

# A MYSTERY WELSH HORIZONTAL DIAL

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This article is based on a presentation made at the 2012 BSS Newbury meeting.

This sundial (Figs 1, 2 and 3) has almost everything you could wish for in terms of furniture. Despite being only 252 mm (nominally 10") in diameter it has a complex compass rose, an EoT scale which includes the zodiac calendar, a timescale delineated to 1-minute by means of transversals, a set of geographical locations, a coat of arms and a name. Since it went through a number of auction houses in London its provenance is lost, but as it is dated (1775) and carries such a wealth of clues, the mystery of its origins was, I felt sure, solvable.



Fig. 1. Three-quarter view of the Hughes of Bryngola sundial.

The most obvious clues to the dial's origins are the name and coat of arms at the south of the plate (Fig. 4). This is where you might expect to find the signature of the maker but "William Hughes Bryngola Esq<sup>r</sup>." does not sound right for an artisan and no maker of that name is recorded. A few investigations quickly showed that Bryngola is a parish on the island of Anglesey, North Wales, in the locality of Llangwyllog, and that the Hughes family were prominent residents there in the 18th and 19th centuries. Thus it seems that it was William Hughes of Bryngola that commissioned the dial in 1775. The church of St Cwyllog in Llangwyllog has a number of 18th-century memorials for the family including the one shown in Fig. 5 which shows a William Hughes dying in 1793 and who is thus likely to be the dial owner as his son, also William, died much earlier. William Hughes was the son of Rowland Hughes of Lligwy (bt. 1702–1762)<sup>1</sup> who is described as "owner of Bryngola"



Fig. 2. Plan view of the dial, dusted in talc to emphasize the engraving.



Fig. 3. Profile of the gnomon. Note also the thick dial-plate.

– perhaps meaning he built it. Together with his wife Margaret Griffith, they had a daughter Mary who married a Dr Hugh Wynne of Chwaen Ddu (bt. 1760–1841) who was coroner of Anglesey for 47 years and described as "of Bryngola".<sup>2</sup> It is possible this marriage had some influence on the coat of arms (see below).

It is worth noting that another dial is known which is dated 1802 and was made for a William Hughes in North Wales: its maker is unknown.<sup>3</sup>

It might be thought that the coat of arms (*argent, a chevron gules between two dolphins and three fleurs-de-lys*) would be easily traceable to the Hughes family.



Fig. 4. The coat of arms and signature, with date and motto.



Fig. 5. Memorial to members of the Hughes family in the church of St Cwyllog, Llangwyllog.

The accompanying motto:

VIA TRITA VIA TUTA  
(The beaten path is the safe path)

is a well-known Roman proverb but is very little used in heraldry. However, neither it nor the arms are officially recorded for the Hughes family.

Welsh heraldry is different to and more complex than that of England and is mainly based on the semi-mythical Fifteen Noble Tribes of the northern areas of the country, dating back to the pre-Conquest period.<sup>4</sup> The arms on the dial incorporate the features of the fifth Noble Tribe (*a chevron between three fleurs-de-lys*) which has been used by other Hughes families in Brecon and in Monmouthshire, synthesized with the addition of the dolphins included by the Wynne family (another family in the northwest corner of Wales) on their arms. It would not be the first time that Welsh families fabricated a coat of arms for themselves.<sup>5</sup>

### The Back of the Dial

The dial is very substantial: it has a thickness in the range 9.3 to 10.6 mm – a nominal 3/8" – and weighs 4.33 kg. The back of the dial (Fig. 6) is most informative. The first thing that is noticed is the set of engraved concentric circles, arranged in groups of 10 and 6, which are presumed to be a practice layout. Next, the ends of the gnomon tenons are visible but instead of being hammered over to retain them, they have been split along their length and then metal

wedges driven in to spread the sides of the tenons so that they grip the inside of the mortice slots, which they still do very firmly. This is a technique which is rare on sundials but is quite common in woodwork and sometimes used by clockmakers.

Also visible on the back of the dial is a set of three blind-tapped holes for the inverted bolts which would have held the dial to the top of the pedestal, using large heads set in wet cement. Two of the holes still contain the sheared-off stubs of the bolts but the third was measured to be of a size just slightly smaller than 4 BA.

