would enable you to check whether you have a raised temperature, one of the signs of Covid-19. This would become a multi-purpose instrument!

Small Print

The serious reason for wearing face masks is to reduce the spread of infection. The Bags of Love website explains

that this is not a medical-grade face mask for health care professionals but it meets the requirements for use in public transport and elsewhere; it is quilted and made from three layers of high-quality breathable fabric.

Masks are available in four sizes. You choose whether to buy two or four and may specify a different design for each. If you are travelling around, you might like to design your sundial face masks for different latitudes. The black edging is elastic and this goes round the ears. The mask really is very soft and comfortable to wear.

I cannot be sure what the material is, but it feels like cotton. It is easy to wash and the printed design does not seem to deteriorate. I bought four and the total cost including delivery was about £25.

ACKNOWLEDGEMENT

The design used on the face mask is adapted from the stereographic sundial that is illustrated in *Sundials: Cutting Time*.² I am most grateful to Fiona Boyd, of the Cardozo Kindersley Workshop in Cambridge, for greatly enhancing my outline design.

REFERENCES

1. www.bagsoflove.co.uk/personalised-face-mask
2. Frank King and Lida Lopes Cardozo Kindersley: *Sundials: Cutting Time* (2019), Cardozo Kindersley, Cambridge, p.125.

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ITALIAN HOURS – *CHE ORE SONO?*

FRANK H. KING and CHRISTINE NORTHEAST

On page 7 of the June 2020 *Bulletin*, there is a photograph of an Italian hours sundial on the Church of San Vincenzo Ferreri in Ragusa, Sicily, with accompanying notes by John Davis.¹ This photograph caught the attention of a number of readers and, in correspondence with Alastair Hunter, John Davis mentioned that he did not know what Italian hours are called in Italian. This is a most interesting point to ponder as there are at least eight answers.

English speakers are familiar with the sometimes subtle distinction between the words ‘time’ and ‘hours’ as illustrated by these two questions:

- How much time will you need?
- How many hours will you need?

Most readers will acknowledge that there is a difference but would probably give varying explanations as to what the distinction is.

Let us start with the word ‘hour’. This comes from the Greek *ώρα*. The omega is aspirated which means that the word begins with an ‘h’ sound. This ‘h’ is preserved in the word ‘hour’ and the French *heure* and the Spanish *hora* but in all three cases the ‘h’ is silent. Italian is more straightforward; the word is *ora* (singular) and *ore* (plural).²

If you ask Google to translate ‘time’ into Italian you will be given the word *tempo* but it is best to avoid using that word. The Italians do not use it in the way ‘time’ is used in English. For example, *Che brutto tempo!* translates as ‘What terrible weather!’. If you want to know the time of day you ask *Che ore sono?*, literally ‘What are (the) hours?’, which explains the title of this article.

It is equally acceptable to ask the question in the singular,

Che ora è?, literally ‘What is (the) hour?’ but this is more equivalent to ‘What is (the) time?’. Here we observe that *ora* (singular) can quite often be translated as ‘time’ whereas *ore* (plural) is almost invariably translated as ‘hours’.

We are now ready for our first translation of ‘Italian hours’. If you ask Google, you will be given *ore italiane* where we note both that *italiane* is spelt with a lower-case ‘i’ and that the ‘e’ endings indicate that the words are plural. Italian diallists really do use the term *ore italiane* and we could end the story here, except that this is by no means the only term used for ‘Italian hours’ in speech and in print.

You will also find the singular *ora italiana* which translates as ‘Italian hour’ but it is arguable that ‘Italian time’ is a more natural translation and that is what Google gives. This is not altogether satisfactory because, in other contexts, ‘Italian time’ could refer to a time zone.

Intriguingly, the Italians have two words for ‘Italian’ and, by way of illustration, *ore italiche*³ (plural) is another way of describing ‘Italian hours’ and *ora italica* (singular) is another way of describing ‘Italian time’. The word *italica* indicates antiquity and there is no equivalent in English. One might write ‘Olde English’ but this term is rarely used in a serious context. Sometimes *italica*, or *italiche*, is translated as ‘italic’ but, to English speakers, this translation is to be deprecated since ‘italic’ suggests a sloping typeface. There is no such ambiguity in Italian; if you ask Google to translate ‘italic hours’ into Italian you will be given *ore in corsivo!*

We have now seen four terms and all four are found in Italian sundial publications with a slight preference for *ore italiche* and *ora italica*. For example, in the Italian edition

