The British Sundial Society

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Cross dial in the Vicarage garden at Shenstone, near Lichfield in Staffordshire, described on pages 29–30. From 'Croes y Breila' by R.W. Essington, London (1879).

***Front cover**: One of the many dials seen by Douglas Bateman during a visit to the Zuylenburgh Collection in Utrecht. His illustrated report is on pages 2–6.*

***Back cover**: Cube dial at St Mary's College, St Andrews, dedicated to Dr Walter Comrie, Provost in 1685. The dial itself (SRN 1770) dates from 1664 and is inscribed 'DWC' with the date and a Coat of Arms, not yet identified. For more information see Dennis Cowan: 'In the Footsteps of Thomas Ross. Part 17: Some Sundials of East Fife', BSS Bulletin 28(iv), 22–27 (December 2016). Photo: Richard Castro.*

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Christine Northeast and David Brown

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CONTENTS

EDITORIAL

As seems to have become the custom for the September issue of the *Bulletin*, this is a little thinner than normal. No doubt Society members have been taking advantage of the summer sunshine; here in Cambridge, on 25 July, we experienced the highest-ever temperature recorded in the U.K., 38.7° C. It was almost too hot to study sundials in the field.

A recurring theme in this issue is that of following up thoughts presented in previous articles. David Brown looks more closely at the Latin mottoes that were on the sundials included in the main tour at the Bath Conference and reported in the June issue. He ends with a challenge which Christine Northeast found so irresistible that she has written an entire article on the sundials and mottoes of the Reverend Robert Essington.

Alastair Hunter's 'Study of the Shortest Day' in the June *Bulletin* has led to a follow-up article by Fiona Vincent and a Reader's Letter by Kevin Karney.

Once again, a query sent to our Help and Advice Service has resulted in an amazing saga reported by Sue Manston. This centres on a dial, by a rare 18th century maker, which turned out to have been stolen. During the investigation, another allegedly 18th-century dial by the same maker was found in Richmond, Virginia, and then a number of other dials very much like the Richmond dial were identified.

It is impossible to mention follow-up articles without referring to Dennis Cowan's series on Thomas Ross. Readers will be delighted to see the 28th article in the series in this issue.

David Pawley is again organising a Newbury meeting towards the end of this month and we look forward to publishing accounts of the talks and exhibits in the December issue.

In the meantime, enjoy all the autumn sunshine that we may have and please send us your articles.

Frank King

SUNDIALS IN THE ZUYLENBURGH COLLECTION IN UTRECHT

DOUGLAS BATEMAN

I was very fortunate to be able to visit the fabulous Zuylenburgh collection of sundials, clocks, chronometers, telescopes, sextants, and much else besides, situated a few kilometres north of the centre of Utrecht in Oud-Zuilen. The visit was at the request of John Davis, who has been in frequent contact with the owner, Bert Degenaar. This was sufficient to ensure a warm welcome! The location could hardly be more traditionally Dutch, being situated adjacent to the river Vecht, with a castle literally round the corner, and windmills nearby. Fig. 1 gives the view from across the river. Bert Degenaar is well known in the antique and auction world of clocks and scientific instruments, and his own collection has been built up, at least in Oud-Zuilen, during the last 15 years. Among the collection are some English dials of particular interest to John Davis, but as he was unable to travel long distances, I became the willing deputy with a remit to give something of an overview.

Fig. 1. The view of the Zuylenburgh from the lift bridge with the Logement (accommodation) to the right.

Figs 2 and 3. A promising start to the visit.

One cannot escape seeing sundials around the house; for example, there are three armillary dials in the front courtyard (Figs 2 and 3).

Another visible dial is on the south side of the Logement (Figs 4 and 5). This fine dial was designed and delineated

Fig. 4. A fine vertical dial with the inscriptions NIL SINE SOLE *(Nothing without the Sun), and above, reference to restoration by the carpentry firm Verwoerd in 2009.*

Fig. 5. The black surround to the sunburst of the dial shown in Fig. 4 is a window (that fooled me), but from the inside one can see 'the works'.

by the craftsman Pieter de Ruiter. The local heritage regulations required that the window remain, and hence it was cleverly incorporated in the design.

The east side of the property has more dials (Figs 6 and 7). These include another armillary, and a garden table with a number of dials including a horizontal dial dated 1894 by J. Smith (1807–95). Smith is a known English dial maker with other dials recorded in our Fixed Dial Register. On the same table was a vertical dial by W. & S. Jones, 30 Holborn, London.

The main collection is in the large house and here one is confronted by large display cabinets containing every

Fig. 6. Another large armillary dial with a complex astronomical clock (designed and made by Pieter de Ruiter) on the wall behind.

Fig. 7. Horizontal dial by J. Smith, dated 1894, one year before his death. On the deep bevelled edge there are barely detectable remnants of lettering.

Fig. 8. One of the many display cabinets; the 'theme' of this one is clocks and globes.




Figs 9–12. A fine selection of ring dials and precision portable dials.

Figs 13–14. Philips' dial and its box – a simple dial but a rarity.

Fig. 15. A superb compendium by Elias Allen.
Photo: Arie de Ruiter.

imaginable type of clock, telescope, microscope, sextant, chronometer, theodolite, or scientific instrument. Much of the collection is housed in custom-made display cabinets, generally with a particular theme in each. Fig. 8 shows just one of these many cabinets.

The cabinets could be opened to reveal a cornucopia of portable dials covering the 18th and 19th centuries (Figs 9–12). A standing ring dial by J. Sisson, as recorded in 'Dial Dealings 2018',[1] and described in full by David Hawker,[2] has been added to the collection, and it is on the left in Fig. 11. John Davis adds that it has been fitted with a smart compass. Taking the two articles together, the previous owners must have been delighted with the windfall of a Christie's sale price of £23,750 for a dial found in the garden brambles!

Fig. 19. A double horizontal dial by Anthony Thompson. It is planned to fit a replacement gnomon.
Photo: Bert Degenaar.

Figs 16 and 17. A Gunter's quadrant by Elias Allen. The clock key happened to stray into the picture.
Photos: Bert Degenaar.

Fig. 18. A fine dial by Thomas Wright.

Despite being surrounded by such wonders, I could not resist photographing the cheerful portable equatorial dial in Figs 13–14.

The collection includes some rarities by English makers such as Elias Allen (c.1588–1653; Figs 15–17) and Thomas Wright (c.1693–1767; Fig. 18). John Davis has given more information on Wright.[3]

Also on view is a very large double horizontal dial, about 24.6 in (62.5 cm) diameter. It is quite corroded, missing the gnomon, and currently suffering the indignity of acting as a

Fig. 20. Left to right, Henk Hietbrink, Netherlands Sundial Society; Arie de Ruiter, photographer; myself; Pieter de Ruiter, master craftsman; Rob van Gent, Netherlands Sundial Society; Auke Wiersma, House Manager.

Fig. 22. Bert Degenaar, the owner of the collection, who met us two days later, after the main visit.

table top (Fig. 19). This large dial is from Anthony Thompson and dated c.1660. It is the only known double horizontal from this maker and is very interesting, though not in brilliant condition. This dial is the subject of research, and the photographer and researcher, Arie de Ruiter (see Fig. 20), and John Davis have extracted a great deal of information from the corroded surface.[4]

The display cabinets are full of treasures, and to supplement my photographs, Fig. 21 shows another such selection, including dials by Humfrey Cole (c.1530–91) and Thomas Tuttell (c.1674–1702).

Whilst this report dwells on sundials, the collection includes some of the best examples of early clocks from makers in the hall of fame such as Fromanteel, Arnold, Thuret, Salomon Coster and, of course, makers from Amsterdam. The collection is also home to an unusual planetarium (we might call it an orrery) that is installed in the ceiling of one of the rooms. The ceiling planetarium was inspired by the well-known version made in 1774–81 by Eise Eiesinga in Franeker, northern Netherlands, and adapted to suit the Zuylenburgh building. More details are in the collection website.

Fig. 21. On the left is a dial signed H Cole, 1574; in the centre a horizontal and analemmatic dial signed Tho Tuttell Charing ✢ Londini Fecit; on the right, maker unknown but believed to be Scottish.
Photo: Bert Degenaar.

Finally, Bert Degenaar, the owner (Fig. 22), is well known in the world of antiques dealing, and currently with a number of other business interests. He is also known in the Netherlands for appearance on a TV panel of experts on the valuation of antiques. The collection is supported by a team of experts, three of whom are included in Fig. 20.

Visits to this privately owned collection are possible but only by appointment, and even then for academic studies. There is a link to make contact via the website: *www.planetariumzuylenburgh.com.*

ACKNOWLEDGEMENTS

Bert Degenaar, Arie de Ruiter, Pieter de Ruiter, and John Davis. Also John Foad for providing up-to-date Fixed Dial Register serial numbers.[5]

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2. David Hawker: 'A standing ring dial by J. Sisson', *BSS Bulletin* 29(iii), 41-43 (September 2017).
3. John Davis: 'Thomas Wright's horizontal sundials', *BSS Bulletin*, 16(iv), 135-143 (December 2004).
4. *http://www.ariederuiter.nl/moulsham*
5. Fixed Dial Register serial numbers associated with the various dial makers mentioned in this article:
   Smith: 2224, 3436.
   Jones: 1046, 2677, 3313, 5886, 3469.
   Allen: 3010, 5291, 6048.
   Wright: 0619,0140,1294, 1710, 1910, 2723, 2748, 2463, 3500, 4116 (now a replacement copy), 4249.
   Tuttell: 3539, 3796.

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BRUSHING UP ON YOUR LATIN… INSCRIPTIONS

DAVID BROWN

A number of the sundials visited during the recent 2019 BSS Conference in Bath had a motto in Latin. Members may be interested to know what their translations are.

In Parade Gardens (Fig. 1), the motto around the marble base immediately below the armillary sphere is: HORAS NON NUMERO NISI SERENAS which becomes (loosely): *I count only the sunny hours* (Fig. 2).

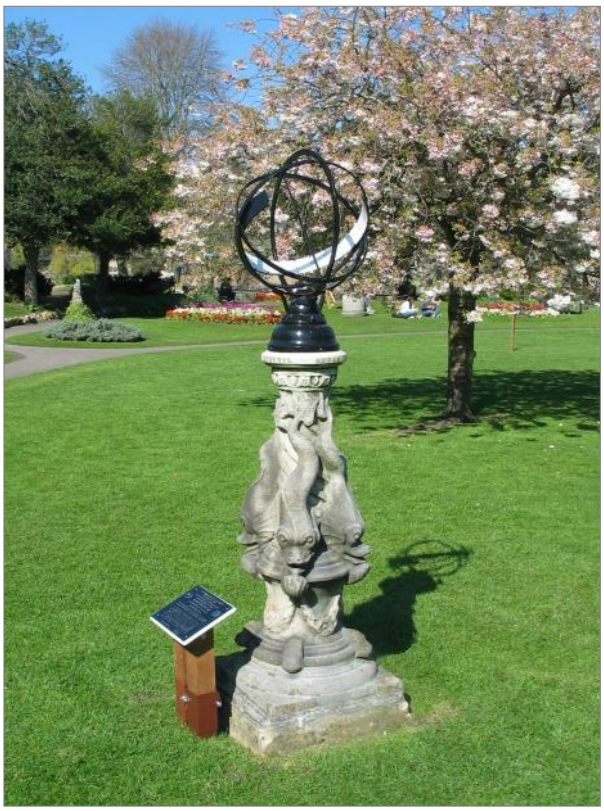

Fig. 1. Armillary sphere in Parade Gardens, Bath.

At Kingswood School, the vertical sundial (Fig. 3) has LUX SPEI LUX VITAE which becomes: *The light of hope (is) the light of life*. The reason for having this motto goes back to the days in 1989 and 1990 when the Berlin Wall came down and Eastern European countries were beginning to experience more freedom. At that time, with the BSS newly-born, I had not acquired the skill of letter-cutting in stone, so I made a painted sundial on wood. The wall it was put on (the same as now) happened to be the exterior wall of one of my Physics laboratories, so I chose to allude to optics in the motto. The wooden dial did not last long, so the BSS visit was a spur to my replacing it with a slate version.

Fig. 2. Motto on the Parade Gardens sundial. Photos: Frank King.

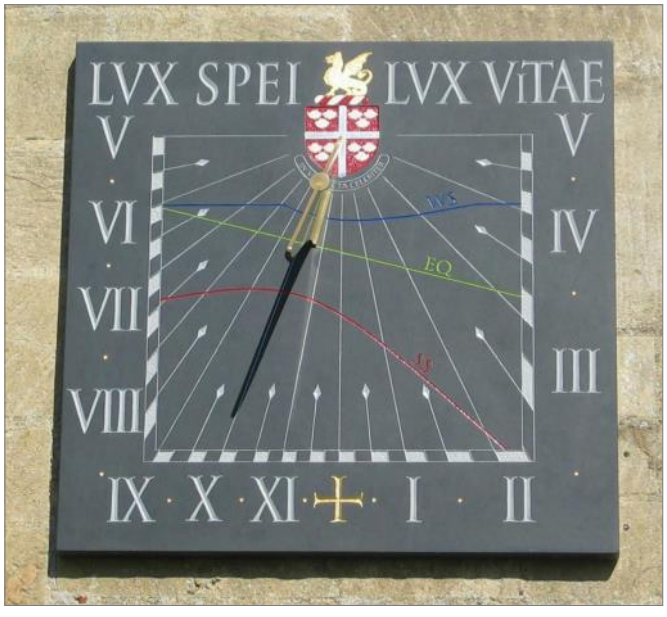

Fig. 3. Vertical declining sundial, Kingswood School, Bath.

Fig. 4. Analemmatic sundial, Kingswood School, Bath. Circled: the stainless steel instruction plate.

Fig. 5. Instruction plate with its two Latin mottoes.

