CAN SNOWDON BE SEEN FROM THE WREKIN? A TOPOGRAPHIC DETECTIVE STORY

David Squires

Abstract

In 1869, the Cotteswold Naturalists' Field Club visited the Wrekin. One of the party, Reverend Cobbold, read a humorous poem which pointed out some of the features that could be seen, and some that could not – including Snowdon. The Field Club was ahead of its time as many guide books and magazine articles dating back to the 1860s have claimed that Snowdon is visible from the Wrekin. This error has been persistent and widespread, and continues to be repeated, despite having being refuted in the last thirty years. This paper examines the origins of the myth, discusses whether it could ever be true, and explains how it was revealed that Snowdon is hidden from the Wrekin.

Hesba Stretton

In the first week of August, 1869, readers around Britain settled down to the latest edition of *Sunday at Home: A Family Magazine for Sabbath Reading*. Many will have turned eagerly to the first installment of the new story by Hesba Stretton (Fig. 1). The success of Stretton as a children's author, while no match for J.K. Rowling in our own day, was sensational enough. Her best-known work, *Jessica's First Prayer*, which sold over two million copies in her lifetime, was translated into fifteen languages and placed in all Russian schools by an executive order of the Tsar (Demers 2004).

Her new story, *Alone in London*, begins in a tiny newsagent in one of the narrow streets of London between Holborn and The Strand. The city is hot and stinking and old Oliver, the owner of the business, is reminiscing about his childhood in the Shropshire countryside with his sister Charlotte:

"Eh, Charlotte," said Oliver, after drawing a long and toilsome breath, "what would I give to be a-top of the Wrekin, seeing the sun set this evening! Many and many's the summer afternoon we've spent there when we were young, and all of us alive. Dost remember how many a mile of country we could see all round us, and how fresh the air blew across the thousands of green fields? Why, I saw Snowdon once, more than sixty miles off, when my eyes were young and it was a clear sunset."

Figure 1. Hesba Stretton

Alone in London became another best-seller. When printed as a book, it sold hundreds of thousands of copies. The idea that Snowdon could be seen from the Wrekin was given huge publicity when Stretton placed the claim in the opening chapter of her story.

A Summer Day on the Wrekin

Hesba Stretton was born and raised in the town of Wellington, near the Wrekin, and had five years earlier anonymously published an article in which

the Snowdon claim is discussed. '*A Summer Day on the Wrekin*' begins:

If love, and long acquaintance, and hundreds of livelong summer days spent upon the Wrekin in childhood were the only qualifications necessary for writing upon my proposed subject, no pen ought to run more readily than mine (Stretton 1864 p.603; see Lomax 2009 for confirmation that the author was Stretton).

Describing the view from the summit, she writes:

I am told that, at sunset in summer, when there is the clear shining which precedes rain, the loftiest peak of Snowdon stands out against the brightness of the western sky; but I am apt to find that the faint form I fixed upon as Snowdon begins to float away, or up in crimson glory, as the sun goes down (Stretton 1864 p.605).

It appears then that the fictional old Oliver's claim was based on an assertion that Stretton had heard locally. But it is interesting to note that despite her hundreds of summer days spent on the Wrekin, Stretton made no personal claim to have seen Snowdon clearly.

From fiction to fact

By 1870, the Snowdon claim had been transposed from fiction to fact with the publication of Murray's *Handbook for Shropshire, Cheshire and Lancashire*. That book includes the following description of what can be seen from the Wrekin:

The view is remarkably beautiful, embracing the whole of Shropshire, the ranges of Church Stretton, the Longmynd, and the Stiper Stones, the Welsh mountains, in which the Breidden, the Berwyns, and in the far distance Snowdon, are conspicuous… (Murray 1870 p.47).

Murray's guidebook assertion that Snowdon can be seen from the Wrekin must have provided the idea with a great fillip, and not only was Snowdon visible; it was conspicuous. Murray's Handbooks for Travellers were the most widely read and respected guidebooks in Britain through most of the nineteenth century, only being gradually eclipsed by the rival Baedeker Guides in the 1880s (Palmowski 2002 p.119).

After this, with publicity provided by Stretton and authority by Murray, we find the assertion that Snowdon is visible from the Wrekin in numerous magazine articles and guidebooks down to the present day (for example: Vale 1935 pp.80-82; Hogg 1975 p.117; Barker 1991).

Seventeen Counties

Another question that Wrekin authors have addressed is the number of counties to be seen from the summit. An early reference to this question is in a guidebook to the Great Western Railway published in 1860. This includes a short section on the attractions in the vicinity of the recently-opened Wellington station:

Wellington is the nearest station to the famed Shropshire mountain, the "Wrekin," which is 1,320 feet above the level of the sea. It is distant from the town about two miles. From the summit, which is occupied by an ancient fortification, seventeen counties may be seen; and in every direction the most extensive and magnificent prospects are open to the view (Measom 1860 p.526).

Like the Snowdon claim, the seventeen counties assertion has appeared in numerous guidebooks and magazine articles since 1860 and persists up to the present day. On the website answerbank (an online version of the traditional Notes and Queries format; see www.theanswerbank.co.uk) one contributor in June 2008 posed the question *'What are the seventeen counties that can be seen from the Wrekin in Shropshire?*'.

The seventeen counties claim migrated to the classroom and has been presented as fact in a number of school geography textbooks (for example: Blakiston 1884 p.146; Palgrave 1885 p.177; Mason 1881 p.85).

The Shell Guide to Viewpoints of England

A summary of the conventional wisdom can be found in *The Shell Guide to Viewpoints of England*,

published in 1975. One chapter of that work is devoted to the Wrekin. It enthusiastically sets out the key features of the view:

From its summit, at 1,334 feet, on a clear day you can see to the north-east Kinder Scout, 100 miles distant as the crow flies; to the north-west you can descry the summit of Snowdon, 120 miles distant; looking to the horizon full circle, your eye covers part at any rate of no fewer than seventeen counties. No other viewpoint in all England can match these figures (Hogg 1975 p.117).