The most important feature of the rear of the dial is the single word "Owen" which is engraved near the centre (Fig. 6 insert). It would be easy to jump to the conclusion that this is the signature of the dialmaker but I have another suggestion. The Owen dynasty of Llanrwst, on the Welsh mainland but not far to the east of Anglesey, are renowned as perhaps the most important Welsh clockmakers of the 18th and 19th centuries.<sup>6</sup> The founder of the dynasty was John Owen (1719–96) and their prolific output was based on the use of components such as movements, hands and dials, imported from other centres, notably the Lancashire clockmaking area around Prescott, St Helens and Warrington which, although near Liverpool, is not very far from Llanrwst. Thus, a jobbing engraver at one of these centres probably engraved the Bryngola sundial as a part of a commission which John Owen had undertaken and would complete with a gnomon cast by another of his suppliers. The engraver would have written Owen's name on the back of the dial to identify it from other dials in the workshop.

A study of the engraving styles to be found on Owen clocks has been published<sup>7</sup> and has identified in particular "The Good Engraver" on account of the quality of his work. The most important example of this is the so-called Titley



Fig. 6. The back of the dial. Inset: a close-up of the gnomon tenons and the name "Owen".

longcase clock, named after the doctor and surgeon Peter Titley who commissioned it around 1772, just three years before the Bryngola sundial. The clock, auctioned in 2009,<sup>8</sup> features a superb silvered dial-plate which is an unusually thick quarter of an inch and weighs 4.28 kg. At the top of the plate (Fig. 7) is a beautifully engraved coat of arms for the thirteenth Noble Tribe of Wales (*argent, a chevron sable between three boars' heads coupéd the second*). The suggestion that the Bryngola sundial came from the same workshop cannot be proved but it certainly seems feasible.



Fig. 7. The dial of the Titley clock by John Owen, attributed to "The Good Engraver". Photo courtesy of C. Brown.

### Transversals

The use of transversals (Fig. 8), sometimes called diagonal scales, on astronomical instruments as a way of magnifying circular scales to allow a finer resolution, in a manner similar to a vernier, goes back a long way.<sup>9</sup> It is thought that they were first introduced on sundials – where they are not quite mathematically exact – by John Rowley on dials he is believed to have supplied to Thomas Tompion at the very end of the 17th century. They enjoyed a brief popularity amongst some of the best London mathematical instrument makers and then have reappeared sporadically in later centuries.

One of the provincial makers who picked up on the idea of transversals was Henry Sephton (1686–1756),<sup>10</sup> a Liverpool



Fig. 8. Close-up of the dial-plate showing the transversals and the geographic place-names.

architect who designed and/or supplied several dials for the large houses of the area, including at least one double horizontal dial.<sup>11</sup> This dial, dated 1722, is 'signed' on the back "H Sephton W. Derby" in a similar manner to the "Owen" on the back of the Bryngola dial. A second double horizontal dial with transversals, unsigned but very probably due to Sephton, is at Knowsley Park, originally part of the famous estate of Lord Derby and then home to the Prescott Museum, housing a permanent exhibition of the history of clockmaking in the town.

The Sephton dials are about half a century earlier than the Bryngola one but there are strong signs that a capability for dial-making had been established amongst the engravers in Prescott and the tradition carried on long afterwards. It is noticeable that the main Roman numerals of the Bryngola dial are inward-facing, a style which was totally obsolete in London by 1775 but which had been used on the Sephton dials.

Slightly later still, around 1799, another Liverpool clockmaker, Thomas Harrison, supplied a sundial which included transversals and inward-facing numerals to a Mrs Piozzi for her house in Wales.<sup>12</sup> Harrison's workshop in Finney's Lane had previously belonged to Joseph Finney who was both a clockmaker and an architect.<sup>13</sup> Thus it seems that there was a distinct cluster of dials coming from the Liverpool area which can be traced back to the style developed by John Rowley nearly a century earlier.