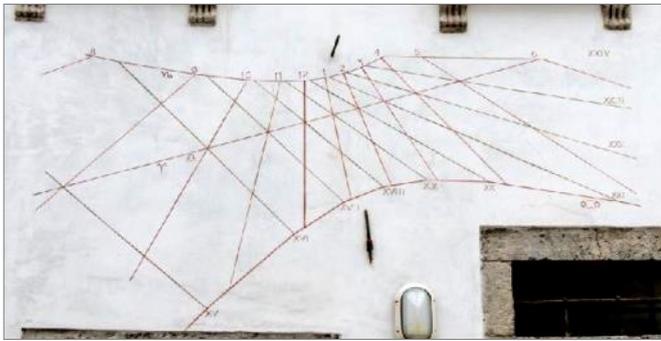


Fig. 1. *Ore italiche comuni + ore francesi.*
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of Wikipedia, the entry for the *Chiesa di San Vincenzo Ferreri (Ragusa)*,⁴ the site of the sundial in the *June Bulletin*, describes the lines on the sundial as indicating *ore italiche*, whereas the entry describing Italian hours is headed *Ora italica*.⁵

The final twist in this story is a gnomonic one; there are two versions of Italian hours whatever you call them! Like common hours, Italian hours are equal hours that divide the day into 24 parts, but midnight is not used as the reference point marking where one day ends and the next day begins; instead the reference point is taken as sunset. If pressed to specify the interpretation of ‘sunset’, most diallists would suggest geometric sunset. For many centuries, this was the interpretation used for Italian hours sundials in Italy and is the interpretation used for the Ragusa dial in particular.

An important variation came into use in 18th century Italy; the day was still divided into 24 parts but the reference point was *half an hour after sunset*. In this scheme, geometric sunset occurs at 23:30 in Italian hours. The reference time, half an hour after sunset, was marked by the ringing of the Angelus bell for the Ave Maria Office. In consequence, Italian hours using this scheme came to be known as *ore italiche da campanile*, ‘Italian hours from the bell-tower’. One also sees *ora italica da campanile*, ‘Italian time from the bell-tower’.

Italian hours that used geometric sunset as the reference were called *ora italica comune*, ‘common Italian time’ (using the singular) or *ore italiche comuni*,⁶ ‘common Italian hours’ (using the plural). Of course, for both variations, *ora italiana* and *ore italiane* can be used.

A good place to visit to see examples of both variations is Pesariis in north-east Italy, very close to the Austrian border. This small town is noted for clockmaking, and numerous interesting sundials and clocks can be seen as you walk around the streets.

Fig. 1 shows a west-declining dial in Pesariis⁷ which indicates *ore italiche comuni* and also common hours which Italians may refer to as *ore civili*, civil hours, or *ore francesi*, French hours, or *ora ultramontana*, time from beyond the mountains. Italian hours hour lines are shown from XV to XXIV. Note that hour line XXIV is horizontal. This is part of the horizon line because hour 24 is sunset.

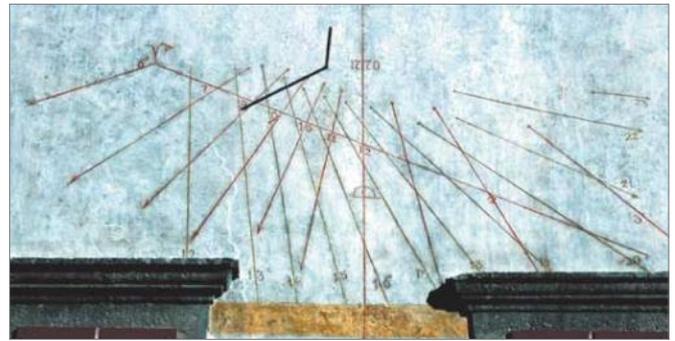


Fig. 2. *Ore italiche da campanile + ore francesi.*
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Importantly, the Italian hours and common hours hour lines intersect in pairs on the equinoctial line. In particular, the Italian hours hour line XVIII intersects the common hours hour line 12 on the equinoctial line. At an equinox, midday is 18 hours after the previous sunset.

Fig. 2 shows an east-declining dial in Pesariis⁸ which indicates *ore italiche da campanile*. This dial also shows common hours. The Italian hours hour lines are shown from 12 to 23 where hour line 23 indicates half an hour before sunset and the missing hour line 24 would indicate half an hour after sunset. The Italian hours hour line 18 now intersects the common hours hour line 12 *above* the equinoctial line. At an equinox, midday is still 18 hours after sunset but only 17½ hours after the Angelus bell. If there were a 17½ hours half-hour line this would intersect the common hours hour line 12 on the equinoctial line. The absence of intersections on the equinoctial line is a useful recognition feature when seeking examples of *ore italiche da campanile*.