But how much of this is true? And what is the original source of the information? It is with these questions that this article is concerned.

The Toposcope

Two years after the Shell Guide was published further illumination about the view from the Wrekin was provided by the Wellington Rotary Club in the form of a toposcope. The story of how it came to be built has been told by Cyril Smith (2005), the man whose inspiration it was, in a recent edition of the Rotarians publication *Rotabilia*.

In 1934, Smith was working as a junior civil engineer on the staff of the County Surveyor of Essex. The County Council had acquired an area of open space near Basildon, now known as Langdon Hills Country Park, under the Greenbelt scheme. One of the modest Essex hills provided a fine view of the Thames Estuary and Kent and it was decided to erect a view indicator. (A visit to Langdon Hills Country Park on 22 March 2009 revealed that although there is a plinth on One Tree Hill, the disc has been removed. The value of replacing the disc is questionable as almost all of the view is now obscured by vegetation).

In his office the project was known as the 'Toposcope' – a word unfamiliar to Smith, and which he had not seen in any dictionary. He wondered if it was the first time that the term had been used. (The second (1989) edition of the *The Oxford English Dictionary* traces the word toposcope back to 1907, when it appeared in *A New Pictorial and Descriptive Guide to Malvern* (Anon 1907). It was widely used to describe the indicator on Worcestershire Beacon, appearing, for example, on Edwardian postcards printed locally).

In January 1939, when Smith arrived in Wellington to take up a new position with Salop County Council, he could hardly wait to walk to the top of the Wrekin, and within the month he had made the pilgrimage to the summit. 'What a marvelous panorama!' he thought, as he stood atop the hill that bright Sunday morning. Truly, there was nothing in Essex to match it. Only one thing put a slight cloud over his enjoyment that day: he could not put a name to a single thing.

Suddenly, thinking back to his Essex days, the solution gripped him: a toposcope! It was the perfect place for one. That day Smith resolved that nothing would deflect him from his plan. There is little doubt a toposcope would have been erected on the summit in the 1940s had not world events intervened.

Meanwhile, Smith's career was progressing and in 1961 he was invited to join the Rotary Club of Wellington. He discussed the idea of a toposcope with fellow members, but it was felt that other projects were more worthy of the club's limited funds. Moreover the proposal raised vexing planning problems as there is a Bronze Age barrow at the summit. The project lay dormant. However, there was one man who shared Cyril's vision: Gerry Powell, who offered to design the toposcope should the project ever come to fruition.

In 1974 Smith, after many Rotary lunches, was invited to become President of the Club. This, he thought, was his chance. Now the Wellington Rotary Club swung into action: Gerry Powell designed the disc; Colin Hanley steered a route through the planning maze; Norman Quinn built the plinth, mostly with his own hands; and Ray Hall provided persistent leadership, overcoming all obstacles.

So in 1977, the year of the Queen's Silver Jubilee, Smith's dream was finally realised. The men of the Wellington Rotary Club stood on the summit and admired the toposcope (Fig. 2). No longer would there be any confusion about what could be seen, for there were all the objects of interest engraved on a metal disc: the Malvern Hills, Caer Caradoc, and in pride of place, the furthest point shown, SNOWDON 71m. The arm of the Archdeacon of Salop moved over the toposcope in serene blessing.

Figure 2. The newly engraved toposcope on the Wrekin in a picture from 1977. From left to right Rotarians Gerry Powell (designer), Cyril Smith (the man whose inspiration it was) and Ray Hall (whose persistent leadership overcame all obstacles).

Chris Jesty's Snowdon Panorama

The first hint that something was amiss came from a man who had spent the best part of a year of his life trying to resolve the question of what could be seen from the summit of Snowdon.

Snowdon has one of most far reaching and complex views of any mountain in the British Isles. While travellers' descriptions of what can be seen from the summit can be found as early as the eighteenth century, the first detailed attempt to resolve the question came in the form of a folding panorama some three feet long and seven inches high published by H.B. Biden in 1877.

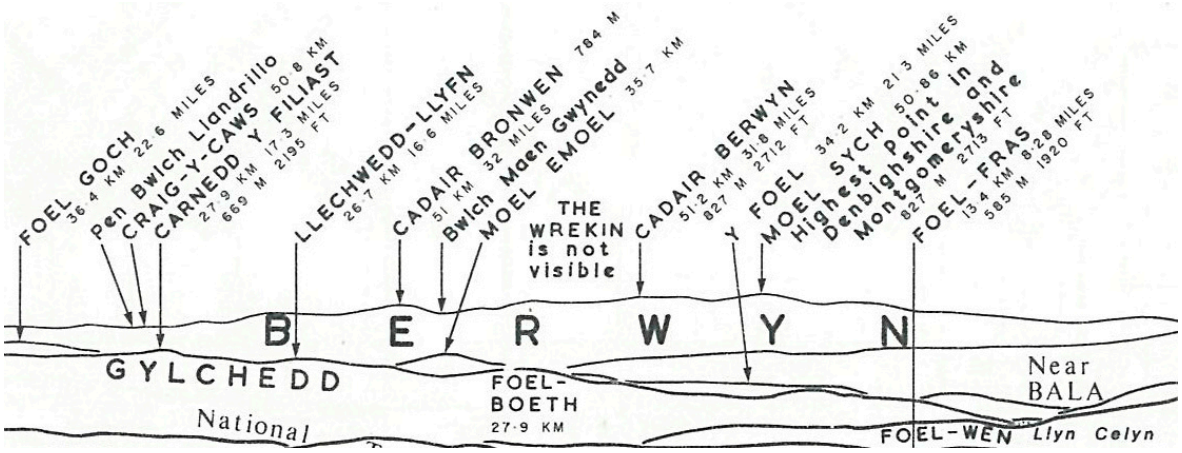

Figure 3. Detail from the 3rd edition of Chris Jesty's Snowdon panorama, published 1980

Biden's panorama, while a creditable effort to resolve an extremely complex view, had its limitations. The nest of peaks in the Lake District that can be seen from Snowdon was represented only by Scafell, drawn as what looked like an island rising from the sea. No hills in Lancashire or Derbyshire were shown. Forgivably, but still slightly disappointing, there was nothing on that fascinating and elusive portion of the view where, in conditions of exceptional visibility, the eye can sweep up more than 130 miles to reach Scotland.