Not far from the vertical dial is an analemmatic dial (Fig. 4). There are no inscriptions on the dial itself, but a stainless steel instruction plate nearby includes two Latin phrases: HORAM MONSTRAT UMBRA and TE IMMOBILEM MOBILIS ILLUMINET SOL (Fig. 5). These had been devised by Michael Bishop, a former teacher of classics at the school, for the ends of the date scale of an earlier analemmatic sundial that had been on the same site. This earlier dial was unsatisfactory in many ways because the hour points were simply paviour bricks with crudely carved numerals set into the grass which had gradually sunk into the soil owing to worm action and pressure from heavy mowers. Over time, unclipped grass around them detracted from their appearance. A fortuitous accident occurred in 2014 when a builder broke the slate date scale with his digger. The contractors paid substantially towards a replacement sundial in recompense. The classics master had noted that a

Fig. 6. Pilkington and Gibbs heliochronometer, Kingswood School, Bath. Photo: John Davis.

user of the sundial generally stands with his/her back to the Sun, so he thought that the words of the inscriptions should also be largely backwards. So, they translate as: *The shadow shows the hour* and *The moving sun shines on you, unmoving.*

The Pilkington & Gibbs heliochronometer at the school (Fig. 6) has an inscription of eight short lines on its uppermost face: NULLI OPTABILIS / DABITUR MORA / IRREVOCABILIS / LABITUR HORA / NE SIT INUTILIS / SEMPER LABORA / NEVE SIS FUTILIS / VIGILA HORA. The same classics master provided me with a translation which is not quite line-for-line: *To no one will be given the desirable delay; irrevocable, the hour glides on. Lest you be useless, be always working; lest you be worthless, watch and pray.*

In the Botanical Gardens at Royal Victoria Park (Figs 7 and 8) the cross dial provides us with a puzzle. A verse in English on the upper face of the dial has practically disappeared, but the wording in Latin on each vertical edge of the hexagonal base immediately below the cross is still

Fig. 7. Cross dial, Royal Victoria Park Botanical Gardens, Bath, with Woody Sullivan and Brad Dillon.

Fig. 8. Upper face of the cross dial.
Photo: John Foad.

just about legible (Fig. 9). Quite where it starts or ends is a mystery, but here it is, starting at the northernmost edge and moving then to the north-west, and so on: SOLIS ADIT LUX / UMBRAM ADDIT CRUX / DATUR HORA / UMBRAM ADDIT NOX / HINC ABIT UMBRAE VOX / ABIT HORA. The use of ADDIT and ADIT is as it appears.

I leave this as a challenge to our readers – all offerings of a cogent translation would be welcome.

To start the ball rolling, Mrs Gatty notes a similar motto "engraved on the eight [*sic*] sides of a shaft in the vicarage garden, Shenstone, near Lichfield, upon the top of which is a cross dial … erected and inscribed by the Rev. R.W. Essington":[1]

SOLIS ADIT LUX,
HIC DOCET UMBRAE CRUX,
DATUR HORA.
UMBRAM ADDIT NOX,
HINC ABIT UMBRAE VOX,
ABIT HORA ABSIT MORA.

Three possible translations are offered, the first of which is:

The sun's light shineth here.
The shade's cross teacheth clear,
Told is the hour of day.
Night makes the shade more dense.
The shade's voice goeth hence.
The hour goes, let there be no delay.

Fig. 9. The inscription on the Royal Victoria Park cross dial. Photos: John Foad (top) and John Davis.

REFERENCE

1. Mrs Alfred Gatty, H.J.F. Eden and Eleanor Lloyd: *The Book of Sun-Dials* (4th ed., 1900), p.413 (no. 1263), London, George Bell and Sons.
http://digital.library.upenn.edu/women/gatty/sundials/401.html

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MNAJDRA SOLAR TEMPLE, MALTA

JULIAN LUSH

Malta lies close enough to Sicily that it has been populated by Neolithic peoples since the very earliest times. The islands are formed of pure limestone, readily quarried into huge blocks for assembly into vast structures prevalent in Megalithic cultures. Gozo Island, just north of Malta, boasts what is reputedly the world's oldest freestanding dry-stone temple, Ggantija, built about 3600 BC. Malta itself testifies to a Neolithic temple culture which flourished between 3600 and 2500 BC, their temples built as vast, megalithic structures of huge, dressed stone blocks, of which some six major sites remain extant today.

What the beliefs were which stimulated these immense communal building achievements is unclear except that in the case of Mnajdra temple, described here, the key points in the sun's annual cycle, the equinoxes and solstices, were sufficiently significant to the builders for the alignment of the rising sun at these key times to be incorporated into the temple structure.

In a complex known as Hajar Qim (from the Arabic for "standing stones") is the Mnajdra temple. It consists in fact of three interconnected temples: the first a small, independent structure of an early period 3600–3000 BC; the second North Temple rather later 3000–2500 BC, and the third South Temple built progressively over all this long period. This temple incorporates features marking the key annual alignments of the rising sun.

The South Temple (Figs 1–9) consists of an entrance (built late), a large central chamber and three rooms in an arc beyond (built successively). The central axis of the temple is so aligned that the rays of the rising sun at the equinoxes pass through the main portal, across the central chamber, through a passage into the middle room to an ultimate wall recess, thus illuminating the temple with the light of the rising sun to the east. Some distance from each side of the passage are vertical stones marking the northern and southern limits of the sun's dawn rays at the summer and winter solstices. The central structure is decorated with

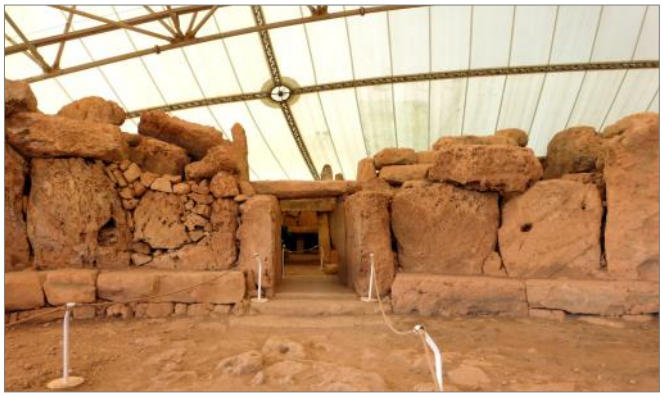

Fig. 3. Entrance and central passage.

Fig. 1. Mnajdra (South) temple under a UNESCO canopy.

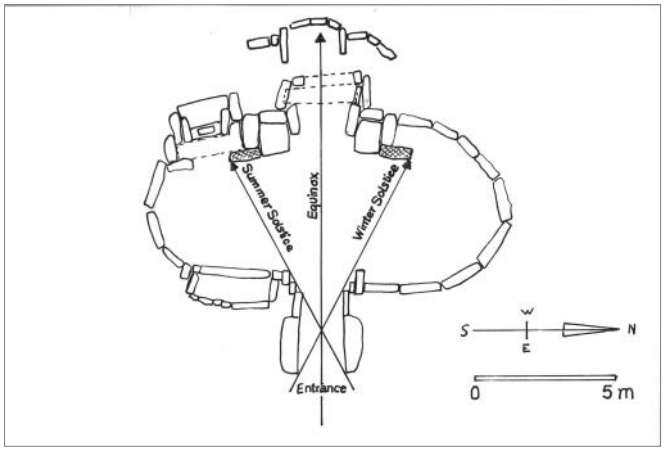

Fig. 2. Mnajdra temple: sketch of alignment.

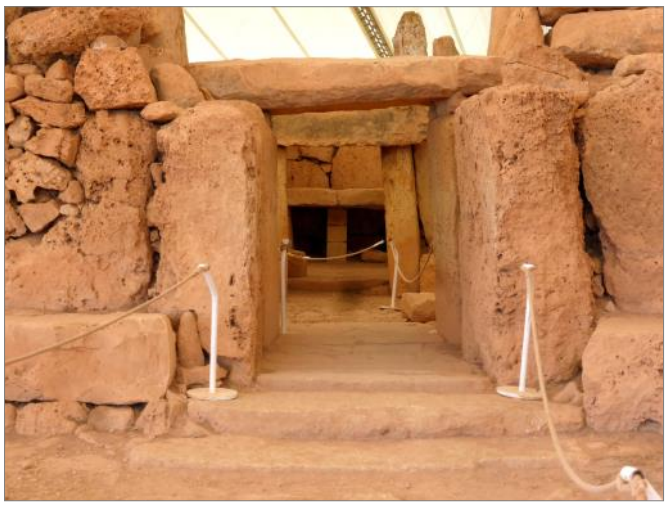

Fig. 4. Main portal and passage, equinox aligned.

Fig. 5. Early morning sunlight on 14 September, elsewhere in the complex.

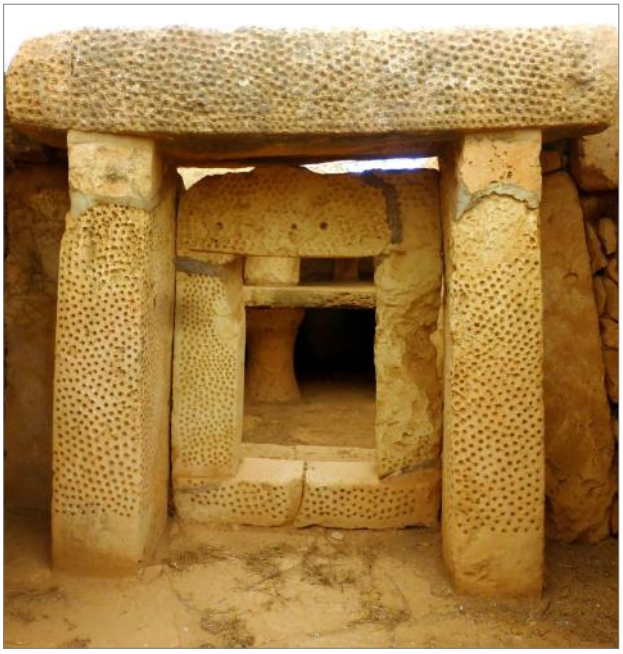

Fig. 6. Middle structure.

Fig. 7. Ultimate recess.

Fig. 8. Summer solstice marker.

Fig. 9. Winter solstice marker.

heavy stippling. This alignment appears to have been built in the middle period, say 3200–3000 BC. The North Temple, of rather later construction, also seems to reflect a possible solar alignment of the winter solstice.

The accuracy of the alignment reflects the depth of knowledge and the powerful motivation for designing structures to mark the key solar points in its annual cycle, the equinoxes and both solstices. The Mnajdra structures, if correctly assessed as built before 3000 BC, would predate the solar alignment of Stonehenge by several centuries, where the principal megalithic Sarsen stone circle, aligned only to the summer solstice, was not erected until around 2500 BC, at least 500 years later. Thus it would seem that Mnajdra could claim to be the earliest structure known for veneration of the sun by marking with precision all four significant points in its cycle.

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GNOMONS OF PORTABLE DIALS

MIKE COWHAM

The gnomons of dials are generally quite interesting but those used on portable dials are often very ornate as well. These dials were pocket devices for the gentleman and needed to look attractive.

The majority of portable dials had plain straight gnomons, so the few with the more attractive ones are worth seeing.

The gnomons on Butterfield dials have already been described in an earlier article.[1] Those in this article are from a variety of other dials from several countries.

The gnomons shown below are mostly fitted to small silver or brass horizontal dials, but some are from inclining dials.

Fig. 1 shows a gnomon by Manche, Paris. It is relatively plain with just a simple engraving of leaves.

Fig. 2 is on a dial by Michael Butterfield, Paris, and is engraved slightly differently on each side.

Fig. 1. Brass dial by Manche, Paris.

Fig. 2. Silver dial by Michael Butterfield, Paris c.1700.

Fig. 3. Silver dial by Morlet.

Fig. 4. Silver dial by Pierre Sevin, Paris.

Fig. 5. Silver inclining dial by Louis Chapotot, Paris.

Fig. 3 is on a small round dial by Morlet. It is a relatively plain dial but its gnomon adds a bit of interest with its leaves and flowers.

Fig. 4 is quite similar but a little more elaborate. Its maker was Pierre Sevin of Paris.

Fig. 5 is again similar but is fitted to an inclining dial by Louis Chapotot, Paris.

Fig. 6 shows a gnomon of another inclining dial, which looks more solid, made by Henry Macquart, Paris.

Fig. 6. Silver inclining dial by Henry Macquart, Paris.

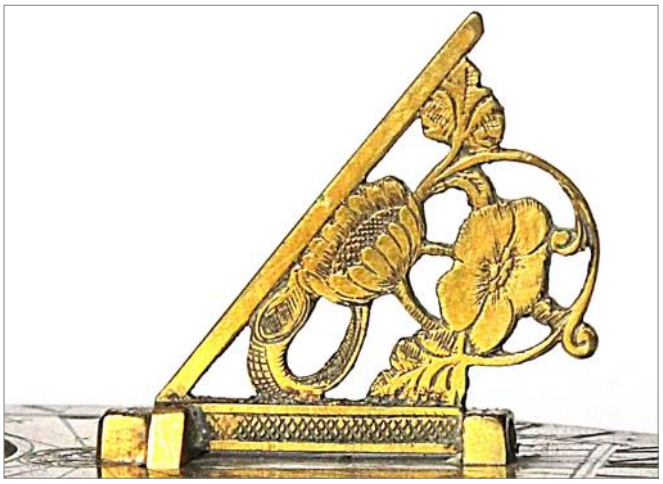

Fig. 7. Silver dial by Nicholas Lemaindre.

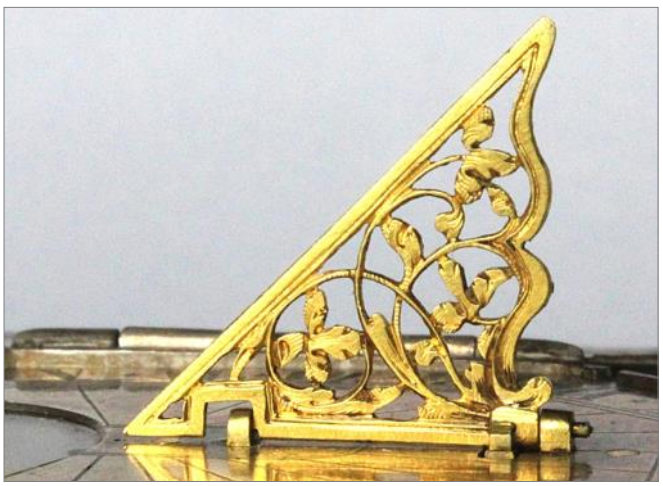

Fig. 8. Silver dial by Jean Nourry, Lion.

Fig. 9. Brass inclining dial, unsigned.

Fig. 10. Brass inclining dial, unsigned.

Fig. 11. Brass inclining dial by Edmund Culpeper, c.1700.

Figs 7 and 8 are particularly attractive being delicately fretted and finally gilt. That by Nicholas Lemaindre (Fig. 7) shows two flowers blooming and that by Jan Nourry of Lion (*sic)* (Fig. 8). shows some delicate flowers and their leaves.