ACKNOWLEDGEMENT

The authors are most grateful to John Arioni who checked the draft and made many helpful comments.

REFERENCES and NOTES

1. John Davis: ‘Holiday snaps’, *BSS Bulletin*, 32(ii), 7 (June 2020).
2. When a singular noun or adjective ends in *-a*, the plural ending is usually *-e*.
3. There is an exception if a singular noun or adjective ends in *-ca* (which is pronounced ‘car’) because the ending *-ce* softens the *c* so that *-ce* is pronounced like the first part of ‘chase’. To harden the *c*, an *h* is inserted and *-che* is pronounced ‘Kay’ as required.
4. [it.m.wikipedia.org/wiki/Chiesa di San Vincenzo Ferreri \(Ragusa\)](https://it.m.wikipedia.org/wiki/Chiesa_di_San_Vincenzo_Ferreri_(Ragusa)) accessed June 2020.
5. [it.m.wikipedia.org/wiki/Ora italica](https://it.m.wikipedia.org/wiki/Ora_italica) accessed June 2020.
6. When a singular noun or adjective ends in *-e*, the plural ending is usually *-i*.
7. In Sundial Atlas, www.sundialatlas.net, this dial has the reference number IT007667. The coordinates given are: 46.522017° N and 12.770467° E.
8. In Sundial Atlas, www.sundialatlas.net, this dial has the reference number IT007668. The coordinates given are: 46.52231589° N and 12.77156353° E.

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THE HORIZONTAL MASS DIAL AT MUNKEBY ABBEY, NORWAY

JOHAN A. WIKANDER

Munkeby Abbey is situated on the south shore of the Trondheim Fjord, almost at the bottom end of the fjord. The abbey belonged to the Cistercian Order and was their third Abbey in Norway; their first two abbeys were founded at Bergen in 1146 and at Oslo in 1147 by English monks. Munkeby Abbey Church was most probably built around 1160. However, the abbey did not exist as an independent order for very long.¹

Munkeby Abbey was closed down and its community and assets were transferred to Tautra Abbey. This abbey was also a Cistercian one and was situated on the small island of Tautra in the Trondheim Fjord.

The abbot at Tautra Island wrote a letter in 1475 to the Pope in Rome, proposing that Munkeby Abbey be re-established as an independent organization. Information about that is to be found in the Vatican Archive. Today, we do not know exactly what happened. However, the property of Munkeby was used and managed in the Middle Ages by the monks at Tautra Island.

The Norwegian monasteries were closed down during the Reformation in the 16th century. The church at Munkeby was then used as a parish church. However, there was a fire and the church was destroyed and today lies in ruins (Fig. 1).



Fig. 1. Munkeby Abbey Church today, with part of the south wall and the remains of a small chapel to the right. The church is situated in a valley, next to a small river, and is surrounded by hills, farmland and woods, at 63° 44' N, 11° 23' E.

Partial excavations have been made. Remains of pillars from wooden buildings have been found, also carbonized wood from the roof of the church and iron nails, also from the roof. English pottery of the Grimston type made ca. 1250–1325 in Norfolk has also been found. Most probably, Munkeby Abbey at that time had close relations with England.²

About 350 metres to the east of the abbey church, there is a hill called *Timstokk-haugen*, translated as “Timstokk Hill”. This particular hill is farmland today, and is used for grazing cattle. On the hill there are about thirty Iron Age burial mounds.

The Old Scandinavian Term *Timstokk*

This term is compounded of two words. *Tim* or *time* means ‘hour’. *Stokk* is a rod or a pillar of wood, a couple of yards or more long; the same term occurs in the English language in ‘stock of an anchor’.

In 1460–80, a Latin to Swedish dictionary was written in the city of Uppsala, Sweden. Looking up *horologium*, the Latin word for ‘sundial’, we find that the Swedish and Scandinavian term is *tima stokker*. The sundial takes its Scandinavian name from the gnomon which was ‘a stock’, a rod of some size. It is then obvious that the term *timstokk* must refer to a horizontal sundial of some size. A vertical sundial on a wall needs only a small gnomon to show the hours.³

The term *timstokk* was also used in Sweden in 1476 in a journal held by Örebro town council. The journal mentions, translated, “... the *timo stokken* at the churchyard”.⁴

The Uppsala Latin–Swedish dictionary also mentions another term for *horologium*: *timaklokka*, that is, a watch, a mechanical clock.

Timstokk-haugen – The Sundial Hill

It is obvious that this particular hill took its name from a sundial. Do we find remains of this sundial today? Yes, we do! We see what appears to have been a large horizontal mass dial. Three small standing stones are shown in Figs 2–4; Fig. 5 shows the back of the stone in Fig. 4. We see that the groundwork is very well done with thinner stones between the standing stone and the ground. This work was carried out by the Cistercians, who were known to be skilful craftsmen.