It was clear then that work remained to be done, and the man who set himself this task in the early 1970s was Chris Jesty, who had previously worked in the Ordnance Survey. He laboured over the new panorama, repeatedly visiting the summit, asking bystanders to take photographs, sketching the view, poring over maps. For the most distant portions, which are almost always veiled with haze, he resorted to trigonometry. The first edition of the panorama, more than ten feet long and eight inches high, appeared in 1972. Not counting the time on the summit, it took him 1300 hours (Jesty 1974 p.18). The second edition took him a further 177 hours. Anyone who has studied the panorama must be impressed by the accuracy and tenacity of the man.

For the third edition, Jesty reluctantly abandoned the stencils and Letraset he had used in the earlier versions and added a number of notes in his own handwriting. It was in this third edition, published in 1980, that the hint comes that something was amiss with the line of sight between the Wrekin and Snowdon. Above Cadair Berwyn, in Jesty's unmistakable hand, appear the words: THE WREKIN is not visible (Fig. 3).

Ferranti's Viewfinders

The fatal blow came in 1995. In that year, the study of hill views in the British Isles was revolutionized when Jonathan de Ferranti launched his Viewfinder Panoramas. These computer generated images indicated the principal features to be seen from a hill in conditions of normal refraction. Initially, they were sold on laminated cards; Viewfinders were produced for more than a hundred different hills. Today, digital versions of these original Viewfinders are freely available on Ferranti's website (www.viewfinderpanoramas.org) and many more hills have been added both from the British Isles and elsewhere.

To anyone interested in hill views, these panoramas were a revelation. It was particularly interesting to compare Ferranti's panoramas with earlier work. Many claims about what could be seen from a particular summit had long been doubted, and now turned out to be true. On the other hand many no less plausible claims turned out to be false, or at least highly doubtful.

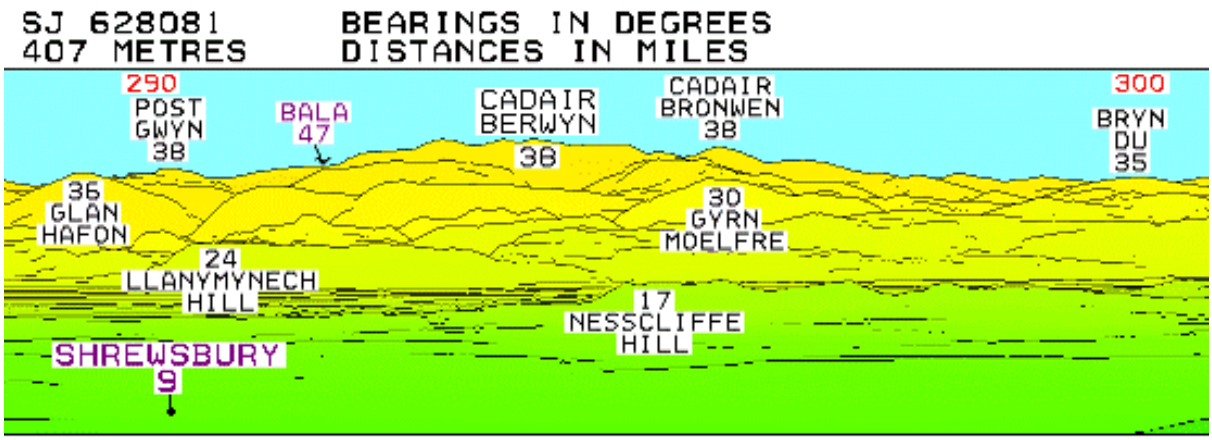

Figure 4. Detail from the Viewfinder for the Wrekin first published in 1995 showing the portion of the view between 290º and 300º. If the line of sight were not blocked, Snowdon would appear at 294º.

One of the casualties was Wrekin-Snowdon. Confirming Jesty's work, if one examines the Viewfinder for the Wrekin (Fig. 4) at the relevant place (294º), it can be seen that the line of sight to Snowdon is blocked by Cadair Berwyn, 38 miles away. It is like trying to see someone on the other side of a high wall.

Refraction

Readers may have noticed the caveat about Ferranti's Viewfinders applying in conditions of normal refraction and wonder whether this holds the key to the Snowdon mystery. Normally light rays bend slightly towards the earth because the air is denser near the earth's surface: this has the effect of slightly reducing the apparent curvature of the earth. In typical atmospheric conditions the curvature of the light ray is much less than the curvature of the earth, but the degree of refraction varies depending on a host of variables such as the temperature gradient, the terrain over which the ray passes, its average height above the ground, its length and so on. The degree of refraction can vary from hour to hour and day to day.

When refraction is greater than normal, this has the effect of reducing further the apparent curvature of the earth. This can pull into view hills which are not normally visible, more pertinently some which are not shown on Ferranti's Viewfinders. Journalist and mountaineer Tom Waghorn (1967 p.247) has written: 'It is never possible to be absolutely certain as to how far the apparent height of a distant object is affected by refraction and for this reason it is very unsafe to dogmatise as to whether any particular mountain can or can not be seen from any other'.

Does it follow that Jesty's comment that the Wrekin is not visible from Snowdon is unsafe or dogmatic?