Figs 9 and 10 show the gnomons of two unsigned English brass inclining dials. They are very similar in several ways and may both be by the same maker.

Fig. 11 is from a brass inclining dial by Edmund Culpeper. He was a well-known English instrument maker. This

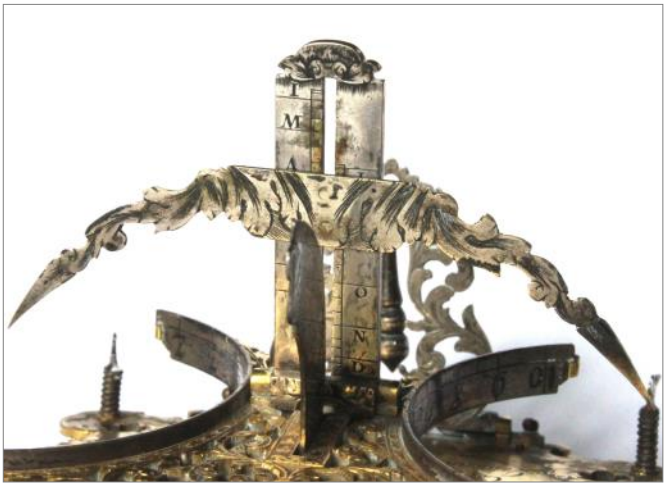

Fig. 12. A double gnomon from a crescent dial by Johann Martin, Augsburg, c.1710.

Fig. 13. A wonderful gilt gnomon on a silver dial by Richard Glynn from about 1710.

gnomon is attractively showing some leaves against a black background.

Fig. 12 shows a double gnomon fitted to a crescent dial by Johann Martin of Augsburg from around 1710. It is fairly simple, being delicately engraved with leaf patterns.

Fig. 13 is perhaps the one of the most attractive gnomons. It is silver gilt and is attached to a silver dial by Richard Glynn. The dial is relatively large, being 4″ or 102 mm diameter. It shows what appears to be a Phoenix rising from the ashes and holding an arrow in his bill. The shield at the bottom is also supported each side by the heads of two small animals, perhaps meant to be snakes.

REFERENCE

1. Mike Cowham: 'Butterfield dial gnomons', *BSS Bulletin* 30(iii), 12-15 (September 2018).

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All Set for the Rocky Mountains

Shortly before the 2019 NASS Conference in Denver, Colorado, Fred Sawyer sent me a photograph of a brass strip set into the pavement outside Union Station. This marks 105° west, the reference meridian for Mountain Time in the U.S. I had already booked a one-day tour to the Rocky Mountain National Park and the meeting point was to be outside Union Station. I turned up early to look at the line and then walked over to the flagpole where my tour companions were gathering. I quickly spotted Geoff Parsons in the group and I mentioned that I had been checking out the line which he hadn't seen himself.

When our tour guide turned up, he told us a little about the station and then directed us to the bus which was a few yards away. I asked why he hadn't told us about the meridian line. Astonishingly, he said he didn't know it was there, despite almost tripping over it! He invited me to explain.

I instantly switched to student-teaching mode. "OK everyone, take a look at this line. If you stand on it and look towards the station you will be facing due north. This runs along the line of longitude which is 105° west of the Greenwich Meridian in England, pretty much where I was yesterday. Now, can any of you divide 105 by 15?"

I got the distinct impression that this wasn't quite how they expected the tour to begin. I found myself looking at blank faces. "Well," I continued, "the answer is seven and that's why Mountain Time is seven hours behind the time in the U.K." I left the rest of the day to the tour guide!

Longitude 105° 0′ 0″ West. Altitude 1 mile.
Photo: Geoff Parsons.

Denver is known as The Mile High City and there is an inscription on the steps of the Capitol Building indicating the one-mile mark. On the tour we passed a two-mile mark. I am more familiar with milestones that mark distances along the level; vertical mile marks are an interesting variation.

Frank King

A SUNDIAL BY THOMAS HART

SUE MANSTON

In June this year the BSS Help and Advice Service received a query from Peter Rawcliffe, of South Hinksey, near Oxford – he asked what we thought about a dial that he had just acquired.

The dial was inscribed with 'JWADE' and 'Tho^{S}. Hart 1773' (Figs 1 and 2). My first impressions were that this was a very clean sundial for its age and that the gnomon was clearly a later addition, inappropriate and in the wrong place (Fig. 3). Thinking this might be a 20th Century dial – one with a spurious name and an old date to make it look antique – I turned to the BSS Fixed Dial Register to see whether there were any other dials by Thomas Hart.

In fact, there was only one sundial by Thomas Hart in the Register (SRN 5181). It was recorded as being at All Saints' Church in Iwade, a village near the north Kent coast. Realising that 'JWADE' on the sundial was most likely 'Iwade' immediately set alarm bells ringing, so I asked John Davis and John Foad for their opinions. Both thought this was highly suspicious, so John Foad made a visit to Iwade to investigate. Unfortunately, he had to report that the dial was no longer on its pedestal.

It was John Foad who had recorded and photographed the dial – missing its gnomon – in 2002. Comparison between his photographs (Figs 4–7) and those of the recent purchase shows that this is the same dial.

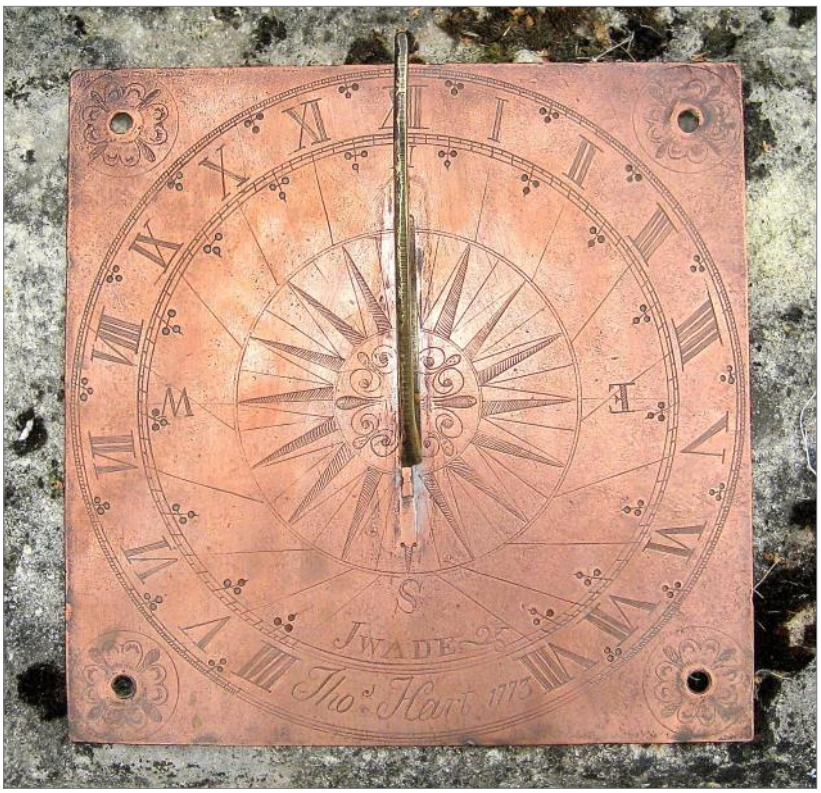

Fig. 1. The Iwade dial today. Photo: Peter Rawcliffe.

Meanwhile, John Foad contacted one of the church-wardens, who put him in touch with Graeme Horner, Vice-chair of the Iwade Parochial Church Council (PCC), to see whether there was any evidence of what had happened to the sundial. It was possible that the church might have sold it to raise funds. Graeme bravely trawled though several

Fig. 2. Close-up of the inscription today. Photo: Peter Rawcliffe.

Fig. 3. The inappropriate gnomon today. Photo: Peter Rawcliffe.

Fig. 4. The Iwade dial plate in 2002. Photo: John Foad.

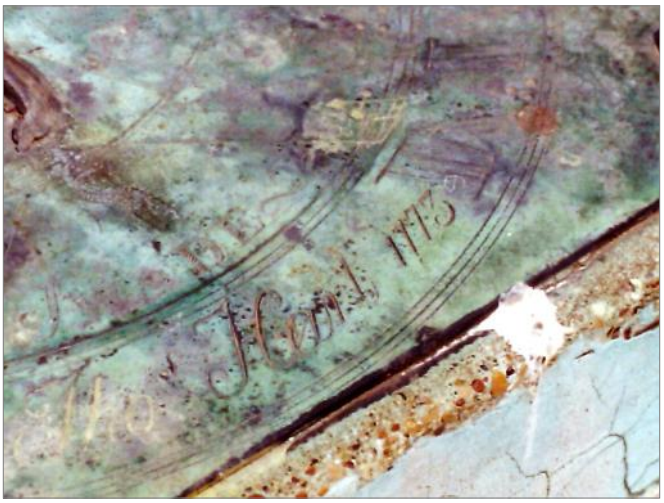

Fig. 5. The signature on the Iwade dial in 2002. Photo: John Foad.

years' worth of PCC minutes and found that the dial's disappearance had been noted by the vicar, the Rev. Webb, as "the copper plate had been wrenched from the sundial" (minutes dated 30 November 2009).[1]

Peter was duly informed and has made a very generous gesture by agreeing to return the dial to the church and to make a donation towards its future safe-keeping.

The dial is about 250 mm square with rosettes in the spandrels. Roman numerals are read from the inside, using IIII instead of IV. There is a 16-point compass with N, E, S and W read from the north. Two separate rings show increments of 30, 15, 10, 7½ and 2 minutes and there are 3-dot markers for the half-hours. In 2002 the dial plate had a heavy patina. Although cleaning (probably chemical) has now given it the appearance of copper, it is almost certainly made of brass.

Wilton House Museum

Whilst all this was going on, Peter discovered a reference on the Internet[2] to a dial at the Wilton House Museum[3] in Richmond, Virginia (now recorded as SRN 8102) inscribed "Thos. Hart, London 1765". This dial had stood outside, on a pedestal at the south-west corner of the museum. We thought that if this dial was by the same Thomas Hart, then perhaps the gnomon design could be copied to make a new one for the Iwade dial.

We duly obtained good photographs from Erica Borey, Collections Manager at the museum, along with lots of helpful information. It turned out that the museum had communicated with Jill Wilson back in 2011 when they were trying to find out more about Thomas Hart. At that time there were suspicions that the museum sundial might have been made in the 20th Century and that the name and date on the dial were 'made-up'. The name and date inscription (Fig. 8) does not look the same as that on the Iwade dial. Also suspicious is the motto, which is not mentioned by Gatty[4] and is thought unlikely to have been used in the 18th Century:

Fig. 6. The now-empty pedestal outside the church Photo: John Foad.

Fig. 7. The pedestal opposite the church doorway. Photo: John Foad.

Fig. 8. Close-up of the signature and motto on the Wilton House dial. Photo: Wilton House Museum.

Serene I stand amongst the flowers,
And only count life's sunny hours,
For me dark days do not exist,
I am a brazen-faced old optimist.

After a tree fell on the sundial and damaged it during Hurricane Irene in 2011, it was taken for repair. The museum decided that the date on the dial was genuine and that the 20th-Century motto was added later. The dial is now kept inside in a controlled environment.

However, we still felt that the dial was made in the 20th Century. The motto is a long one and it takes up quite a lot of space. It is very unlikely that an 18th-Century maker would have left enough blank space on the dial to allow someone else to add a long motto 200 years later.

The dial (Fig. 9) is circular and quite large (around 530 mm). The gnomon (Fig. 10) makes an angle with the dial plate of about 53°, which is almost right for a dial made around Birmingham. There is a very similar dial at Anglesey Abbey (SRN 1778). This dial (Figs 11 and 12) has the same motto and cast gnomon as the Wilton House

Fig. 9. The dial plate of the Wilton House dial. Photo: Wilton House Museum.

Fig. 10. The gnomon of the Wilton House dial. Photo: Wilton House Museum.

Figs 11 and 12. The dial at Anglesey Abbey (SRN 1778). Photos: Sue Manston.

	Location	Shape & Size	Signature & Date	Comments
SRN 8102	Wilton House Museum, Richmond, VA[3]	Circular c.530 mm	Thos. Hart, London 1765	Same* gnomon as SRN 1778
SRN 1778	Anglesey Abbey (NT), Lode, Cambridgeshire	Circular 414 mm	B. Cox, Kew 1785	Same* gnomon as SRN 8102
SRN 8103	Upend, nr. Newmarket	Circular n/a	B.S. Crow, Chiswick 1797	Same* gnomon as Chertsey Museum dial
SRN 7642	Syon House, Brentford	Circular c.230 mm	n/a	Same* gnomon as SRN 6568
SRN 6568	Langham, Essex	Circular c.250 mm	n/a	Same* gnomon as SRN 7642
SRN 3608	Mount Stewart House (NT), Newtownards, Co. Down	Circular c.200 mm	Lande & Co., inscribed on the gnomon	Plain gnomon
Not recorded	Chertsey Museum[5]	Circular 310 mm	n/a	Same* gnomon as SRN 8103
Not recorded	an unfixed dial	n/a	James Todd, Brentford 1787	Noted in the Biographical Index[7]
SRN 4847	Geddington, Northants	not applicable	not applicable	Slightly modified version of the motto on the pedestal

Table 1. Dials with "Brazen-Faced Old Optimist" motto.

** The gnomons appear the same from studies of the available photographs – there may be minor differences in reality.*

n/a: not available.

dial, but is signed "B. Cox, Kew 1785". It also has a typical 20th-Century 'sunface' in the centre. Another dial with the same motto (SRN 8103) was discovered at Upend, near Newmarket, only a few miles away from Anglesey Abbey, signed "B.S. Crow, Chiswick 1797".

We are now aware of eight dials with the "Brazen-Faced Old Optimist" motto, and one dial with a slightly modified version on the pedestal (Table 1). The dial in the Chertsey Museum[5] needs further investigation, so if anyone is able to make a visit to Chertsey and file a report for the Fixed Dial Register this will be appreciated.

By this time, we were pretty sure that whilst the Iwade dial is the genuine article, all these other dials are probably 20th Century, with made-up names and dates, perhaps manufactured in the Birmingham area by Pearson-Page or others of that ilk. The use of the name 'Thos. Hart' on the Wilton House dial is probably just coincidence. Erica is going to trawl though the archives to see whether she can find any more information about the dial's history.