Fig. 2. The eastern standing stone, the front side facing towards the noon line. Height 74 cm, width at the ground ca. 40 cm.



Fig. 3. The western standing stone, the front side facing towards the noon line. Height 68 cm, width at the ground ca. 34 cm.



Fig. 4. The southern standing stone, erected 25.5 metres from the centre of the gnomon, approximately aligned with the noon line, but offset 2.1° to the west. Height 63 cm, width at the ground ca. 35 cm. The front side faces due east.



Fig. 5. The back of the southern standing stone. Notice the thinner stones between the standing stone and the ground. The work is very well done.

These stones have so far been considered to be gravestones. Perhaps the Cistercians looked upon this hill as a sacred place? The hill is an old burial ground with mounds from the Iron Age. The eastern (Fig. 2) and western (Fig. 3) stones are indicated in Fig. 6, which shows a reconstruction of the dial, partly with dotted lines and a semicircle.

The Mass Dial

The eastern and western stones are 7.80 metres apart, measured on the ground from cross to cross. This line is the main line of the mass dial. The noon line is perpendicular to this line, and is only one degree to the west of true north. The third stone (Fig. 4) is 25.5 metres to the south of the E-W line. However, it is offset 2.1° to the west as seen from the centre of the gnomon.

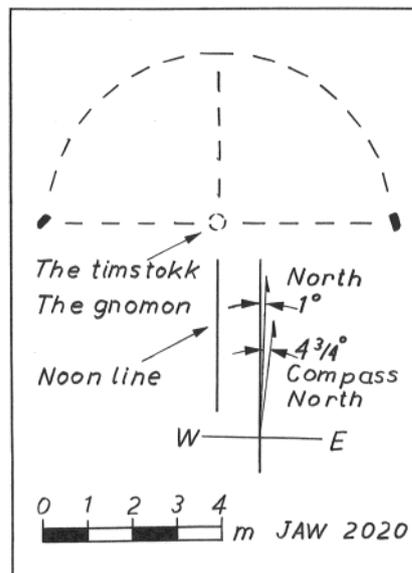


Fig. 6. Sketch showing the main features of the Timstokk Hill mass dial. Only the eastern and western stones are preserved on the site.

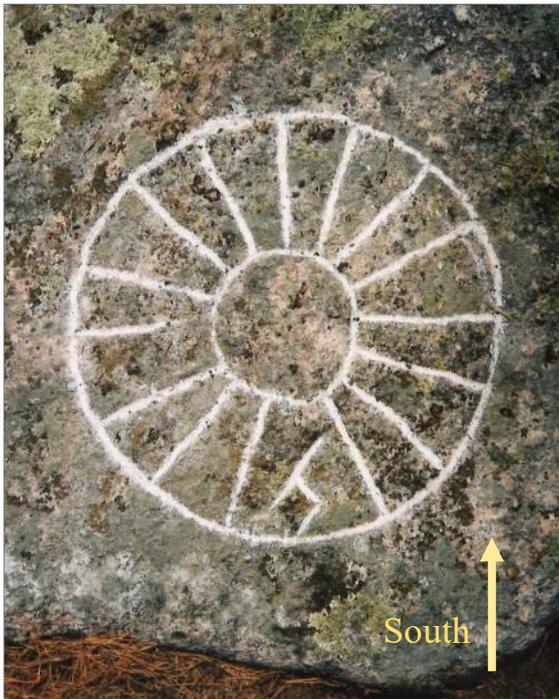


Fig. 7. The Mandal horizontal sundial seen towards the south. The sundial is made according to the octaval hour system used in Norway in the Middle Ages. However, the runic letter 'K', used as a golden number and the 6th letter in the runic alphabet, is carved as a noon mark. $58^{\circ} 2' N$, $7^{\circ} 39' E$.