Let us consider how much refraction would be required to bring Snowdon into view from the Wrekin. Figure 5 shows the terrain profile between the Wrekin and Snowdon in conditions of normal refraction. A ray of light leaving the summit of Snowdon is easily blocked by Cadair Berwyn, striking that hill about 1000 feet below its summit.

In Figure 6, the same profile is shown in conditions of extremely high refraction, in which the curvature of the light rays equals the curvature of the earth. These are known as 'flat earth' conditions since they

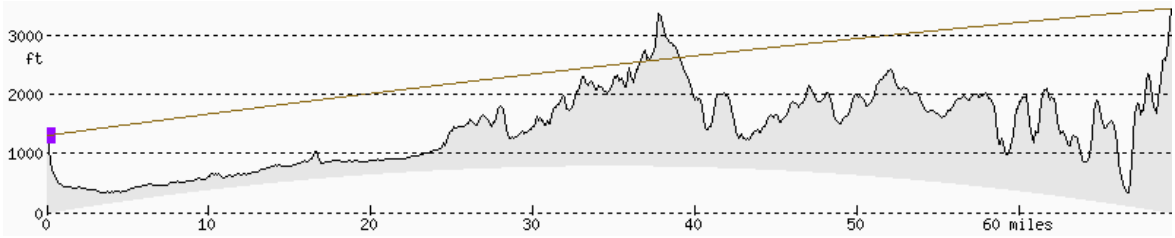

Figure 5. Terrain profile from the Wrekin (on the left) to Snowdon in conditions of normal refraction (refraction coefficient 0.07). Cadair Berwyn blocks the line of sight.

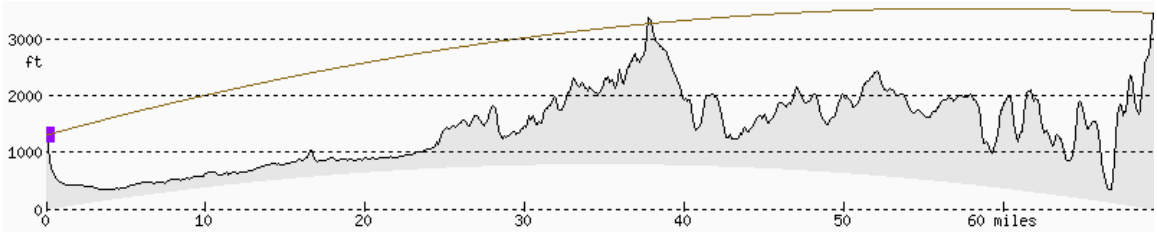

Figure 6. Terrain profile from Wrekin to Snowdon under extreme refraction flat earth conditions (refraction coefficient 0.50). Cadair Berwyn still blocks the line of sight.

have the effect of eliminating the apparent curvature of the earth. The line of sight is still blocked by Cadair Berwyn, striking that hill just below its summit.

What would be needed for the summit of Snowdon to come into view is for the curvature of the light ray to be *greater* than the curvature of the earth. This unusual situation, in which flat terrain appears to rise around the viewer like a saucer, has been observed for rays near the ground in certain parts of the world (Lehn and Sawatzky 1975 p. 120). Such conditions were encountered on occasion, for example, by British surveyors working on the plains of India during the nineteenth century trigonometrical survey of that country. They have also been recorded by surveyors in the arctic taking readings over ice fields.

But have they ever been encountered in Britain for long rays such as Wrekin-Snowdon? In this context, it is interesting to look back at the work done by the Ordnance Survey in this country. Variability of refraction was of considerable importance to the Survey because it could introduce uncertainty into computations as to the height of hills. A great deal of work was done measuring the so-called *refraction coefficient* (a measure of the extent of refraction of light rays). In the course of the first triangulation of the British Isles (1783-1853) the Survey made dozens of measurements of the refraction coefficient between different pairs of hills, at different times of day and in different meteorological conditions.

The conclusions of these investigations can be found in the official published accounts of their work. From 144 measurements, Clarke (1858 pp.542-550) reports averages of the refraction coefficient of 0.0809 for rays crossing the sea and 0.0750 for rays over land, with a range between 0.0320 and 0.1058. At an earlier stage in the survey, Mudge *et al.* (1801 pp.177-178) had measured a wider range of variability from zero to one third.

The refraction coefficient required for flat earth conditions is 0.5. On not a single occasion in seventy years did the Survey measure a refraction coefficient which was near that required to produce flat earth conditions, let alone one which could produce the saucer-shaped earth conditions needed to bring Snowdon into view.

(Some surveying textbooks adopt a different definition of the refraction coefficient from that used by the Ordnance Survey. Specifically, they define the refraction coefficient as the ratio between the radius of the light ray and the radius of the earth. To convert the numbers provided in the text to this alternative definition, it is necessary to multiply by 2 throughout (so that, for example, flat earth conditions are equivalent to a refraction coefficient of one). The website heywhatsthat.com which was used to create Figures 5 and 6 also uses this alternative definition.)

It is reasonable to suppose that hills which would be brought into view by a refraction coefficient within the range measured by the Ordnance Survey will from time to time be visible. However, where viewing a hill would require a refraction coefficient outside that range, it is natural to be skeptical that the hill has ever been observed. Further, the greater the refraction coefficient required, the greater the degree of skepticism.

Waghorn's warning (1967) about refraction is a wise note of caution for hills which could be pulled into view by a refraction coefficient within the range that has been measured in this country, but in a case such as Wrekin-Snowdon, the refraction coefficient required is so far beyond that range that it is, I suggest, neither unsafe nor dogmatic to conclude that Snowdon is not visible from the Wrekin (and vice versa).

The Two Conventions

If refraction cannot provide a solution to the Snowdon mystery, might there be another explanation, one which would apply at least to the toposcope if not the guidebooks?

In Britain, viewpoint indicators have been designed using two different conventions. Under the first convention only objects which can be seen on a clear day are included. This is the principle on which nearly all indicators on upland sites have been designed.