### Geography

The Bryngola dial features a set of worldwide place-names in the chapter ring with small marks against the timescale which allow their times of noon, in Anglesey solar time, to be read to a minute (Fig. 8). The list of place-names and their times are given in Table 1. The time offsets from local noon can be converted into the supposed longitudes of the places which helps to locate the more unfamiliar names.

For example, the ‘Grand Rivr’ is the Amazon, ‘Pequ’ is probably Pegu near Rangoon and ‘C St Lucia’ is thought to be Cabo san Lucas in the Mexico/California region.<sup>14</sup> Several of the other names such as ‘Jaquita’, ‘Desolation Is’ and ‘Panuco’ remain as interesting challenges for readers.

The longitudes of many places would have only been known approximately when the dial was made. However, the presence of astronomical observatories means that the times of noon of London (11:43.5) and Dublin (12:10) are likely to be accurate enough to allow the design longitude for the dial to be reverse engineered. The value, 4° 7.5' W, is a reasonable match to the true value of 4° 21' W. The latitude of 53° 17' is also close to the measured gnomon angle of 53.5° so it is clear that the dial really was made for Anglesey.

### Metallurgy

The composition of the Bryngola dial was analyzed by X-ray fluorescence (XRF). For the most reliable readings, a small area on the back of the dial was cleaned of all the patina using a small abrasive rubber cone rotating at high speed, leaving a bright ‘brassy’ surface: other measurements were also made on the front of the (uncleaned) dial and on the gnomon. The results are shown in Table 2. As expected, the material is basically a leaded brass with a medium level of zinc. The amount of lead (Pb) is quite high and partially explains the significant weight of what is a medium-sized dial. The reason for this high level would have been to improve the flow of the molten alloy – both the dial-plate and the gnomon were almost certainly cast and then the surface scraped flat, rather than hammered into a thin sheet.

There is a marked difference in the lead level between the back and the front of the dial-plate. Whilst part of this difference might be due to the weathering of the front surface, producing the observed dark patina and an accompanying ‘dezincification’, a bigger factor is likely to be the segregation of the lead which is rejected by advancing the solidification front as the molten alloy solidifies in a horizontal mould. This is the process which is employed in zone refining of high-purity materials.

Location	Cu	Zn	Sn	Pb	Ni	Fe	As	Others/Comments
Back, cleaned	75.7	20.1	0.2	2.9	nd	0.9	0.2	
Back, uncleaned	77.6	18.5	0.2	2.2	nd	1.3	0.2	
Front, uncleaned	75.7	11.2	0.2	10.3	nd	1.9	0.6	Bi 0.24
Gnomon, East	78.8	11.7	0.2	7.3	nd	1.8	0.2	
Gnomon, West	74.7	16.4	nd	7.2	nd	1.7	nd	

Table 2. Composition of the Bryngola dial (in wt.%, rounded to one place of decimals) as measured by XRF by the author using an Olympus Innov-X Alpha 2000 analyser with a 60 second sampling time and used in its ‘Analytical’ mode. The instrument was cross-calibrated against a set of CHARM (Cultural Heritage Alloy Reference Materials) test specimens with a representative range of trace elements in a copper-alloy matrix.<sup>15</sup> nd = not detected.

EAST		WEST	
12:00	NOON	03:53	Manilla
12:10	Dublin	04:17	Pekin
12:50	Goree	04:39	Tonquin
13:17	St Michael I	05:15	Pequ
~13:45	Flores I	05:32	Bengal
~14:15	Jaquita	06:21	F St George
~14:45	Desolation I	06:49	Cinde Rr
~15:15	Grand Rivr	07:12	Cinde Rr
15:46	Martinico	08:13	Cape Glate
~16:10	Boston	08:21	Ispahan
~16:25	Williamsburg	08:47	Macca
16:49	Havanna	09:15	Damascus
17:19	N Orleans	09:46	Constantinople
17:44	Panuco	10:17	Warsaw
18:19	Aquaputco	10:44	Rome
18:41	C St Lucia	11:21	Lyons
19:11	St Clemet I	11:42	London
~20:15	C St Sebastian	12:00	NOON

Table 1. Place-names on the Bryngola dial.