Whilst all of this was an interesting diversion, it has not helped us to find out any more about Thomas Hart or the Iwade dial.

Thomas Hart

We know very little about Thomas Hart and suspect he may have been a clockmaker/engraver. There was a Thomas Hart in Iwade, recorded as a victualler[6] – he may have been the publican of the present day 'Woolpack' which is believed to date from 1746. His death is recorded in the church burial register (buried on 5 December 1798) and his will is believed to be in the Canterbury archives. There is a headstone in Iwade churchyard which mentions his name, but the style of the headstone appears to be mid-19th Century, so perhaps the stone was for a subsequent relative. This may not even be the same Thomas Hart, though clearly there were Harts in the village at the time.

The Future of the Iwade Dial

At the end of July, the PCC committee held an extraordinary meeting to discuss the future of the sundial. They have decided to keep the dial secure inside the church, in a glass display case, and to investigate the possibility of having a resin copy installed on the pedestal outside.

Meanwhile, Graeme intends to try and find out more about Thomas Hart and the history of the sundial. He has discovered an old photograph from 1904 which shows that the sundial was not in its present position (Figs 13 and 14). Perhaps it was somewhere else in the churchyard or the village at the time.

Hopefully there will be more to this story, and a follow-up article once the dial is in its glass case and, possibly, a replica is on the pedestal.

ACKNOWLEDGEMENTS

Grateful thanks must go to John Davis, John Foad, Frank King, Erica Borey and Graeme Horner for their help and advice. And a special thank-you to Peter Rawcliffe for kindly returning the dial to the church.

Fig. 13. The Iwade church entrance showing the position of the pedestal today. Photo: Graeme Horner.

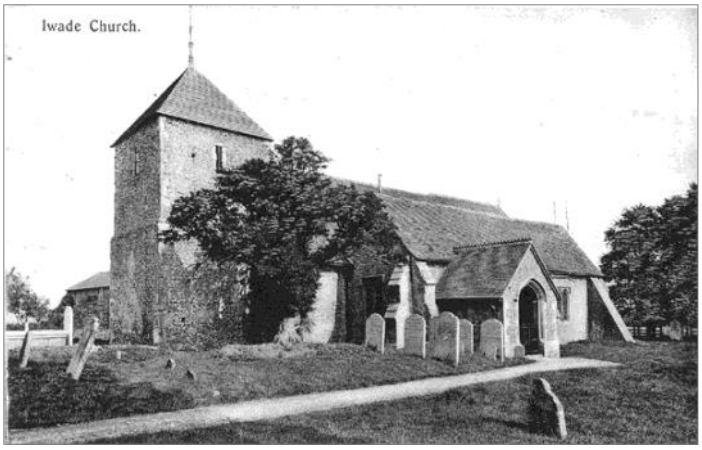

Fig. 14. The Iwade church in 1904 – no sign of the sundial or pedestal.

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1. Email from Graeme Horner, 7 July 2019.
2. *https://foundinthecollection.blogspot.com/2012/04/i-am-brazen-faced-old-optimist.html*
3. *http://www.wiltonhousemuseum.org*
4. Mrs Alfred Gatty, H.J.F. Eden and Eleanor Lloyd: *The Book of Sun-Dials*, George Bell and Sons, London (4th ed., 1900).
5. *http://chertseymuseum.org/search_collection?offset=20400&item=20625*
6. Email from Graeme Horner, 26 June 2019.
7. Jill Wilson: *Biographical Index of British Sundial Makers from the Seventh Century to 1920*, Second edition, British Sundial Society Monograph No. 2 (2007).

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Postcard Potpourri 48
Dial House, Marlow, Buckinghamshire

Peter Ransom

This dial (SRN 0501) at Dial House, The Causeway, off the High Street, Marlow, declines to the west, though that is hard to distinguish on the postcard because of the angle at which the picture has been taken. The Fixed Dial Register tells us that the dial appears to be painted on a metal sheet secured to wood. Recent restoration of the nineteenth century dial appears to be slightly faulty – perhaps the gnomon is not positioned quite correctly. The dial, facing south-west, shows 1 pm to 8 pm divided to 15 minutes. Hour lines are drawn through the vertical Roman numerals. All lines, numerals and the upper motto are gilded on a blue ground. It has mottoes reading: "Ne quid pereat" in the pedimented top and (in black on white) "Horas non numero nisi serenas" below the dialplate. The maker is listed as Edwin Clark (1814–94). The name of the dog is unknown.

The postcard has not been used. It was published by Photochrom Co. Ltd, London and Tunbridge Wells. Photochrom is a process for producing colourised images from black and white negatives through the use of lithographic printing plates. However, the postcard shows no evidence of colour (apart from the sepia in which it is printed).

Photochrom Co. Ltd was established in 1896 as a Christmas card producer and diversified into guide books, tourist albums and postcards. I have been unable to find a date when they ceased trading. The number of items they produced is thought to exceed 40,000.

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THE SHORTEST DAY REVISITED

FIONA VINCENT

In the last issue of the *Bulletin*,[1] Alastair Hunter addressed the problem that someone always raises around the time of the winter solstice: why does the earliest sunset occur a few days *before* the shortest day, and the latest sunrise a few days *after*?

Alastair's treatment is mathematical, and intended, he says, "… for sundial people. Astronomers may approach their explanation in a different way." Being an astronomer, I couldn't resist the challenge! I hope my version may help those who prefer a more visual approach.

The two diagrams here are based on those often published in magazines for amateur astronomers. Any horizontal line across the grid represents one day. Usually these diagrams are centred on midnight, and various curves are added to show when the sun sets, when various planets rise and set, and so on. Here, I have put midday at the middle, and provided only two curves: sunrise and sunset. I have plotted these for my home latitude, 56° N (though I do not claim high accuracy). Further south, these lines would be less curved.

I have also shown a 'noon' line, when the Sun is due south. Fig. 1 is plotted using local solar time, and it shows that the Sun is due south at 12 h every day, just as we would expect if we used a simple sundial to measure time. Furthermore, the sunrise and sunset curves are symmetrical around the noon line: the latest sunrise and the earliest sunset both occur on the shortest day – just as we would expect.

However, if we choose to measure time by the clock instead of the sundial, we find that the Sun sometimes reaches due south a little early, and sometimes a little late. The difference is the Equation of Time, familiar to sundial people. So on Fig. 2, which is plotted using local mean time, the noon line wanders from side to side of the 12 h line. The wandering is not actually very large, and would be hard to see clearly on the diagram, so I have exaggerated it by a factor of three.

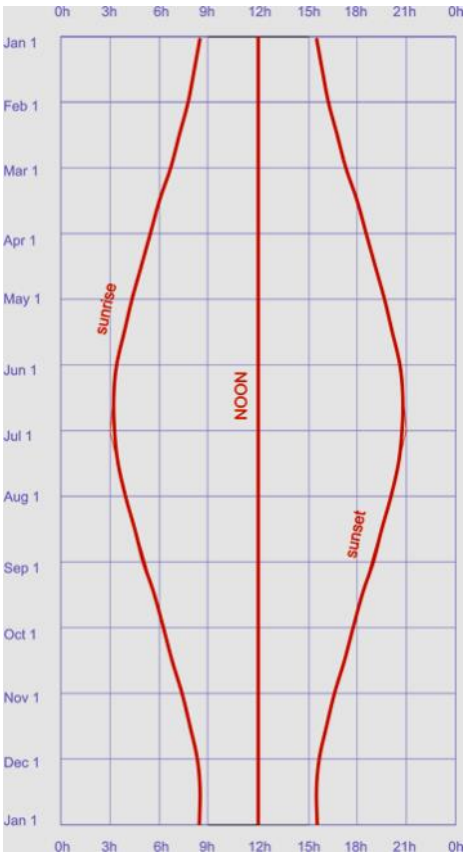

Fig. 1. The times of sunrise, noon, and sunset, calculated for 56° N, as measured by local solar time.

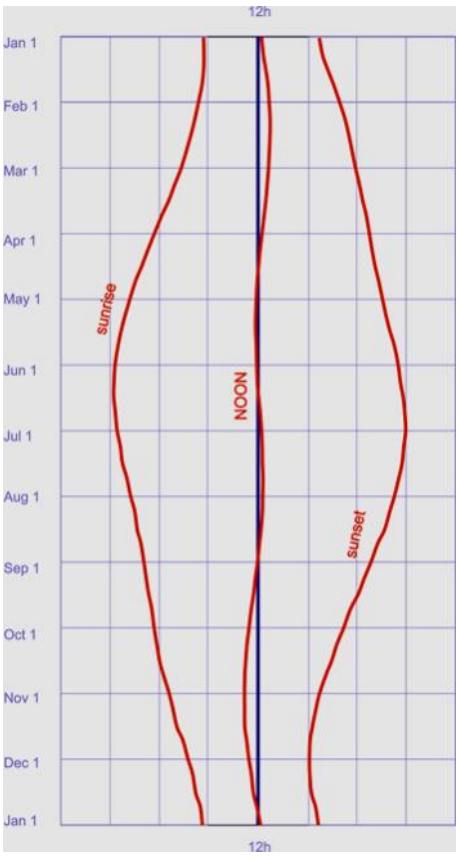

Fig. 2. The same times as they would be measured by local mean time, if the Equation of Time were three times greater than it is.

But on any one day, the Sun is due south at a point midway between sunrise and sunset. So if the noon line wanders, then the sunrise and sunset curves have to wander with it! Fig. 2 shows the result. The date of the shortest day has not changed, but according to this exaggerated diagram, the latest sunrise would apparently occur in mid-January, and the earliest sunset around the start of December.

Remember, though, that the real Equation of Time is three times smaller. So the real discrepancy is smaller: sunrise and sunset change direction about a week early or late, at 56° N. And in theory there is a similar discrepancy around the summer solstice, but it is smaller still – I have never heard anyone asking questions about that!

REFERENCE

1. Alastair Hunter: 'A study of the shortest day', *BSS Bulletin*, 31(ii), 17-19 (June 2019).

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A RICHARD MELVIN SUNDIAL

IAN BUTSON

Recently rescued from a centre offering recovered heritage garden items, this slate sundial by Richard Melvin was found in a rather dirty and sorry-looking state (Fig. 1).

Fig. 1. The dial as found.

Following the purchase, and with some gentle soap and water washing, the surface markings proved to be in very good condition, considering the age of the dial.

The dial is typical of the work of Richard Melvin, with finely engraved furniture. A compass rose is inscribed at the centre with eight major points indicated, an EoT correction scale, engravings for 70 geographical locations around the world, two mottoes as well as instructions to correct for the difference in local time from that of Greenwich, at a location close to the Winchester area of Hampshire.

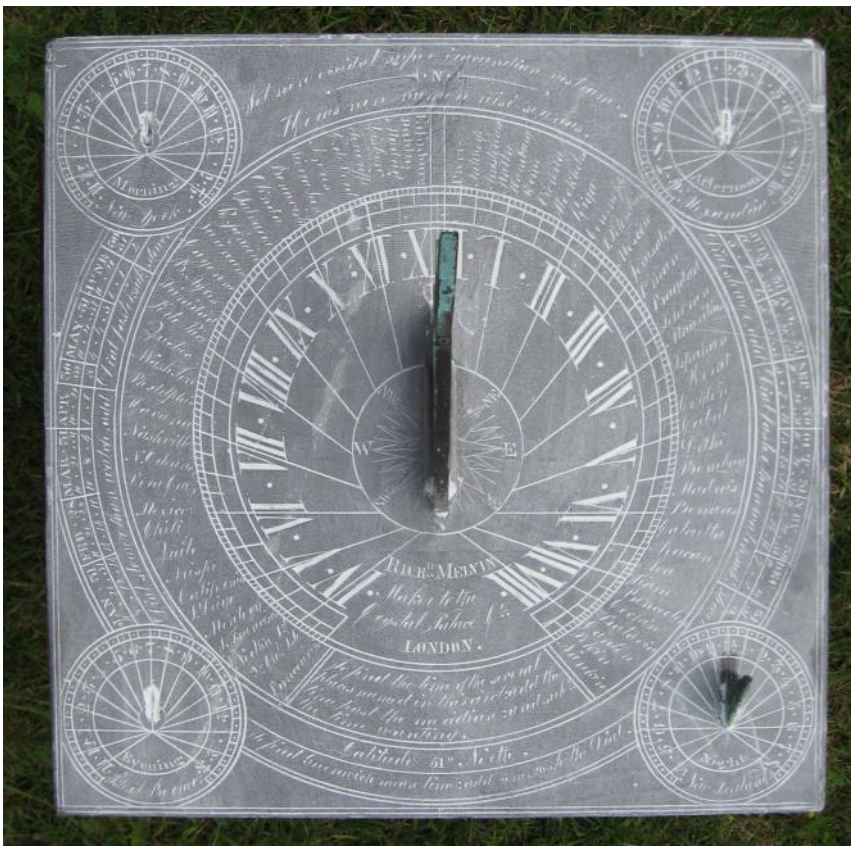

Fig. 2. The dial after cleaning, and markings highlighted with talcum powder.

A feature, typical of Melvin sundials, is the addition of four smaller corner dials. These give the comparable times at New York, Alexandria, Isle of Borneo and New Zealand, when compared with the local time. Unfortunately, three of the four smaller gnomons are missing (Fig. 2).

It seems most likely that this sundial was located at Kilmeston Manor, about 9 miles from Winchester, for well over 100 years. This property was put up for sale in 2009 and it is presumed that the dial subsequently found its way onto the market.

Considering that this sundial is around 150 years of age, it is pleasing to see that it has generally remained in a good condition, except for the three missing gnomons.

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3D RECONSTRUCTIONS OF ANCIENT SUNDIALS WITH MULTIPLE FACES: PART 2

ORTWIN FEUSTEL

Part 1 of this article, in the previous issue, introduced the intention of analysing and creating correctly-scaled 3D reconstructions of the dial faces and gnomons of five interesting multi-faced ancient sundials. Three were considered in Part 1, and this second part analyses two further dials.

Symbols used[5,6,7,8 – see Part 1]

φ	geographical latitude
δ	sun's declination
d	declination of a plane face (angle between the plane and the east–west direction)
ρ	cylinder's radius
R	sphere's radius
G	pin gnomon length
α	half opening angle at the cone's vertex
c	count of a temporal hour line
w	subscript for winter solstice
e	subscript for equinoxes
s	subscript for summer solstice
1,2,3 etc	subscript for temporal hours

Three Vertical Hollow Cylindrical Faces (Figs 13 and 14)

This dial is from Musei Vaticani, Vatican City. It was interesting to analyse, since the museum had mounted it upside down!