Under the second convention, the designer includes objects regardless of whether they are visible - the signpost at Land's End (Cornwall) pointing to John

O'Groats, New York etc. is a much-visited example. Another is seen on the Wye Crown Stone (2004) near the North Downs Way in Kent. The indicator includes an arrow to York some 210 miles away. While experience teaches that the potential for confusion on these matters is almost unlimited, it would be surprising if many have interpreted the Wye Crown Stone as a claim that York is visible from the North Downs. The purpose of the indicator, under this convention, is merely to provide directions rather than make any claim about visibility. This convention makes life much easier for the designer – no chilly hours on the summit waiting for the view to clear! No painful trigonometry! It does, however, have the disadvantage that it provides no information about what can be seen. Indeed, it risks positively misleading the walker if they mistakenly think that the other convention is being adopted. In one case, the famous indicator on Worcestershire Beacon, there is a warning note to avoid confusion:

NOTE

The names of those places that have been observed, are shewn thus – BREDON. Those which cannot be seen, or are uncertain thus – Plynlimmon.

It is admirable that, given his uncertainty about the visibility of some of the more distant hills, the designer of the Worcestershire Beacon toposcope let us know the limits of his knowledge. Read in the light of the explanatory note, the Worcestershire Beacon toposcope is perfectly accurate judged against Ferranti's Viewfinder of the hill. (Plynlimon, of which the designer was uncertain, turns out to be visible 66 miles away). Faced with uncertainty about whether a particular hill can be seen, designers adopting the first convention usually leave them off the dial. This was the cautious policy followed by James Parker (1936 p.111), one of the most prolific and accurate makers of indicators in Scotland.

As has been seen, the toposcope on the Wrekin includes Snowdon, which is not visible from the summit. There are at least two hypotheses as to how this arose. The designer may have accepted the conventional wisdom that Snowdon is visible and expected the toposcope to be understood as making this claim. Alternatively, he may have been aware that Snowdon was not visible but included it since the toposcope was being designed on the 'directional' convention.

Can one learn to live with the Wrekin toposcope as an unusual example of a 'directional' indicator on an upland site? It is a beguiling argument, which one can see would appeal to those who, for whatever reason, would prefer to leave the original design untouched.

The difficulty with this solution is that, as there is no Worcestershire Beacon style warning note, many have assumed that the places shown on the disc are visible. For example, the prolific Wrekin author George Evans (2004 p.8) refers to *'a toposcope erected by the local Rotary Club to celebrate the Queen's Jubilee. This incorporates a steel plate showing directions and distances to places you can view on a clear day'*. Another author on Wrekin related matters, Allan Frost (2007 p.48), refers to *'a brick cairn with a stainless steel toposcope (a diagram showing all places visible and their distances from the summit)'*.

It is clear that the Wrekin indicator misleads people. Here is an extract from Barker (1990):

Adjacent to the triangulation point is a toposcope, erected by the Rotary Club of Wellington to commemorate the 1977 Jubilee, indicating the directions and distances to the surrounding points of interest. On a clear day the 3560-feet summit of Snowdon is visible 70 miles away.

Does it matter?

Does it matter that the toposcope misleads people as to what can be seen? It can readily be conceded that, as topographic misinformation goes, it is hardly in the same league as the directions published by *Trail* magazine in 2004 on how to descend from the summit of Ben Nevis safely. In that case the unfortunate hill-walker who believed what they read would have spent their last moments rapidly descending some of Britain's highest cliffs (see *The Angry Corrie* May 2004 online at http://bubl.ac.uk/org/tacit/tac/tac61/thetrial.htm, for example).

But, while not even potentially fatal, the inclusion of Snowdon on the Wrekin toposcope does have consequences. In the same year that *Trail* published its infamous instructions I paid a visit to the Wrekin. It was 30 June and the day was warm and sunny, with excellent visibility from the summit. To the south one could see the sharp fin of Ysgyryd Fawr, 59 miles away and to the north the huge dome of Winter Hill, 66 miles distant. Just the sort of day, then, that one might think there was a chance of Snowdon – if one did not know any better.

Armed with a laminated Ferranti Viewfinder, I was in no danger of being led astray by the toposcope. But as I stood near it, a white-haired gentleman with a walking stick made his way up to the top. His progress was slow and it was clear that the ascent to the summit had cost him much effort. He reached the toposcope and, his eye caught by the word SNOWDON, immediately started to speculate with his companion as to whether that hill on the western horizon could be the Welsh giant. He peered and pointed with his stick; they tried to follow the line on the toposcope to the horizon; but – where was it? After a quarter of an hour or so he left the summit confused and a little troubled – were his eyes quite what they used to be? In some indefinable way, his visit to the famous viewpoint had been spoiled.

The other consequence of Snowdon's inclusion on the toposcope is to reinforce and sustain the myth of Snowdon's visibility. My research on the history of the claim revealed that the idea was nothing less than the accepted view, repeated in numerous books and magazine articles dating back to the 1860s. The toposcope was not an aberration but part of a pattern. While Snowdon's inclusion on the indicator was most likely the result of the existing misconception, it now helped to keep the myth alive, misleading writers and walkers in its turn.

Slowly I came to the view that something had to be done.

A letter to the Wellington Rotary Club

On 15 February 2009 I sent a letter to the Chairman of Wellington Rotary Club, referring to Ferranti's Viewfinder and saying that I thought the inclusion of Snowdon on the toposcope was misleading. Could I ask that the next time the disc was replaced, Snowdon be removed from the dial, or else it be clarified there that it is not visible?

As I did not receive a reply, I sent an email to the campaigning group All Friends Round The Wrekin, formed in 2004 to stop the sale of part of the hill. I explained the content of my letter to the Rotary Club. I received a reply from the author George Evans, not a Rotarian, but the chairman of the campaigning group. He thought that no change to the toposcope was required and we debated the question.