The gnomon is of a very similar alloy to the dial-plate and was probably cast at the same time. There is no apparent segregation of the lead between the east and west faces: the value is midway between the levels of the front and the back of the dial-plate. This is likely to be due to the much faster solidification of the openwork gnomon, freezing-in the lead from the melt.

The level of iron (Fe), an unwanted but ubiquitous impurity in brasses until electrolytically-refined copper became available, is typical for the 18th century, as is the trace of arsenic (As).

## Conclusion

The dial is an excellent example of late 18th century provincial dialmaking and strengthens the links between clockmaking and dialmaking as well as shining light on the outsourcing methods then in use. It hints at the presence of a 'Liverpool school' of engraved dials lasting throughout most of the 18th century.

## ACKNOWLEDGEMENTS

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## REFERENCES and NOTES

1. bt. means 'baptised'.
2. J.E. Griffith: *Pedigrees of Anglesey and Caernarvonshire Families*, Bridge Books, Horncastle (1914). I am grateful to Irene Brightmer for this information.
3. Colin Brown, personal communication.
4. [www.theheraldrysociety.com/articles/wales/arms\\_of\\_the\\_xv\\_noble\\_tribes.htm](http://www.theheraldrysociety.com/articles/wales/arms_of_the_xv_noble_tribes.htm)
5. I am grateful to John Allen for assistance with the heraldry.
6. C. Brown and M. Brown: *The Clockmakers of Llanrwst – pre-industrial clockmaking in a Welsh market town*, Bridge Books, Wrexham (2002).
7. W. Linnard: '“Occasion's Bald Behind”: A neoclassical dial by John Owen of Llanrwst', *Antiquarian Horology*, 29(3), 359–70 (March 2006).
8. <http://writeantiques.com/antique-clocks-by-a-welsh-family-that-rival-the-best-in-the-world/>
9. J. Davis: 'Thomas Wright's horizontal sundials', *BSS Bull.* 16(iv), 135–143 (December 2004).
10. I. Brightmer: 'Henry Sephton – architect, mason and diallist', *BSS Bull.*, 22(iii) 46–52 (September 2010).
11. J. Davis and M. Lowne: *The Double Horizontal Dial and associated instruments*, BSS Monograph No. 5 (2010). The Henry Sephton DH dials are DH-64 and DH-65 (attrib.).
12. Irene Brightmer, personal communication. The dial is recorded in the BSS Fixed Dial Register as SRN 7873. See item 10 on p. 35 of this issue.
13. Joseph Finney I (1708–72) was primarily known for his complicated astronomical and musical clocks as well as being an architect. He was made a Freeman of Liverpool in 1732 and was succeeded by his son, Joseph II (w. 1770–96).
14. I am grateful to John Foad for consulting his database to provide these identifications.
15. A. Heginbotham, J. Bassett, D. Bourgarit, C. Eveleigh, L. Glinesman, D. Hook, D. Smith, R.J. Speakman, A. Shugar and R. van Langh: 'The Copper CHARM Set: a New Set of Certified Reference Materials for the Standardization of Quantitative X-ray Fluorescence Analysis of Heritage Copper Alloys', *Archaeometry*, doi: 10.1111/arcm.12117 (2014).

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## Postcard Potpourri 35

### The High Hall, Steeton, Keighley, West Yorkshire

Peter Ransom

An impressive horizontal dial that is not listed in the BSS Register, possibly because it may no longer exist. Perhaps someone in the area could do some investigation to see if anything remains. The gardens are open under the National Gardens Scheme in 2016 on 19 June and 24 July, so an interesting visit for those in the area!

There are many pictures of The High Hall at <http://www.steeton.net/gallery2.html> and they include one which shows Alexander Keighley with the giant sundial and it is clear on that picture that the motto on the dial is SUMMER TIME with the initials A.K. and date 1934. So perhaps Alex Keighley is the man who is responsible for the dial. Alex Keighley (1861–1947), the son of Joseph Keighley, a wealthy worsted manufacturer, was a pioneer in the pictorial movement in photography.

In 1934 the *Keighley News* reported that "Mr Alex Keighley had a compass stone and a sundial erected in his garden,



made from old millstones (probably 100 years old) from the Steeton Corn Mill".

The postcard is not dated and there is no mention of a publisher.

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