Characteristics

It has three half hollow cylinders, which are positioned side by side and, in plan, the three half cylinders face southeast, south and southwest, respectively. Hence each dial has its own range of hour lines: see Fig. 15.

Editor's Note

*Repeating the comment from Part 1 of this series, the reader is **strongly** recommended to visit the site where the referenced models can be viewed, rotated, magnified and lighting direction changed, allowing an extraordinary level of detail to be viewed on one's computer's screen. For example, visit http://repository.edition-topoi.org > Ancient Sundials > Search > scroll to page 15 > select Dialface ID 299 > Click on 3D Models/ObjID273*

Kevin Karney

Fig. 13. The upside-down dial in the Vatican Museum.

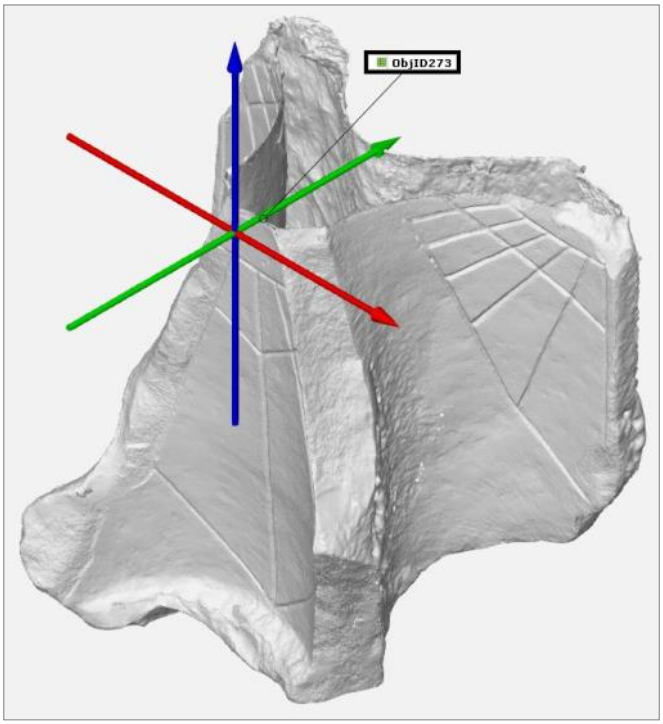

Fig. 14. Lateral view from southeast of the fragment of the sundial with three vertical half hollow cylinder faces, shown in Topoi 3D-Model ObjID273.[12]

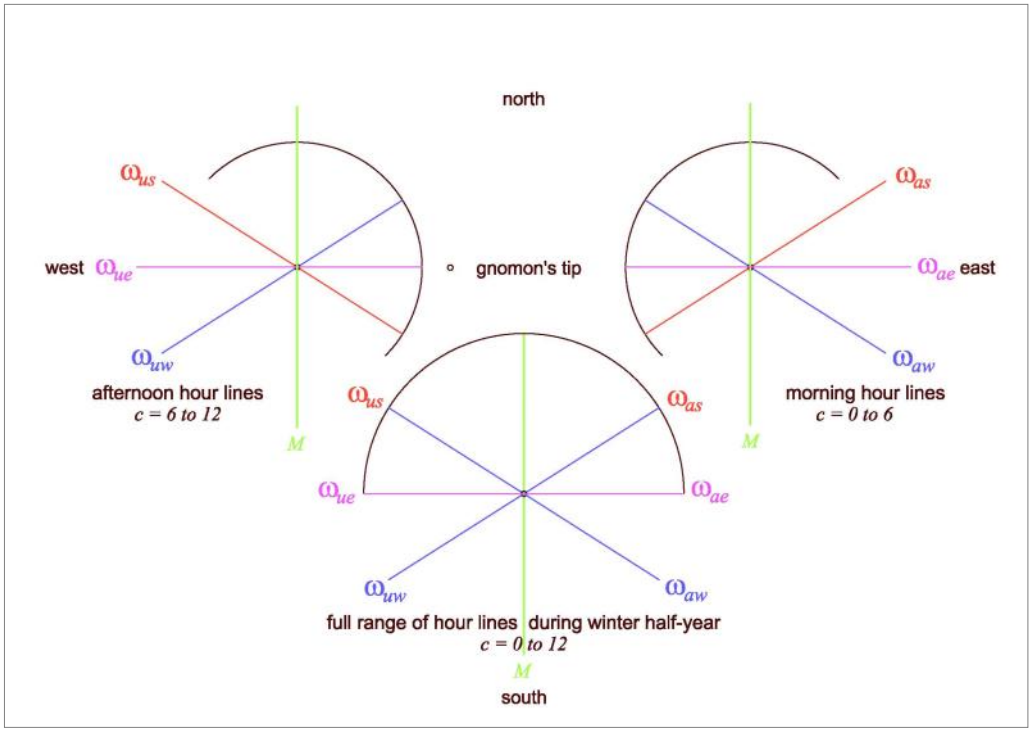

Fig. 15. Hour-line ranges of the three hollow cyclindrical faces: ω_a = solar azimuth at sunrise, ω_u = solar azimuth at sunset, M = meridian.

All gnomons are aligned horizontally from north to south in the meridian plane; their tips are located at the centres of the tops of each cylinder and their feet are fixed to the most northerly points of the three tops. The radius of the central cylinder is greater than the radii of the other two cylinders.

The line nets consist of the solstitial and equinoctial declination lines and six or eleven temporal hour lines.

Parameters of 3D-Model ObjID273[12]

The measurements of the cylinders' radii, as represented by the original 3D model, using the GOM Inspect software proved problematical: the sundial is so fragmented that the direct measurements were not possible. Consequently, it was considered best to measure the undisturbed distances along the meridian of both the central and eastern faces. Fig. 16 reveals the results.

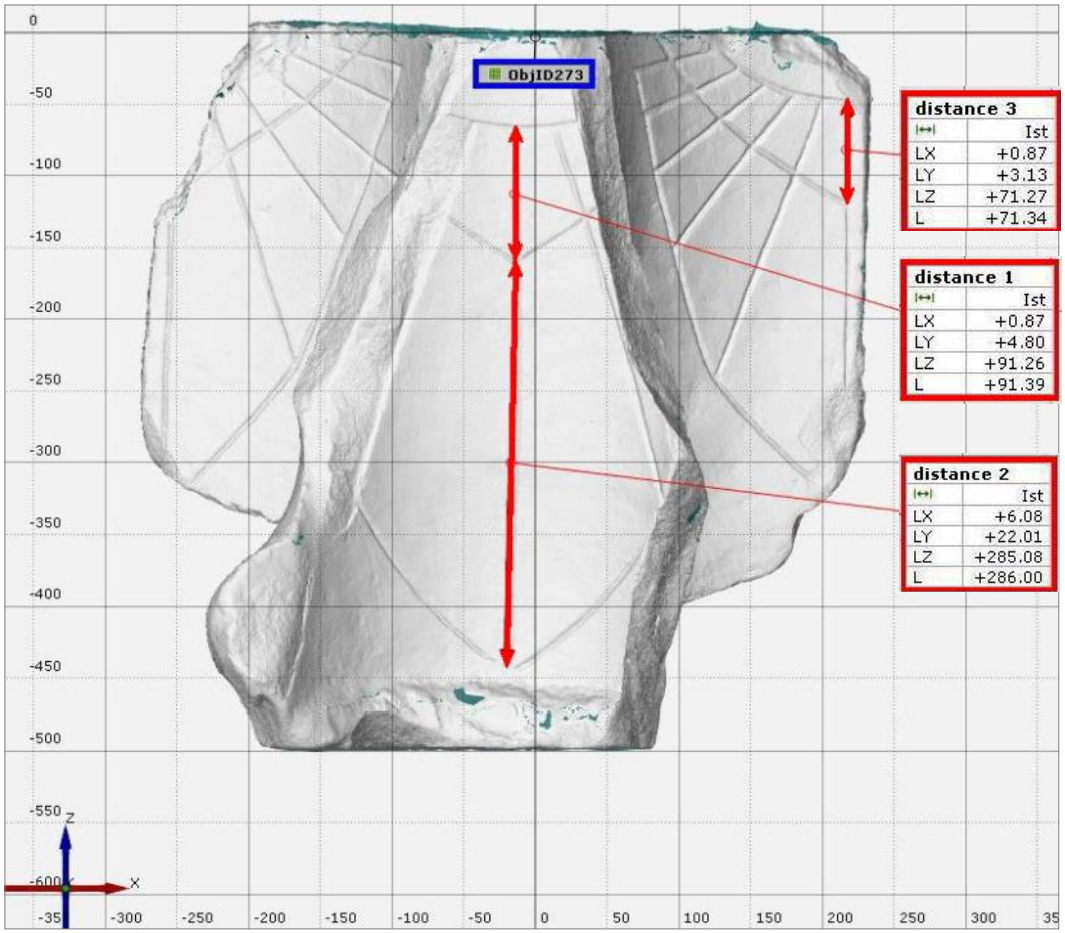

Fig. 16. Front view of the Topoi 3D-Model ObjID273[12] *allowing measurements of distances between declination lines along the meridians of two cylinders. The coordinate system is scaled in mm.*

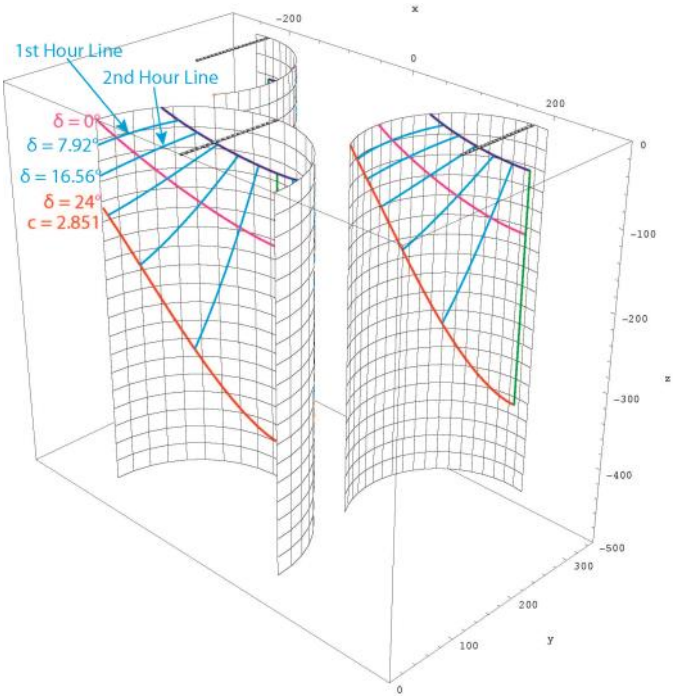

Fig. 17. 3D reconstruction of the sundial in Fig. 14 with solstitial and equinoctial declination lines together with temporal hour lines c = 0 to 12.

Calculation based on the following parameters:
$\varphi = 41°$ *and* $-24° \le \delta \le 24°$,
$\rho_{middle} = G_{middle} = 135$ *mm,*
$\rho_{east} = G_{east} = \rho_{west} = G_{west} = 105$ *mm.*

The measured distances were:

distance 1 = 91.39 mm
distance 2 = 286 mm
distance 3 = 71.34 mm

Using trial and error and different values for the geographical latitude and the sun's declination yielded the radii $\rho_{central} = 135$ mm, $\rho_{east} = 105$ mm.

Based on these radii, $\varphi = 41°$ and $-24° \le \delta \le 24°$, the percentage deviations Δ between calculated and measured distances along the meridians are:

$\Delta_{we} = (1 - 92.348 / \text{distance 1}) \times 100 = -1.05\%$
$\Delta_{es} = (1 - 286.265 / \text{distance 2}) \times 100 = -0.09\%$
$\Delta_{we} = (1 - 71.826 / \text{distance 3}) \times 100 = -0.68\%$

Graphical representation

The 3D representations in Figs 17 and 18 explain the limited length of four hour lines on the central dial. For example, assuming that $\varphi = 41°$, these lines are:

$c = 1$ and $11 \Rightarrow \delta > 7.92°$
$c = 2$ and $10 \Rightarrow \delta > 16.56°$

Lines with full length start and end, respectively, at

$c = 2.8307$ and $9.1616 \Rightarrow \delta = 24°$

Thus, the hour lines start and end at the rim of the half cylinder's cutting plane.

Both the other dials have morning and afternoon hour lines covering the whole year.

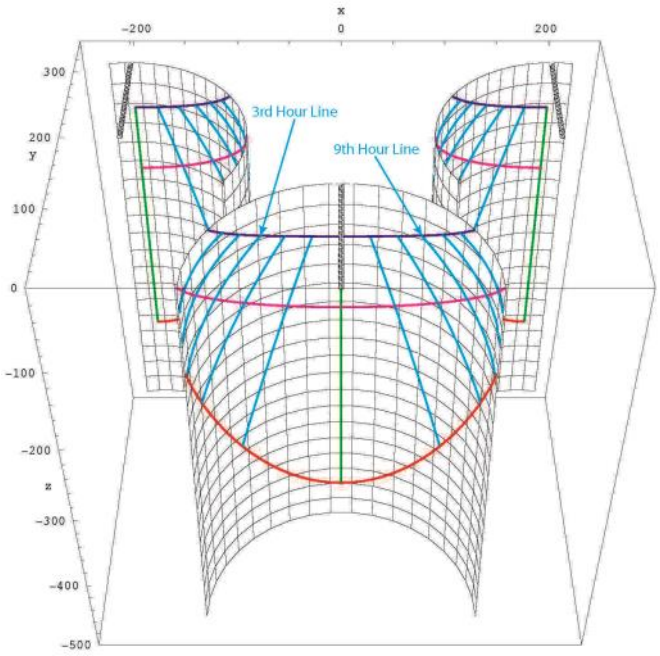

Fig. 18. Front view of the same 3D reconstruction as in Fig. 17.

Review

This 'pack-of-three' vertical dial is especially impressive for three reasons:

- The three half hollow cylinders are so arranged and oriented that there is always at least one face indicating the time throughout the day.
- No auxiliary equipment is necessary for the correct installation of the dial; the same time indication on two dials means that the placement is correct.
- The line elements of the side faces are identical to those of the central face except for their scaling.