Allan Frost, who also thought the toposcope should be left untouched, added some comments on the exchange between myself and George Evans, and the whole correspondence was posted by the campaign group on their website (www.wrekinfriends.com). They helpfully drew my attention to an early Panoramic Chart from the summit of the Wrekin drawn by the Reverend Butt (Fig. 7).

The Shropshire Star intervenes

Somewhat to my surprise, a journalist at a local newspaper had noticed the correspondence which had been posted on the website and ran a news story on it:

Can you see Snowdon from The Wrekin?

Can you see Snowdon from the top of The Wrekin? That is the big question being considered by lovers of Shropshire's landmark hill. The debate is raging on the website All Friends Round The Wrekin after a critic poured scorn on the "misleading" toposcope at the summit. The metal disc, designed by the late Gerry Powell, was originally set on The Wrekin in 1977. It was replaced by Wellington Rotary Club in 2005 after it deteriorated.

It depicts landmarks, including the 3,561ft summit of Snowdon, at all points of the compass. But its accuracy has now been questioned by David Squires, who is carrying out research into long lines of sight in the British Isles. He said on a recent visit to the summit of The Wrekin that he found the toposcope very useful.

"However, I notice Snowdon (71 miles)

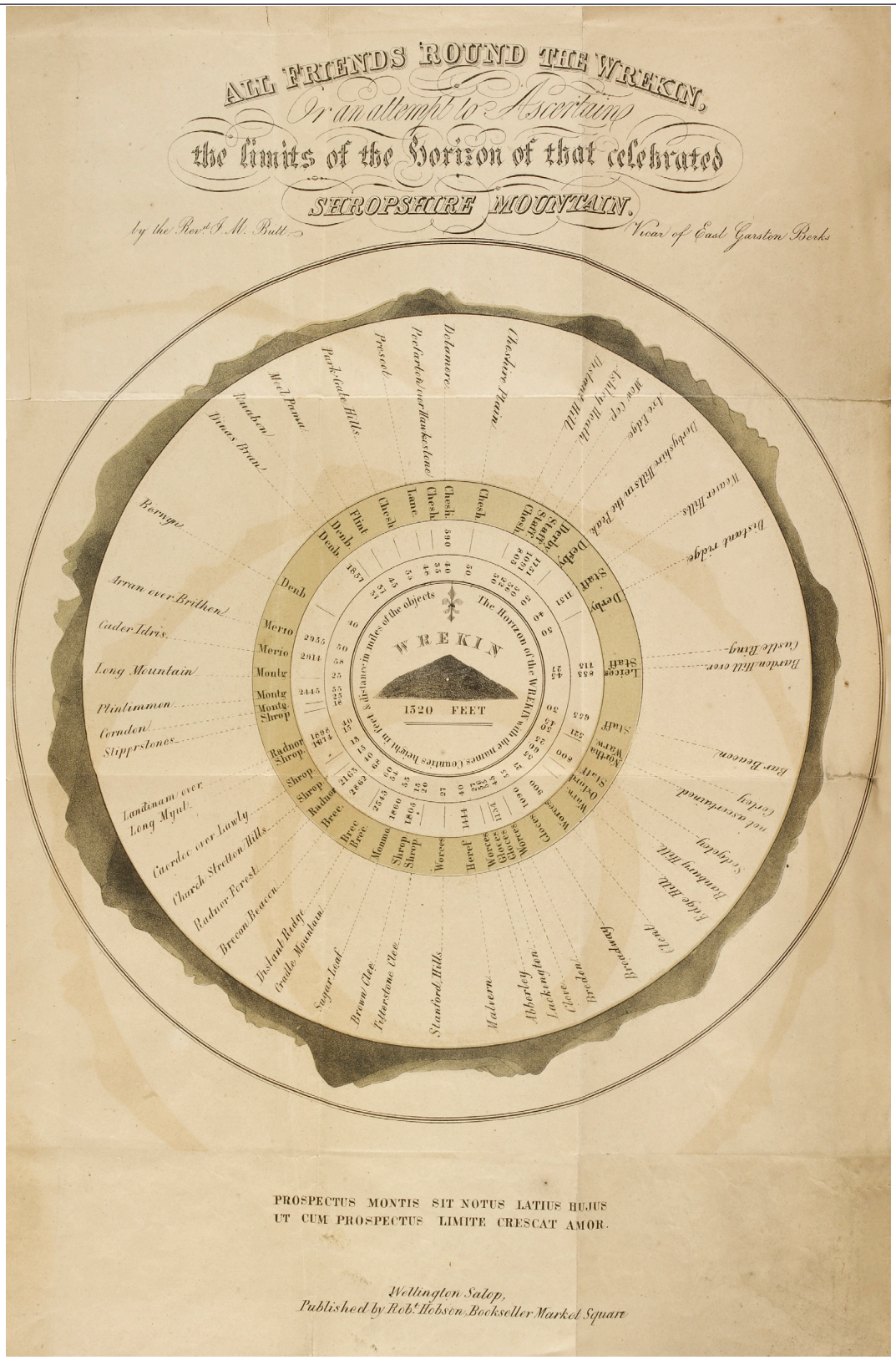

Figure 7. Panoramic Chart of the view from the Wrekin, drawn by the Reverend Butt. First published 1820s, but this is the 1862 edition.

is identified on it. Recent research by Jonathan de Ferranti has established Snowdon is not actually visible from The Wrekin, even on the clearest of days. The line of sight is blocked by part of Cadair Berwyn.

"I appreciate the intention in putting Snowdon on the toposcope may have been to indicate the general direction of objects of interest, rather than to show what surrounding hills are visible, but nevertheless I think this is misleading."

But Wellington author Allan Frost, who says it should more accurately be described as a topograph, and fellow historian George Evans are accusing Mr Squires of making a mountain out of a molehill.

Mr Frost said: "I think Gerry was a bit misguided – it was a flight of fancy on his part – but he's not around any more to ask why he did it.