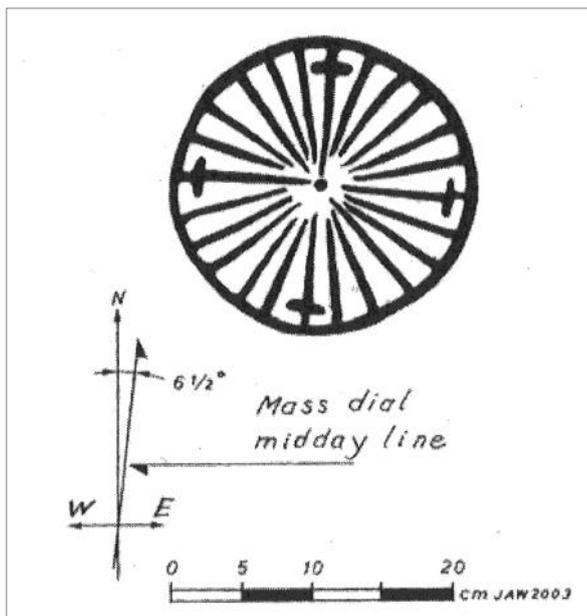


Fig. 8. The Halten Island mass dial. The four main geographical directions, and the corresponding hour lines, are indicated by small crossbars. $64^{\circ} 10' N$, $9^{\circ} 24' E$.

In the Middle Ages the Cistercians probably conducted ceremonies on the site. The south stone is obviously connected with these ceremonies; however, at present we do not know what function this particular stone would have had.

Originally, at least some of the canonical hours and hour lines would have been marked, probably by slabs laid round the semicircle. Symbols, perhaps Roman numerals or runic letters, would have been carved on the slabs.

Runic letters were used in Scandinavia as a numerical system to indicate golden numbers. This system was also used to indicate hour lines on sundials: we see an example in Fig. 7.⁵ These slabs have been lost over the centuries. Perhaps at least a couple of them could be found, for instance in a wall or in a museum? This is a task for further research.

East – the Main Geographical Direction in Christianity

The E–W geographical direction is very well indicated in the horizontal mass dial at the Timstokk Hill. The two stones with carved Latin crosses are the only remains today of the original mass dial.

Latin crosses as shown in Figs 2–4 were used in horizontal mass dials to indicate the main geographical directions and the corresponding hour lines. This is shown in the mass dial at Halten Island, a fishing village and a group of small islands off the coast (Fig. 8). These four directions are indicated by crosses just formed from small crossbars.⁶

Another example is from Selje Monastery. This very nice mass dial is carved on a slab (Fig. 9). We see two holes drilled in the VI–VI hour line. The mass dial would have been fastened to a horizontal surface by pegs through these holes. The heads of the missing pegs would have been nicely made with Latin crosses, just as we see it in Figs 2 and 3. These pegs would have been made by a clever locksmith or a silversmith.⁷

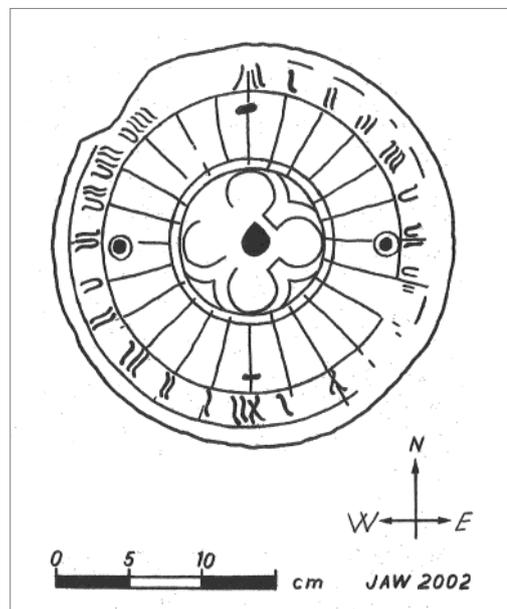


Fig. 9. The Selje Monastery horizontal mass dial, originally fastened by nice pegs with heads showing crosses. We see the drilled holes in the VI–VI hour line. The mass dial was most probably made in the middle of the 15th century. $62^{\circ} 3' N$, $5^{\circ} 18' E$. It is now in Bryggen's Museum, Bergen.

North – Method Used to Determine this Geographical Direction

We start this discussion by considering the Øyestad Church horizontal mass dial. This dial is carved on the soapstone threshold at the south entrance to the church. The dial is

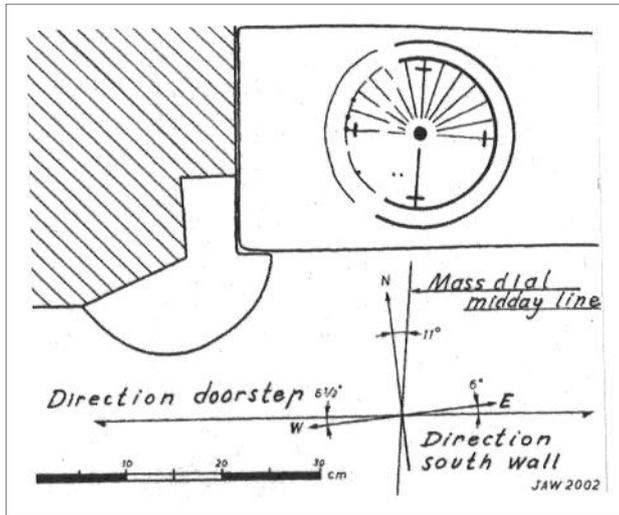


Fig. 10. Øyestad Church horizontal mass dial carved on the soapstone threshold at the south entrance. The original dial is damaged, but a reconstruction has been made. The noon line is aligned according to compass north when the dial was carved. $58^{\circ} 25' N$, $8^{\circ} 39' E$.

partly damaged. However, a reconstruction of the dial has been made (Fig. 10).