Two Vertical Hollow Cylindrical and Spherical Faces (Fig. 19)

Characteristics

This dial, from Herculaneum and now in the National Museum in Rome, comprises a half cylinder and a half sphere, positioned one on top of the other, with both facing south.

The tip of the cylinder's gnomon is not located at the cylinder's centre; therefore the length of the cylinder's envelope has been adapted for such a short gnomon.

The hemisphere's gnomon is horizontal north–south with its tip at the centre of the sphere.

The engraved lines consist of the solstitial and equinoctial declination lines and eleven or thirteen temporal hour lines.

On both dials, an indication of time during the summer half-year happens only when the sun has crossed the first vertical.

Fig. 19. Ancient sundial with a half cylinder and a half sphere; unfortunately, the dial has been badly restored. Photo: Gerd Graßhoff, Elisabeth Rinner.

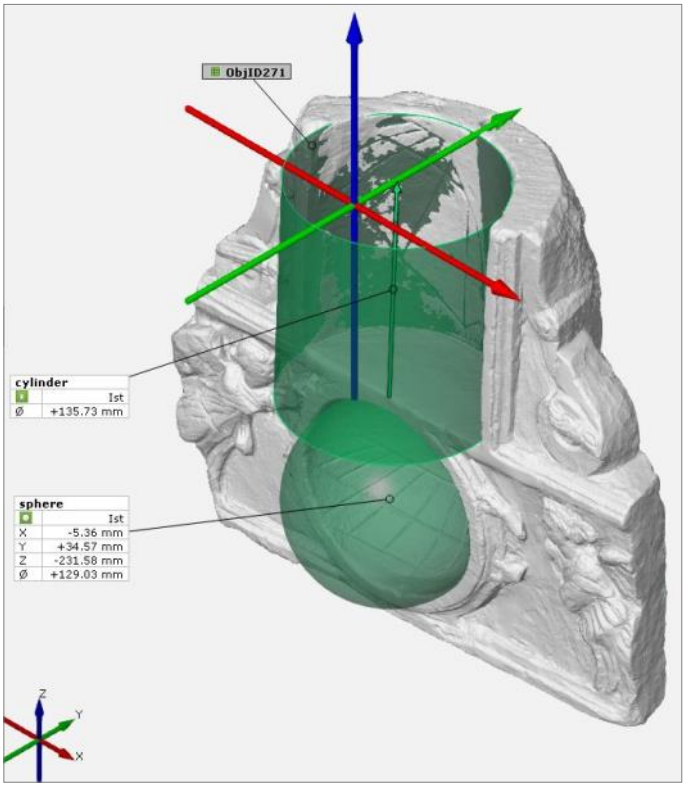

Fig. 20. Lateral southeastern view of the Topoi 3D-Model ObjID271[13] for the measurements of the cylinder's and the sphere's diameter.

Parameters of 3D-Model ObjID271[13]

Fig. 20 reveals the measurements of diameters (radii):

cylinder = 135.73 mm ⇒ ρ = 68 mm
sphere = 129.03 mm ⇒ R = 64.5 mm

Fig. 21 reveals the measurements of distances and chords between the intersection points of declination lines and meridian for the hollow cylinder and the hemisphere, respectively:

distance 1 = 27.05 mm
distance 2 = 96.05 mm
chord 1 = 28.71 mm
chord 2 = 25.36 mm

Graphical representations

Cylindrical face: using

$\phi = 38°$, $\delta_w = -23.7°$,
$\delta_s = 23.7°$, $\rho = 68$ mm,
distance 1 and distance 2,

the gnomon length G, determined by trial and error, is 31.5 mm. The deviations between the calculated and measured values are less than −0.5%.

Spherical face: using

$\phi = 38°$, $\delta_w = -23.7°$,
$\delta_s = 23.7°$, $R = 64.5$ mm,
chord 1 and chord 2,

the deviations amount to 7.7% and −4.5%, respectively.

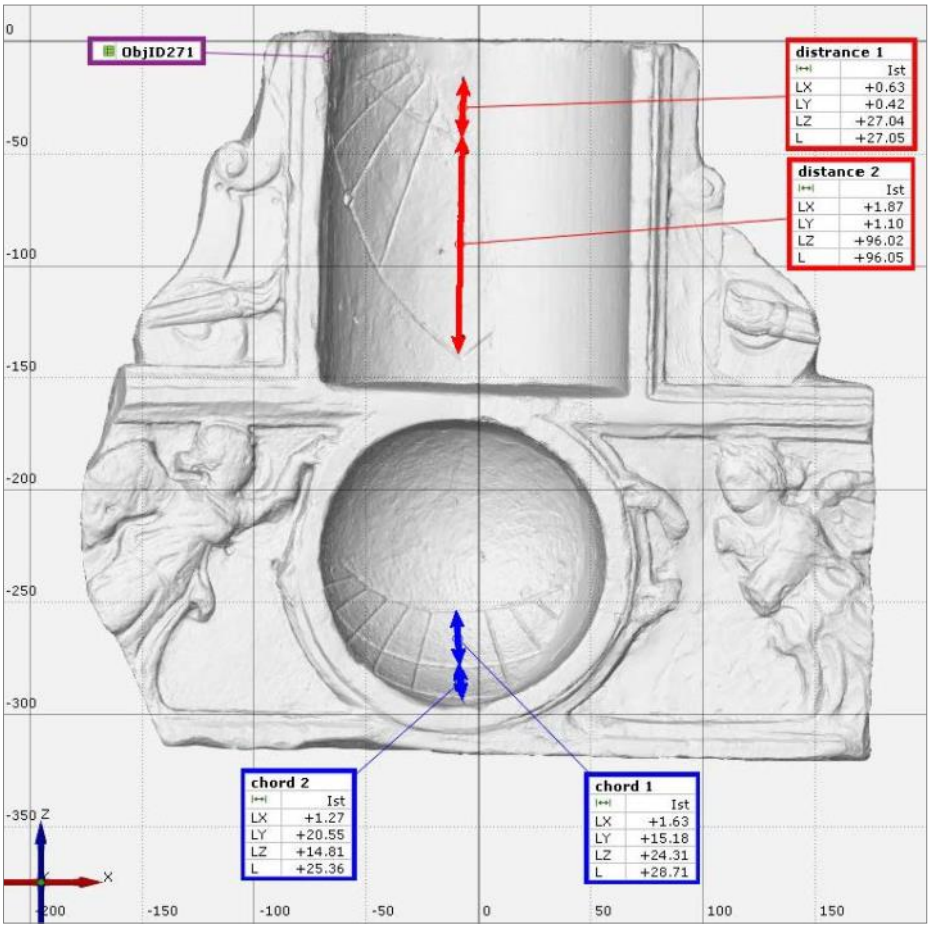

Fig. 21. Front view of the Topoi 3D-Model ObjID271[13] allowing measurements of distances and chords along the meridians.

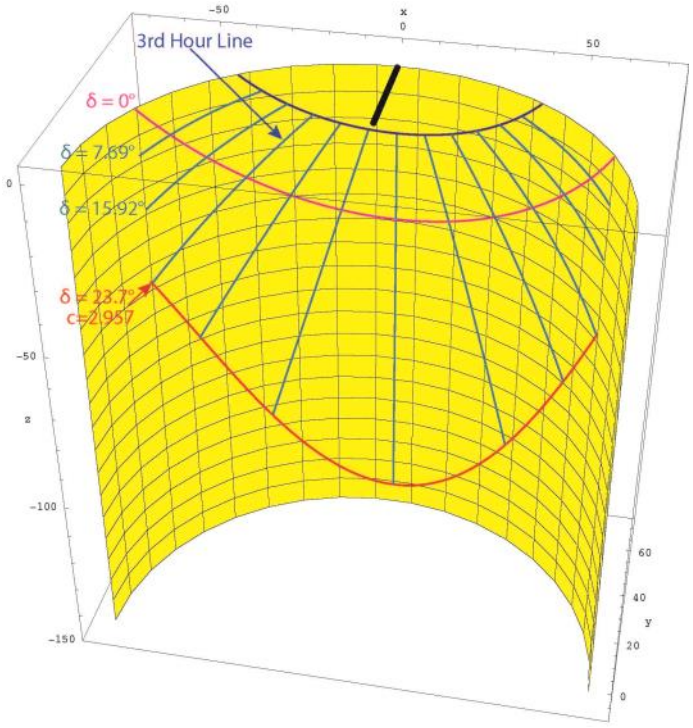

Fig. 22. 3D reconstruction of the cylindrical dial in Fig. 19 with solstitial and equinoctial declination lines together with temporal hour lines c = 1 to 11.

Calculation based on the following parameters:
φ = 38° and −23.7° ≤ δ ≤ 23.7°,
ρ = 68 mm, G = 31.5 mm.
The inserted declination values indicate the seasonal dependence of the hour lines.

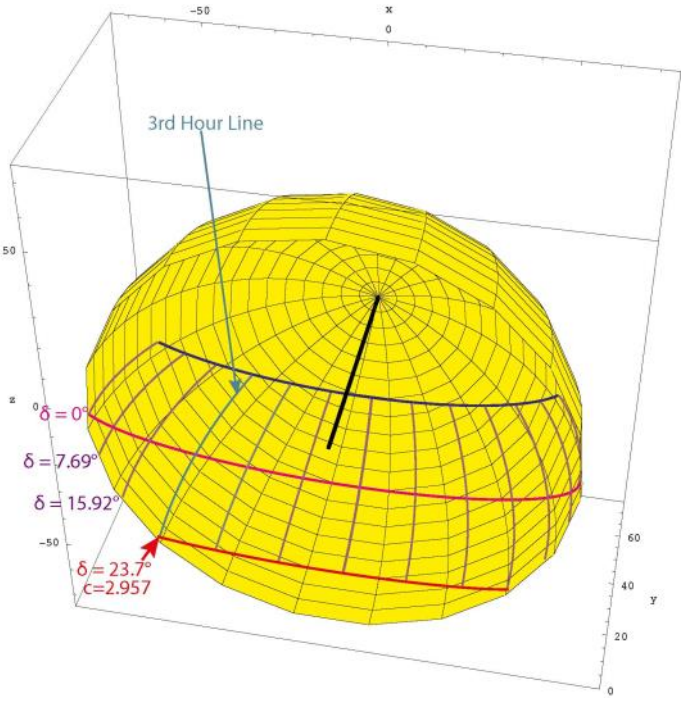

Fig. 23. 3D reconstruction of the spherical dial in Fig. 19 with solstitial and equinoctial declination lines together with temporal hour lines c = 0 to 12.

Calculation based on the following parameters:
φ = 38° and −23.7° ≤ δ ≤ 23.7°, R = 64.5 mm.
G tallies with R.
The inserted declination values indicate the seasonal dependence of the hour lines.

Figs 22 and 23 show the 3D representations of both faces with their gnomons. It can be seen that during the summer half-year the beginning and ending of time indication depends on the sun's declination. Some examples may underline it:

$\delta = 0°$ $\Rightarrow c =$ 0 and 12
$\delta = 7.69°$ $\Rightarrow c =$ 1 and 11
$\delta = 15.92°$ $\Rightarrow c =$ 2 and 10
$\delta = 23.7°$ $\Rightarrow c =$ 2.957 and 9.043

Thus, for instance, considering hour angles, the range of hour lines comes to $-55.816° \le \tau \le 55.816°$ at $\phi = 38°$ and $\delta = 23.7°$.

The boundaries between presence or absence of hour lines are vertical straight lines on the cylindrical face and circular arcs along the rim of the spherical face: for example, the line for the beginning is formed by the ends of the equinoctial line, the 1st hour line, the 2nd hour line and the hour line for $c = 2.957$.

Review

A curiosity of this combination of two vertical dials is their common orientation to the south, which therefore means that a full set of hour lines was not possible during the summer half-year.

There are two peculiarities in the construction. First, the chosen diameters of cylinder and sphere are almost the same. Secondly, the gnomon's length is smaller than the cylinder's radius. In this way, the shorter cylinder's envelope gives rise to an almost quadratic cutting surface and hence the harmonious appearance of the whole unit.

Final Remarks

Again and again, it is fascinating to realise the degree of astronomical knowledge and inventive genius that the creators of these five ancient dials possessed – even two thousand years ago. Hats off!

ACKNOWLEDGEMENT

Thanks to Kevin Karney for his help in preparing these two articles for the *Bulletin*.

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THE CROSS DIALS AND MOTTOES OF THE REVEREND ROBERT ESSINGTON

CHRISTINE NORTHEAST

In David Brown's article about Latin mottoes seen at the 2019 BSS Conference in Bath, the similarity was noted between the Latin inscription on the Royal Victoria Park cross dial and that reported by Gatty as being on a cross dial erected by the Rev. R.W. Essington at Shenstone, near Lichfield.[1] It seems that Essington was quite a fan of cross dials.

A Brief Biography

Robert William Essington (Fig. 1) was born on 17 May 1818 at Compton Bassett, near Calne in Wiltshire. He was the only son of Robert Essington of Nolands Farm and his wife Sarah (née Wayte); when he was four years old his father died and his uncle William Wayte of Highlands[2] (a small estate on the outskirts of Calne) became his guardian. His uncle sent him to Eton, and from there he went up to King's College, Cambridge as a Scholar in 1837, proceeding to the BA Degree in 1841, and MA in 1844. From 1840 to 1849 he was a Fellow of the College, and Lecturer in Divinity and Morning Reader 1845–7. He was ordained deacon at Lincoln in 1842, and priest in 1843. From 1848 until 1895 he was Vicar of Shenstone, a village near Lichfield in Staffordshire, and from 1891 to 1894 he was Rural Dean of Lichfield. In January 1857 he married Anne Negus (1837–1920).[3]

Fig. 1. Copy of Henry Turner Munns' portrait of the Rev. Robert Essington, displayed in the church of St John the Baptist, Shenstone.

Fig. 2. The remains of the old church.

Fig. 3. The present church of St John the Baptist, Shenstone.