"It isn't the end of the world. Walkers will still get enormous pleasure from viewing the vista, whether or not they take the trouble to identify every single indicator on the topograph."

Mr Evans said: "I must admit that in 73 years of looking at the view from The Wrekin I have never seen Snowdon, though I have seen the barrage balloons over Liverpool during the last world war."

After the Shropshire Star article (Johnson 2009) was published, it emerged that my letter had reached the Wellington Rotary Club. It had been read out at a meeting of the club on 20 February and was discussed the same day. Unfortunately the email containing the club's reply did not reach me.

However, I soon learnt its content. I was told that there was no support among club members for my request to amend the toposcope.

Reverend Butt's Panoramic Chart

The first comprehensive attempt to determine the hills to be seen from the summit of the Wrekin came from the Reverend John Marten Butt. In 1824, he published a Panoramic Chart entitled *All Friends Round The Wrekin: an Attempt to Ascertain the limits of the Horizon of that celebrated Shropshire Mountain* (Fig.7 shows the 1862 edition). At around the same time, he published a list of fifty three objects visible from the summit; this originally appeared in *Select* magazine, and was reprinted by Hulbert (1825 pp.305-308).

Butt's Chart has a significant place in the history of mountain panoramas since it is one of the earliest examples to be published in the British Isles. The origins of the form can be traced back to a number of works produced in the Alps. The first 360º mountain panorama is thought to be the *Vue circulaire des montagnes* drawn from the summit of the Glacier de Buet, which was made on the instructions of de Saussure in 1776, but a number of artists drew mountain panoramas in the Alps in the last quarter of the eighteenth century (Oettermann 1997 pp.32-38).

Although the form never achieved the popularity in this country that it did in the Alps, where hand-drawn panoramas were produced for hundreds of summits, a small number of panoramas from British summits were produced in the nineteenth century. There are some, but only a very few, as early as Butt's (Wood 2001 pp.107-110).

The exploratory nature of Butt's work on the view from the Wrekin is clear both from the Chart and the list. Thus on the Chart we have 'Distant Ridge' in Derbyshire; 'Distant Hill' in Cheshire; and 'not ascertained' in Northamptonshire. Similarly, on the list is the statement:

Conjectural Statements are noted by ? Inferior objects, by &c. Objects not ascertained by N.A.

It is interesting to examine Butt's chart in the light of modern topographic tools. Particularly helpful were Ferranti's Viewfinder of the Wrekin and the Visibility Cloak from the website heywhatsthat (www.heywhatsthat.com). The Visibility Cloak enables a map to be drawn of all the terrain which is visible from a point specified by the user.

Given that he was working in an era before photography, let alone computers, Butt's Chart is an impressive effort. It must have taken him many

hours with a telescope at the summit, and many more poring over maps in his rectory.

The first thing that one notices is that there is no mention of Snowdon, or any other Caernarvonshire mountain, either on the Chart or the list. Cadair Berwyn is correctly shown as bounding the horizon in the relevant place.

The second thing is that nineteen counties are shown on the Chart, not the seventeen which are mentioned in Measom's 1860 guide onwards. What is the explanation for this? My conjecture is that Northamptonshire and Oxfordshire were dropped by later authors. It was correct to drop Northamptonshire: the Visibility Cloak shows that no portion of the county is visible in conditions of normal refraction.

The case of Oxfordshire is more interesting. Butt's chart shows 'Banbury Hill, Oxford' at 60 miles. Banbury Hill, 71 miles away, is not visible and it is also marked on the wrong place on the dial: if visible, it would appear between Clent and Broadway. Yet Butt was on to something, because there is one hill in Oxfordshire which is visible from the Wrekin: Chastleton Hill, 63 miles distant. Since Chastleton Hill is on the line between the Wrekin and Banbury Hill it appears likely to be the object that Butt had seen. (Looking at the Visibility cloak, one cannot help but wonder if it is coincidental that Chastleton Hill, the only place to which light from the Wrekin penetrates the Cotswold Scarp is (like the Wrekin itself) the site of a barrow).

Another point which creates scope for confusion is the status of Plynlimon. While the summit lies wholly within Cardigan (and, indeed, is the historic county high point), it is close to the border with Montgomery and there was a dilemma as to the county to which the peak should be assigned. In the list, Butt assigns Plynlimon to Cardigan, but in the Chart he assigns it to Montgomery (in an edition of the Chart published in the 1890s Plynlimon was re-assigned to Cardigan). While there is a sense in which it not incorrect to place Plynlimon in Montgomery, as a portion of the hill which lies in that county can be seen, for the purposes of county-counting it is legitimate to assign it to Cardigan.

Counties Visible

So how many counties are visible from the Wrekin? Using the Visibility Cloak, it was possible to pick up one county that Butt missed: Yorkshire. It would

THE TWENTY HISTORIC COUNTIES VISIBLE FROM THE WREKIN

1.	Worcestershire	Worcestershire Beacon, 40 miles
2.	Staffordshire	The Roaches, 42 miles
3.	Warwickshire	Ebrington Hill, 53 miles
4.	Shropshire	Caer Caradoc, 12 miles
5.	Oxfordshire	Chastleton Hill, 63 miles
6.	Brecon	Pen Y Fan, 66 miles
7.	Gloucestershire	Cleeve Hill, 56 miles
8.	Monmouthshire	Ysgyryd Fawr, 59 miles
9.	Radnor	Radnor Forest, 39 miles
10.	Montgomery	Glan Hafon, 36 miles
11.	Leicestershire	Bardon Hill, 52 miles
12.	Herefordshire	Herefordshire Beacon, 43 miles
13.	Denbighshire	Llantysilio Mountain, 37 miles
14.	Flint	Hope Mountain, 37 miles
15.	Merionethshire	Cadair Idris, 57 miles
16.	Cheshire	Bickerton Hill, 29 miles
17.	Derbyshire	Alport Height, 50 miles
18.	Lancashire	Winter Hill, 66 miles
19.	Cardigan	Plynlimon, 54 miles
20.	Yorkshire	Blake Moor, 73 miles

have needed a powerful telescope and sharp eyes to detect it in pre-computer days, but Blake Moor in the vicinity of Warland reservoir can be seen from the summit.