The south wall of the church is turned 6° to the south of the true E–W direction, and the noon line is turned a further 5° to the east. A magnetic compass was used when north was determined. In those days they did not bother about the magnetic variation. This information is important to estimate the age of the dial. It was carved on the soapstone in the last part of the 15th century.⁸

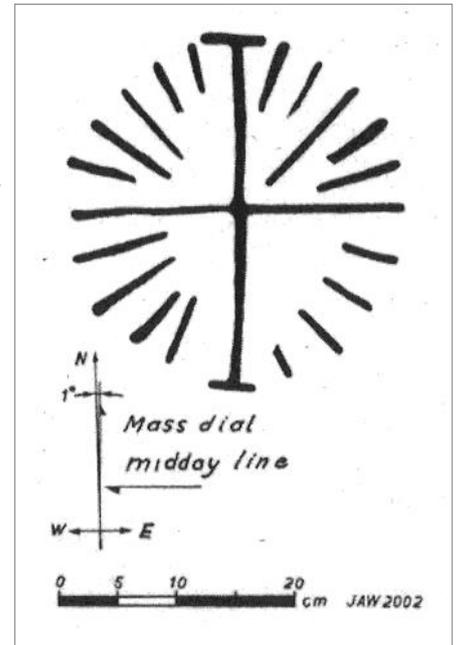
We then have a look at the Halten Island mass dial (Fig. 8), which is offset $6\frac{1}{2}^{\circ}$ to the east. Again, a magnetic compass has obviously been used. The dial was carved very late in the 14th century or in the first part of the 15th century.⁹

Was a magnetic compass used when the Timstokk Hill mass dial was designed and built? It is possible, which means that the mass dial dates from about 1350. The magnetic variation was at that time rather small, with a minimum, perhaps close to zero degrees. Magnetic variation was not recorded at such an early date, but by using modern geophysical methods it is possible to estimate the magnetic variations before formal observations were made.¹⁰

There is no evidence for unusual magnetic behaviour on this site, as can be verified from historical data provided by the Norwegian map authorities. However, the geophysical survey does not yet extend to this part of Norway, so we cannot be sure of the magnetic variation at Timstokk Hill in ca.1350.

There is a second mass dial in Norway whose noon line is aligned almost exactly N–S. This dial is by Øyestad Church, on the south-east coast of Norway (Fig. 11). It is unlikely that these two dials, the Øyestad and the Timstokk Hill mass dials, were designed about the same time in the mid-14th century. It is possible that true north was determined with reference to the Pole Star. Accordingly, we cannot use magnetic variation to estimate the approximate

Fig. 11. Øyestad Church horizontal mass dial at the vicar's residence. The noon line was probably determined by using the Pole Star. The T-cross symbol is used rather unusually. $58^{\circ} 25' N$, $8^{\circ} 39' E$.



ages of these sundials. However, they are both clearly from the Middle Ages.

Further Research

It is possible that this rather large kind of horizontal mass dial was designed and built by other abbeys and churches in Scandinavia, so similar small standing stones, slabs with crosses, numerals and symbols of different kinds may perhaps be found. This is a matter for further research.

ACKNOWLEDGEMENTS

I was told about Timstokk Hill by Mr Roar Hagen-Diez, a colleague of mine; he suggested that the stones were connected with a sundial. I got permission to do the research on site at the farm Munkrøstad from the owner Mr Nils Arne Aasenhuus, and the cattle were taken away. I am very grateful for this support.

REFERENCES and NOTES

The sundials in Figs 7, 8, 10 and 11 are also described in Mario Arnaldi: *Tempus et Regula: orologi solari medievali italiani, le origini & la storia*, Chapter 7.2, 'Scandinavian Countries, Norwegian medieval sundials' by Johan Anton Wikander, AMArte, Ravenna (2010), pp. 307–12.

The terms used in this article are according to John Davis: *BSS Sundial Glossary*, The British Sundial Society (2000).