When he took up the living at Shenstone, Essington rather regretted leaving his comfortable life at Cambridge. He found the church building in a very poor state, with leaking roof and dilapidated walls. He was the driving force behind its replacement in 1852–3 by a building designed by John Gibson, formerly clerk of works to Sir Charles Barry at the Houses of Parliament, and latterly an architect employed by

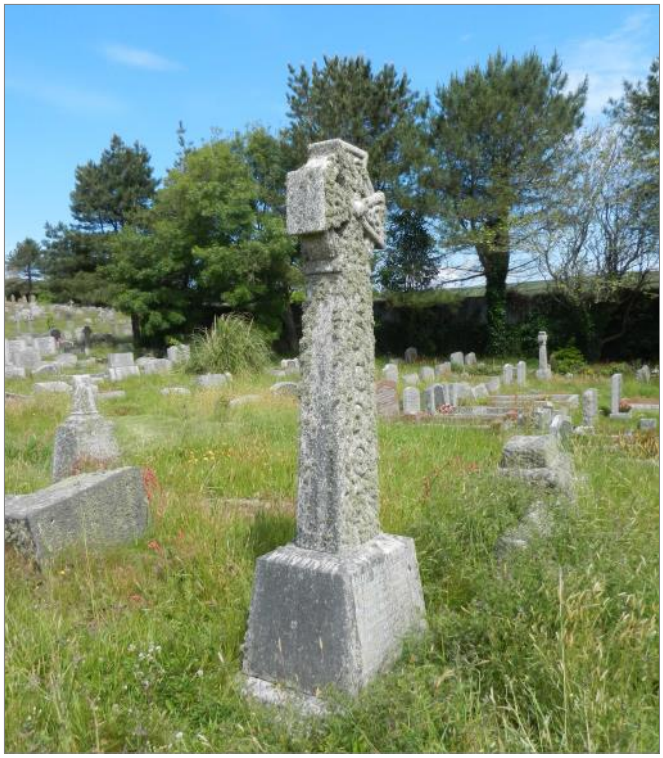

Fig. 4. Lichen-encrusted cross marking the grave of Robert William Essington and his wife Anne in the churchyard of St Columba's Church, St Columb Minor, Cornwall.

the National Provincial Bank.[4] The old church was largely demolished, apart from the tower (Fig. 2), and the new one, with Essington's name inscribed on its foundation stone is, according to Pevsner, "surprisingly grand, and in its dark stone somewhat forbidding" (Fig. 3).[5] An information board in the church describes Essington as being hugely influential in the life of the village in numerous other ways. On 11 January 1895, after 46 years as Vicar of Shenstone, he resigned the living as a consequence of illness, and was presented with his portrait painted by Henry Turner Munns of Birmingham, an illuminated address and many other gifts from his grateful parishioners.[6]

Towards the end of his life he lived at 'Plen', Newquay in Cornwall, and he died there on 18 July 1907; he was buried at St Columb Minor (Fig. 4), Newquay still being a part of that parish at the time. A brass plaque in Shenstone Church indicates that the lectern and the plaque itself were presented in his memory by "his old parishioners and other friends as a testimony of his good work at Shenstone".

Essington was the author of several publications, both under his own name, and pseudonymously as 'A Kingsman'.[7] He was a frequent correspondent to *The Times* and local newspapers, often expressing very decided opinions. He was also something of a poet: whilst still in Cambridge he won the 1846 Seatonian Prize for his sacred poem 'The Curse upon Canaan'.[8] Amongst his publications was a collection of verses (including hymns) and short pieces of prose entitled *Croes y Breila* which includes the two short poems "On a Dial in Shenstone Churchyard" and "On a Dial in front of Shenstone Vicarage", together with drawings of the sundials in question.[9]

Essington in *The Book of Sun-Dials*

The Rev. R.W. Essington makes several appearances in Mrs Gatty's *The Book of Sun-Dials*; in the 4th edition his first mention is in Chapter VII, in which some particular types of dial are described:

"*Cross dials have been revived of late years, and the Rev. R.W. Essington, late vicar of Shenstone, composed for one which he put up, some singularly beautiful and appropriate lines which will be found in the collection of mottoes. The shape is that of a Latin cross, placed slanting, so that the shadows from the angles fall on the sides where the hour lines are drawn, and no gnomon is needed.*"[10]

In the main part of the book, Gatty sets out the mottoes on three cross dials that were erected and inscribed by Essington: two in Shenstone and one in Newquay.

No. 1 – Shenstone Churchyard

In the penultimate chapter (the 54th!) of his book *The Annals of Shenstone* (entitled "The Vicar's Remains"!) Essington, who writes in the third person, says

"*When the Vicar looked round Shenstone on his arrival, he found many things in ruin, and among them a dial in the middle of the churchyard. The graceful shaft and steps, given by a lady many years before his time, were there, but the latter were overgrown with weeds and turf, and the former had neither gnomon nor plate. In fact it was a dial no longer.*"[11]

White's history of Staffordshire suggests that the sundial was originally erected by Rowland Fryth,[12] and, if this is the case, that would date the shaft to around the early eighteenth century. Essington considered replacing the missing dial plate by another horizontal dial, but feared that one made of good quality metal would be stolen, there having been recent thefts from the church. He decided instead to have a copy of a cross dial that was in the gardens belonging to his uncle and guardian William Wayte at Highlands. That sundial was clearly marked on the 1:2,500 Ordnance Survey map First and Second Editions. According to Essington, the Highlands cross dial was itself a copy of "a singular sun-dial" seen in Greece. His story is that:

"*... an architect, named Oakley, when he was employed to enlarge the house, had just returned from a visit to the monasteries at Athos, and having seen and admired a sundial of this sort there, he presented a copy of it to Mr Wayte, with whom he was connected by marriage.*"[13]

Essington placed his new marble cross dial on the old sandstone pedestal, the steps having been cleaned and repaired, and the upper surface was inscribed with a motto:

IF O'ER THE DIAL GLIDES A SHADE, REDEEM
THE TIME, FOR LO, IT PASSES LIKE A DREAM;
BUT IF 'TIS ALL A BLANK, THEN MARK THE LOSS
OF HOURS UNBLEST BY SHADOWS FROM THE CROSS.[14]

Fig. 5 shows the churchyard dial, with the partly demolished old church behind. Although the caption to this

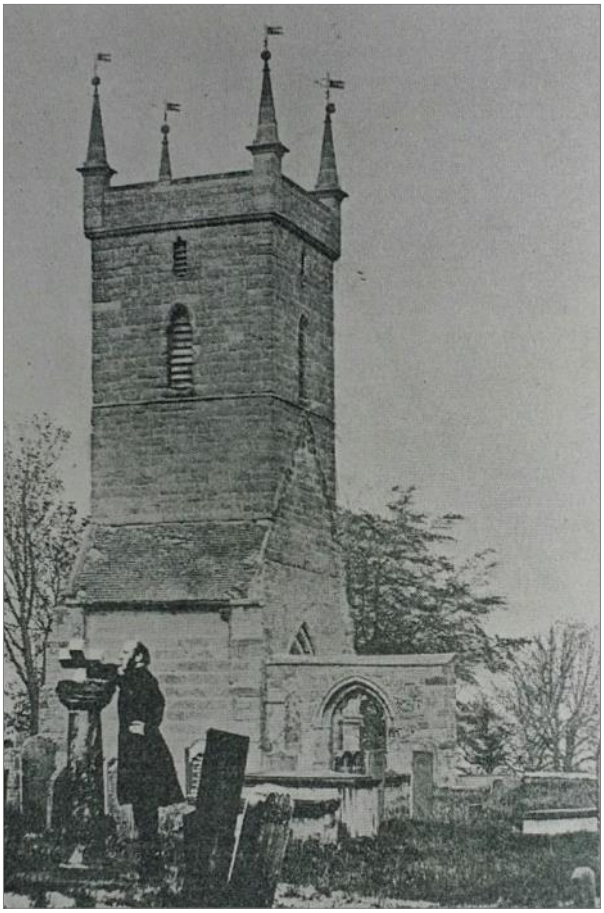

Fig. 5. The cross dial in Shenstone churchyard, with the partly-demolished original church behind. The gentleman in the photograph is thought to be Essington himself. (From the Annals of Shenstone.)

picture in *The Annals of Shenstone* gives the date as 1848 (the date quoted by Gatty), this seems unlikely unless services were being held in the church ruins at that time. It is believed that the figure may be Essington himself.

This is the only one of the three Essington dials in Gatty that appears in the Fixed Dial Register (SRN 2768), and it is now in very poor shape. Indeed, the dial itself is missing. The original red sandstone shaft still stands, damaged and badly eroded, with the broken pieces of the capital lying around it on the circular plinth (Figs 6 and 7).

No. 2 – Shenstone Vicarage

Although Gatty says that the Rev. R.W. Essington erected a second dial which he placed in the garden of Shenstone Vicarage (Fig. 8), Essington's version[15] in the *The Annals of Shenstone* is that it was erected by his wife and that it was similar to the restored churchyard dial, including the motto (not mentioned by Gatty).

There were some differences, however. At its foot there was a slate slab bearing inscriptions in Greek ὡραν διδωσι † ὀντος ἡλιου (the word σταῦρος, *a cross*, being supplied by †) and Hebrew יהי אוֹר meaning, respectively, *The cross gives the hour in sunshine* and *Let there be light*.[16]

For this dial, Essington composed the Latin motto mentioned in David Brown's article, and the words were

Fig. 6. All that remains of the churchyard sundial.

Fig. 7. Broken pieces of the capital.

Fig. 8. The cross dial in Shenstone Vicarage garden. (From The Book of Sun-Dials).

Fig. 9. The slate slab: all that remains of the dial that was originally in the vicarage garden.

inscribed round the top of the six-sided capital. In *The Annals of Shenstone* they appear as the two lines:

> Solis adit lux. Hic docet umbra crux. Datur hora.
> Umbram addit nox. Hinc abit umbrae vox. Abit hora.[17]

Essington goes on to explain:

"*It will be seen that these are two hexameters, when read together, and that each part is a motto by itself. It will also be observed that they rhyme. So when engraved on a hexagon, there are six mottoes in Latin.*"

At some point this second dial was removed from the vicarage garden and placed next to the metal gates at the top of the church drive; it was still there in the 1970s/1980s but by 2003 all that remained was in several pieces which were sent to a Birmingham stonemason for eventual repair. They languished there, the stoneyard closed, and pieces were lost.[18] The slate slab can, however, still be seen (Fig. 9).

No. 3 – Newquay

Gatty tells us that Essington set up a third cross dial in front of his house 'Plen', which was on Tolcarne Head, near Narrowcliff, Newquay. This was evidently before he left Shenstone in 1895, for it is referred to in the 3rd edition of *The Book of Sun-Dials* (published 1890).[19] It is described as standing on a pedestal formed from an old stone roller, with all the inscriptions from the two Shenstone dials. The verse was similar to the one he inscribed on the Shenstone churchyard dial, but altered, Gatty says, in order to explain how the hour lines are thrown by the shadows of the cross:

> THE HOURS ARE GRAVEN ROUND THE CROSS'S SIDES,
> AND ON THEM ALL IN TURN A SHADOW GLIDES;
> IF THE SUN SHINES, AND DRAWS A LINE, REDEEM
> THE TIME, FOR LO! IT PASSES LIKE A DREAM;
> BUT IF THE LINE BE ABSENT, MARK THE LOSS
> OF HOURS NOT RULED BY SHADOWS FROM THE CROSS.[20]

We are not told the exact wording of the Newquay version of the Latin motto, but there may be a clue from the poet Robert Browning (1812–89). It appears that a poem entitled "Inscription on an Ancient Cornish Sundial" and written on a single half-sheet of paper was, according to his daughter-in-law Fannie, found in Browning's blotter after his death. On the recto was a Latin motto "in an unidentified hand", and on the verso, Browning's translation. The manuscript is now in the Armstrong Browning Library in Waco, Texas, USA.[21] As we know that Essington had already erected his Newquay dial by 1890, and Browning died in 1889, it seems quite possible that the 'ancient sundial' was Essington's own. The lines were very like those on the Shenstone Vicarage dial:

> Solis adit lux
> Hic umbrâ docet crux
> Venit hora.
>
> Umbram addit nox
> Hinc abit umbrâ vox
> Abit hora.

No. 4 – Bath?

The cross dial in the Botanical Gardens, Bath looks very much like the pictures of the dials in Shenstone, with its hexagonal capital and circular plinth (Fig. 10). It has, as noted in David Brown's article, a motto that bears a remarkable resemblance to that on the Shenstone Vicarage dial:

> SOLIS ADIT LUX
> UMBRAM ADDIT CRUX
> DATUR HORA
> UMBRAM ADDIT NOX
> HINC ABIT UMBRAE VOX
> ABIT HORA

The inscription on the upper surface of the cross is more problematic, as much of it is badly eroded (Fig. 11). However, some of the words can be deciphered, and some familiar Essington phrases seen, such as THE HOURS ARE, OF HOURS NOT and FROM THE CROSS, so it begins to look as though Essington might have been involved in the design or erection of this dial in some way.

According to the 4th edition of 'Gatty', Essington moved to Newquay after leaving Shenstone,[22] but this is not the complete story, for Venn's *Alumni Cantabrigienses* records him as being "latterly" at 19 Marlborough Buildings (Fig. 12),[23] just a few yards from the eastern boundary of the Royal Victoria Park. He had resigned the living at Shenstone "crippled by rheumatism",[24] so perhaps he was hoping that the spa waters would alleviate the symptoms. He rented the house between 1895 and 1900[25] (although he spent at least one winter at his house in Newquay), and he became a well-known figure in Bath, taking an active part in the Bath Royal Literary and Scientific Institution, and contributing letters and articles to the *Bath & County Graphic*, and the *Bath Chronicle and Weekly Gazette.*

Fig. 10. Cross dial in the Botanical Gardens, Royal Victoria Park, Bath (SRN 7809).

Fig. 11. The inscription on the upper surface of the cross dial in the Botanical Gardens, Royal Victoria Park, Bath.

Amongst his articles in the *Chronicle* was one in the issue of 10 March 1898, entitled "Sundials", and signed by "R.W.E.". It occupies half a column, and begins

"*Bath is such a time honoured city, and has been, as it is still, so prosperous that one wonders it does not possess amongst its many attractions any conspicuous sundials*."

Although it briefly introduces the subject of sundials, the article is for the most part concerned with Essington's own cross dials at Shenstone and Newquay (although we are not told that they are his), and whether or not they appear in Mrs Gatty's book (which he describes as "charming"). R.W.E. concludes

"*And now for the motive for this article, which perhaps may have been guessed from the nature of its opening sentences. It is to express a hope that someone will present a sundial of this sort to our Victoria Park. Many visitors might be expected to take an interest in such an ornament as this would be. So the requisite permission would be readily obtained. There are sunny spots in all directions there. ... Of course the dial should be of Bath stone, which is unrivalled in excellence, and it should be erected by Bath masons. ... The cost need not exceed ten pounds*."