1. Øystein Ekroll: *Munkeby – Tautra. Cisterciensermunkenes Kloster ruiner i Trøndelag*, Trondheim (2003). The book has English, German and French summaries.
2. Kristin Foosnæs: Rapport. *Arkeologisk undersøkelse ved Munkeby kloster, Munkeby søndre 303/10, Levanger kommune, Nord-Trøndelag*, issued by Norges Teknisk-Naturvitenskaplige Universitet NTNU, Vitenskapsmuseet, Seksjon for arkeologi og religionsvitenskap, Trondheim (2003). This is a PhD dissertation.
3. Erik Neuman: *Latinskt-Svenskt Glossarium efter Cod. Ups. C. 20*, Uppsala, Sweden (1918–1920), p.338, «horologium».
4. K.F. Söderwall: *Ordbok öfver svenska Medeltids-Språket, Supplement O–Ö*, Lund, Sweden (1953–1973), p.903, «tima stöcker».

5. Johan Anton Wikander: 'Solur eller kompassrose på Høybakken ved Mandal?', *Agder Historielag*, Annual publication, Kristiansand, No.85 (2009), pp.43–54.
6. Johan Anton Wikander: 'Solur eller kompassrose på Halten?', *Fosen Historielag*, Annual publication, Trondheim (2003), pp.7–34.
7. Johan Anton Wikander: 'Kompassrosen på Jektehaugen ved Osmundsvåg', *Vågsøy Historielag*, Annual publication, Måløy (2016), pp.80–96. This article is mainly about a carved compass rose from the Napoleonic Wars 1807–14. However, the mass dial from the nearby Selja Island is also described.
8. Johan Anton Wikander: 'Solurene ved Øyestad kirke', *Agder Historielag*, Annual publication, Kristiansand, No. 80 (2004),

pp.9–60. The change of magnetic variation AD 1000–1700 is shown in Fig. 14. The period AD 1000–1550 is based on geophysical observations; the period AD 1550–1700 is based on observations made by compass and the studies made by Willem van Bemmelen. Johan Anton Wikander: 'Kompassrosene på Haabø og Merdø', *Agder Historielag*, Annual publication, Kristiansand, No. 46 (1968), pp.36–72. The change of magnetic variation AD 1500–1970 is shown in Fig. 1, based on several observations made by compass.

9. Wikander, ref. 6.
10. Wikander, ref. 8.

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BSS PHOTOGRAPHIC COMPETITION 2020

DAVID HAWKER

Since the Annual Conference was unable to be held this year, the photographs that would have been displayed for the Photographic Competition have been incorporated into the BSS website by Bill Visick.

Prior to lockdown, I had received ten entries for the competition. No further photographs were submitted. It was decided that these entries should be put on the website with members being requested to vote for their first, second and third selections. This would allow the photographs to be viewed and also provide a small competition to give interest during the period of lockdown.

By the closing date there was a return of 20 votes and three points were awarded for the first selection, two for the second and one for the third. The results are as follows with an out and out winner:

1st place (39 points)	<i>Time..... Flys</i>	Mike Shaw	Private Garden, Wirral
2nd place (25 points)	<i>Singing In Time</i>	Ian Butson	Parade Gardens, Bath
3rd place (20 points)	<i>Amongst the Flowers, I Count the Hours</i>	Ian Butson	Duncombe Park, Helmsley

The remaining seven photographs were:

'---and Lo, Night Cometh'	The Causeway, Marlow	Ian Butson
<i>The Third Dimension</i>	Inverleith Park, Stockbridge, Edinburgh	John Allen
<i>Time Standing Still</i>	Kintyre, Scotland	John Allen
<i>Double Winter Time</i>	Augsburg, Bavaria	John Allen
<i>NT Not Expecting Winter Sun</i>	Scotney Castle, Lamberhurst, Kent	David Hawker
<i>A Thorny Location</i>	Scotney Castle, Lamberhurst, Kent	David Hawker
<i>Sundial Tuition</i>	Down House (Darwin's house), Downe, Kent	David Hawker

Certificates will be awarded for those first three places and these will be sent to the winners by mail.

Thank you to all who provided photographs and many congratulations to the winning photographers. Thanks too to all those members who voted in the competition.

david@hawkerdials.co.uk

See page 48 for six of the remaining entries; unfortunately there was not sufficient room to include all seven.

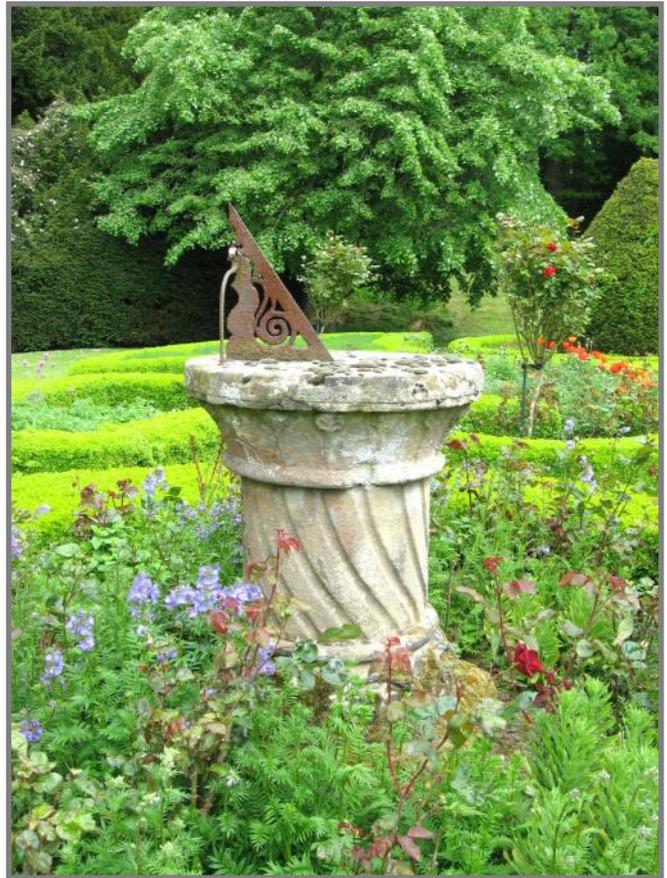


Winner
Mike Shaw

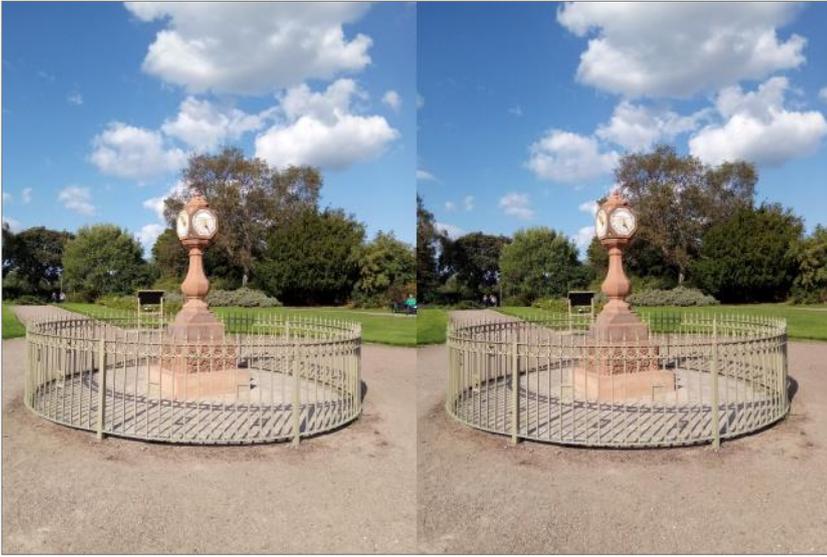
Time Flys



Second Place
Singing In Time
Ian Butson



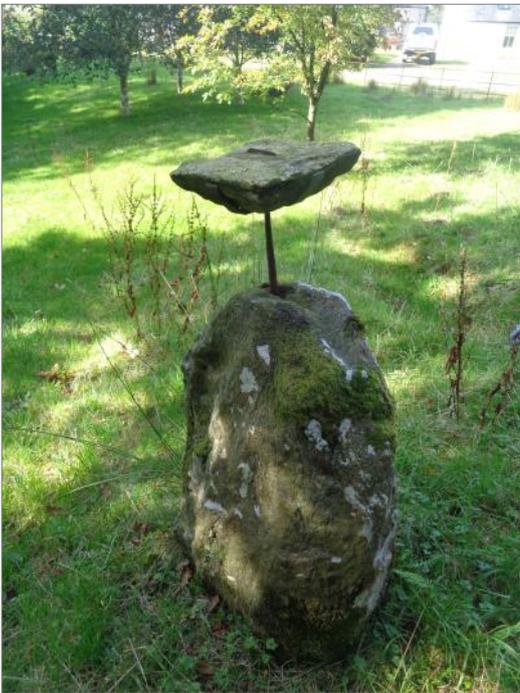
Third Place
Amongst the Flowers, I Count the Hours
Ian Butson



The Third Dimension John Allen



'---and Lo, Night Cometh' Ian Butson



Time Standing Still John Allen



Double Winter Time John Allen



NT Not Expecting Winter Sun David Hawker



A Thorny Location David Hawker