R.W.E.'s wish was granted, but not until 1900: on 13 September that year, the following appeared:

"*Some time ago we printed an article* [which] *attracted some notice, and a gentleman seemed disposed to give a sun-dial to the city; indeed, he expressed his intention to do so. This ambition, however, was not fulfilled. We are now enabled to state that the Committee which administers the Victorian* [sic] *Park and the Botanic Gardens with judicious care and unfailing courtesy has accepted another, which will be erected in the Garden*."

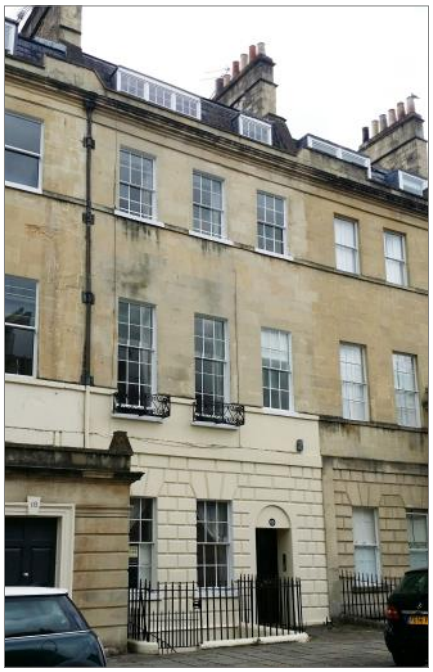

Fig. 12. No. 19 Marlborough Buildings, Bath.

For the final evidence that this is indeed one of Essington's cross dials we can turn again to the pages of the *Bath Chronicle and Weekly Gazette.* The edition of 18 October 1900 carried the following report, with its mention of a third inscription:

"The cross sundial in the Botanical Gardens is attracting attention. Certainly the invention, attributed to the monks of the Athos Promontory, is ingenious. The inscription on it is 'Aquis et hort solis hoc Essingtonus. D.D.D.M.D.C.C.C.C.' "[26]

On reading this, it seemed to me that another visit to the sundial was required, in order to search for this inscription. It turned out that it was to be found under a thick layer of moss and grime, round the octagonal base (Fig. 13).

References to the sundial continued to appear in the *Chronicle* from time to time. One such indicated that the sundial had suffered accidental damage[27] – a crack can be seen just above the base in Fig. 10 – but of more relevance

Fig. 13. The inscription round the eight sides of the base.

to this article were the correspondents[28] who provided the answer to the mystery of the inscription on the upper face. The complete verse appears to have been:

THE HOURS ARE ROUND THIS CROSS AND WHILE TIS FINE
THE TIME IS MEASURED BY A MOVING LINE
BUT IF THE SKY BE CLOUDED MARK THE LOSS
OF HOURS NOT RULED BY SHADOWS FROM THE CROSS

Postscript: Mr Hopcraft, Stonemason of Lichfield

Gatty says that the Rev. R.W. Essington "erected" or "put up" the Shenstone and Newquay cross dials, but according to Essington himself in his "R.W.E." article, a Mr Hopcraft, stonemason of Lichfield, was "concerned with" (the maker of?) all three. Hopcraft is known to be the maker of another cross dial with Essington's lines, which he donated to the City of Lichfield as part of the celebrations for the marriage of the future King George V and Queen Mary in July 1893 and which was placed in the museum gardens.[29]

It would be interesting to know how much direct input was provided by Essington and Hopcraft in the case of the other cross dials mentioned by Gatty as having variants of Essington's motto.[30]

ACKNOWLEDGEMENTS

Graham Birt and Bill Whitney in Shenstone Church; Shenstone Library for access to the rare book *The Annals of Shenstone*; Stephanie Adams of Bath Record Office, Jane Tutte of Newquay Old Cornwall Society & Newquay Heritage Archive and Museum; and David Brown for (indirectly) starting my interest in the Rev. R.W. Essington.

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16. Ref. 10, p.413.
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READER'S LETTER

More on the Shortest Day

I was delighted with Alastair Hunter's 'Study of the Shortest Day' in the June 2019 *Bulletin*. I have a brief comment on Alastair's text relating to the difference in length of the solar day, which, as he correctly says, is insignificant.

But he was not the first to make this comment. Around 150 AD, that astronomical genius, Claudius Ptolemy, wrote a whole chapter in Book III of the Almagest called "On the Inequality in the Days". The following is summarised from G.J. Toomer's translation (*Ptolemy's Almagest*, Princeton Press, 1998):

> … it seems appropriate to add a brief discussion of the subject of the inequality of the solar day. A grasp of this topic is a necessary prerequisite, since the mean motions which we tabulate for each body are all arranged on the simple system of equal increments, as if all solar days were of equal length.
>
> However, it can be seen that this is not so … for two reasons:
>
> > firstly, because of the sun's apparent anomaly;
> >
> > secondly, because equal sections of the ecliptic do not cross … the meridian in equal times.
>
> Neither of these effects causes a perceptible difference between the mean and the anomalistic return for a single solar day, but the accumulated difference over a number of solar days is quite noticeable …
>
> Neglect [of these effects] would perhaps produce no perceptible error in the computation of phenomena associated with the Sun or Planets: but, in the case of the Moon, since its speed is so great, the resulting error could no longer be overlooked …
>
> Both of these [effects] produce a maximum additive or subtractive effect, which is composed of …
>
> … about 3 2/3° due to the effect of the Solar Anomaly …
>
> … about 4 2/3° due to the variation in the time of Meridian crossing …

In this quotation,

1. "simple system of equal increments" – classical astronomers were used to working in what we would now call mean time.
2. the first reason – the "sun's apparent anomaly" – refers to the Greeks' understanding of the Sun's movement in the Ecliptic, which was based on the epicyclic theory rather than Kepler's elliptical theory. This – in modern terms – describes the EoT's Eccentricity Effect.
3. the second reason – "equal sections of the ecliptic do not cross … the meridian in equal times" – exactly describes the EoT's Obliquity Effect.
4. "maximum additive or subtractive effect" is magnitude of the two EoT effects – which, computed in modern terms, are 3.83° (the maximum effect of the Solar Anomaly) and 4.93° (the effect of the Meridian crossing). Using Harry von Ghent's Almagest Ephemeris Calculator (*http://www.staff.science.uu.nl/~gent0113/astro/almagestephemeris.htm*), Ptolemy's estimations of the Equation of Time were within 2 minutes of modern calculations.

If we take the actual date and times of the Full Moon in 2019 and calculate length of the lunar month in both mean days and solar days and find the difference, we get:

Mean Days	Solar Days	Difference in Minutes
29.4417	29.4398	2.6
29.4514	29.4558	−6.3
29.3951	29.4009	−8.3
29.4160	29.4179	−2.8
29.4722	29.4691	4.4
29.5472	29.5436	5.2
29.6194	29.6205	−1.5
29.6694	29.6756	−8.9
29.6910	29.6975	−9.4
29.6437	29.6453	−2.2
29.6507	29.6441	9.5

The difference in minutes is effectively the sum of the daily changes in the EoT over that lunar month.

I find it extraordinary that – without the means to measure these differences directly – Ptolemy was able to predict them in both physical and computational terms with such precision.

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IN THE FOOTSTEPS OF THOMAS ROSS
Part 28: The Lee Castle Sundial

DENNIS COWAN

After a lecture on sundials by BSS member Kevin Karney back in 2015 in Kelso in the Scottish Borders, Kevin got in touch and advised me that a member of the audience had a sundial that he wished someone to see. A couple of months later I made arrangements with the owner, Michael Turner, to see the sundial, which was located at his house in Leitholm around ten miles from Kelso.

It turned out that the shape of the sundial, a rhombic dodecahedron with all the faces being sunken, was one that I had not come across before. As its name implies, it was a twelve-sided polyhedron but with each face being a sunken diamond shape (Fig. 1). Its overall size was 13 inches wide, 14 inches deep and 17 inches high. Each sunken shape, which was around 10 inches by 6½ inches, was a sundial in its own right and there were Arabic numerals throughout (Fig. 2).

Unfortunately, the pedestal and finial were missing and all of the gnomons had gone, leaving only their roots. Most of the hour lines were still visible, though.

Michael said that his father was a collector of 'things' and that he had acquired the sundial in the late 1970s when he lived at Kinellar House in Aberdeenshire, but he said that he did not think that it was original to that area.

After some discussion, I advised him that if he wished to sell it, Bonhams held an annual Scottish sale in Edinburgh, and that it should fit in well there. Subsequently he entered it into this sale in 2017 but unfortunately it failed to sell. However, it did find a buyer a couple of months later in a 'Home and Interiors' sale at the same auction house for £312, including buyer's premium. I must admit I was disappointed, as I had thought that it was worth much more than that.

Fig. 1. The Leitholm sundial.

But what has this to do with Thomas Ross? I didn't realise it at the time, but I later found that Ross had identified a

Fig. 2. Detail of the Leitholm sundial showing the hour lines and numerals.

Fig. 3. Ross's sketch of the Lee Castle sundial.

Fig. 4. Ross's second sketch of the Lee Castle sundial.

very similar sundial at Lee Castle in South Lanarkshire. In volume 5 of *The Castellated and Domestic Architecture of Scotland*,[1] he said:

"*This capital lion-supported sundial* [Fig. 3] *stands within a short distance of the castle. The lion carries an enriched cartouch* [sic]*, on which is the Lock Heart, the origin of the cognomen of the family of Lockhart of Lee, and on its head the facetted dial-stone is skilfully poised* [Fig. 4]".

Looking at Figs 3 and 4, it seemed to me that the Lee Castle sundial bore a remarkable resemblance to the one at Leitholm. Could it be that they were one and the same? If the sundial was still at Lee Castle, then that would rule that out. I had to find out.

Lee Castle and the associated estate has been owned since 2004 by an absentee American, but I was able to contact the estate manager who said that it would not be possible to arrange a visit, but he did say that there was no sundial present at the house or gardens. This was confirmed by the Historic Environment Scotland website[2] which stated, "A stone lion, a former sundial, stands in a shrub bed on the gravel approach to the house."

A 'former' sundial, so I presumed that the sundial part was missing, and Ross had said that the sundial was supported by a lion. That confirmed it for me – it was highly likely that the sundial at Leitholm (before it was sold at auction) and the sundial formerly at Lee Castle were one and the same. Michael Turner's father must have acquired it. I was feeling very pleased with myself.

But the story doesn't end there. A few weeks later, I was browsing Anne Somerville's notes[3] when I read her comments about the visit that she and Andrew made to Lee Castle in 1984. She wrote, "the lion was there in the centre of the rockery in front of the house, but the young mistress of the house knew nothing of any associated sundial. Andrew and I, standing at either end of the rockery, said almost immediately: 'How about this?' The block had been divided in two, and flowering plants now trailed from the hollows!"

So my well worked out theory was totally wrong. The sundial, albeit in pieces, existed at Lee Castle in 1984 after Michael Turner's father acquired his one in the 1970s. The estate manager at Lee Castle could have been wrong when he said that there was no sundial there. It may not have been recognised as such by him, just like the mistress of the house at the time of the Somervilles' visit. In any case, there was no sign of a break or crack on the Leitholm sundial. It was totally in one piece so they could not be one and the same.

However, they were so similar, perhaps even identical, that they were most probably made by the same person.

It just shows that when all the available evidence backs a particular theory, there may be another piece of evidence just round the corner which throws it all into the air! I just hope that at some time in the future I will be able to visit Lee Castle to see for myself if the two parts of the sundial block are still present in the rockery.

ACKNOWLEDGEMENTS

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Spot the Sundial

It is a common enough experience. A client expresses interest in a sundial. You check out the site. It is immediately obvious that the intended spot is overlooked by neighbouring buildings or tall trees. The client isn't put off: "Maybe we could place the dial high up on my front wall?" You agree. The project goes ahead.

I came across an extreme version of this while attending the recent NASS Conference in Denver, Colorado. Fig. 1 shows the Alfred A. Arraj United States Courthouse which stands at the intersection of Champa Street and 19th Street. It was just a few blocks from the Conference Hotel and I went to see it several times. Can you spot the sundial?

Fig. 1. The Alfred A. Arraj Courthouse, Denver.

The tallest part of the building is the elevator tower whose top is about 245 feet above the ground. The external cladding appears to be brickwork but, if so, the bricks are about one foot long, which is much larger than standard U.S. bricks (about 8" between vertical joints). The sundial (Fig. 2) is on the broad south-east face of the top and can be seen clearly only with the aid of a zoom lens or a telescope. It is described in a website[1] about the building.

Using the Google Earth ruler, the sundial is estimated to be about 38 feet wide and 19 feet high. The dial furniture seems to be made from stainless steel strips which have been fastened to the surface. The hour lines are ornamented with circular buttons at approximately 3" intervals. The equinoctial line and the solstice curves are plain, as are the hour numbers. There is a very small gnomon whose tip serves as the nodus. The photograph in Fig. 2 was taken on 24 June, three days after the summer solstice, and the shadow extends just an inch or two beyond the solstice curve. One may safely assume that few people will have noticed.

Fig. 2. Close-up of the sundial.

Some readers may wonder about the absence of a horizon line. Careful inspection reveals that the upper ends of the equinoctial line and the two solstice curves are on the same horizontal level. This suggests an implicit horizon line which, perhaps by chance, coincides with a joint between two courses of brickwork.

The geographical coordinates are 39° 45′ 0.1″ N, 104° 59′ 24.4″ W which is just a little to the east of the reference meridian for Mountain Time, 105° W. The photograph was taken about 09:45 local apparent sun time and the time indicated by the sundial must be very close to this.

A fellow diallist[2] who read a draft version of this text asked whether the shadow of the gnomon could ever reach the 3 pm hour line. The website notes that the dial declines 48.08° east, so the afternoon sun aligns with the wall when its azimuth is 221.92°. By calculation, the solar azimuth is always greater than this value at 3 pm though it is only 0.076° (or 4.6′) too much on the day of the winter solstice when the solar azimuth is about 221.996°. The solar disc is about 32′ across so a keen observer might see the outer extremity of the penumbral shadow of the gnomon fall across the 3 pm hour line.

The building is said to be the one of the first green courthouses in the U.S. and it has numerous solar panels to power its services. Incorporating a solar-powered clock in the design is no doubt another way of demonstrating its green credentials.

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Frank King

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