To complete the analysis, I examined whether the Visibility Cloak extended to any other historic county. I concluded that it did not. Accordingly, here is the list of what I believe to be the twenty historic counties visible from the Wrekin in conditions of normal refraction (see table on previous page).

I noted above that the seventeen counties claim has appeared in several school geography textbooks. It is sobering to see just how inaccurate some of these are. In John Blakiston's Geographical Reader (1884) we find a description of:

...the solitary Wrekin, from whose top may be seen, in clear weather, seventeen counties. It will be no bad map practice to find out which these are likely to be.

Let us suppose that we are standing there on a clear day. Facing northward, our eyes roam over the flat Cheshire Plain to the moors which sever Lancashire from Yorkshire, and perhaps we think to descry in the dim blue distance the giants of the Cumbrian group [not visible]. *Turning our gaze eastward over the Central Plain, across the smoke of Staffordshire, we sight the Peak, and, unhindered by tame Nottinghamshire* [not visible]*, try to make out the towers of Lincoln Cathedral* [not visible despite the famously tall towers]. *Letting our glance sweep over the tableland of Leicestershire, the uplands of Northamptonshire* [not visible]*, and the plain of Worcestershire, we turn southward to look for the Edge Hills and the Cotswolds. And westward from the hills which hem in the Wye, we try to distinguish the Welsh giants of Radnor, Montgomery, Carnarvon, Denbigh, and Flint, but shall probably find that they are kept out of view by lower ranges near the border* [or perhaps we won't, since with the exception of Caernarvon, hills in all these counties are visible].

At the end of the chapter, one of the 'Exercises' is to 'Describe the view from the Wrekin'.

You may say it is easy to criticize these earlier accounts when we have access to computer tools which can resolve in seconds visibility questions which previously took hours of hard 'map practice'. Blanket criticism of earlier accounts is not my position. I have every respect for a man such as Butt, who made a superb effort with the tools available to him at the time, presented his work as tentative and, despite a few mistakes, achieved a largely accurate account.

It is more difficult, however, to defend Blakiston, retailing his speculations to children in the geography classroom when even a relatively limited amount of research would have shown them to be incorrect.

Returning to the Snowdon question, I found myself rather puzzled. After weeks of research I could trace the claim that Snowdon is visible from the Wrekin no further back than Hesba Stretton in the 1860s. In his 1824 Chart and list, Reverend Butt had made no mention of the mountain. It seemed there must be a missing link.

It was around this time that I discovered a poem by Reverend Corfield and the first guidebook devoted to the Wrekin.

Reverend Corfield's Poem

Butt's striking Panoramic Chart created quite a stir, and a number of references to it can be found in various nineteenth century magazines. One of its admirers was another clergyman, the Reverend Corfield, rector of Pitchford and vicar of Waters Upton in Shropshire. In 1833 he published a poem, in somewhat extravagant style, which was intended to be read as an accompaniment to Butt's Chart. While the poem begins with a description of various hills that can be seen, this is just a prelude to loftier matters (*'From Nature's charms our aspirations rise, From scenes* below*, to scenes* above *the Skies.'*). The poem begins:

From WREKIN's summit cast the eye around,
To view the objects which th' Horizon bound;
O'er Salop's plains with beauteous verdure drest,
The Cambrian Mountains stretch along the West,
And though Snowdonia's cloud-capt tops are hid,
Yet, through the vast expanse the eye is bid…

Corfield's comment on Snowdonia is dangerously ambiguous. Are Snowdonia's tops hidden by

intervening hills or are they hidden by clouds? (The meaning of the term 'Snowdonia' has changed since Corfield wrote his poem. After the creation of the National Park in 1951, the term Snowdonia designated a much wider area, whereas it was previously '*virtually a synonym for the Caernarvonshire mountains, especially those immediately around Snowdon itself*' (Condry 1966 p.1). None of the Caernarvonshire mountains are visible from the Wrekin).

The First Guidebook

1862 saw the publication of an anonymous booklet entitled *A Guide to the Wrekin and its Environs*. The text of this guidebook contains a description of the view from the Wrekin, and it falls straight into the trap created by the ambiguity in Corfield's poem:

The well-defined Briedden group, like the pillars of Hercules, stand boldly out, guarding the entrance to the vale of Shrewsbury; and beyond, the Berwyns lift their leviathan forms, o'er-topped by Arran Fowdy, Arran Ben Llyn, and the distant cloud-capped Snowdonian range. (Anon 1862 pp.4-5).

An early advert tells us that this guide was available at '*Railway Book-stands and at the Upper Cottage on the Wrekin*' (Randall 1863). The scope for this guidebook to mislead later readers was magnified by the fact that it was sold in two different versions. One version included Butt's Panoramic Chart and cost a shilling; the cheap version did not include the Chart and cost sixpence.

Someone who could afford the expensive version would at least be given conflicting messages about whether the Snowdonian range could be seen – on the one hand, the Chart showed nothing beyond Cadair Berwyn; but on the other hand, the text of the guide included it as part of the view. However, to someone who could not afford the extra sixpence for the Chart, there was no conflicting message: simply a statement that the cloud-capped Snowdonian range was part of the view.

The 1862 guidebook appears to be the earliest written source of the claim that Snowdon can be seen from the Wrekin. It is clear from the ordering of the description of the view in Murray's 1870 guide that it uses the 1862 work as a source.

However the 1864 article by Hesba Stretton suggests the claim that Snowdon is visible, at least under certain conditions of light and atmosphere, was circulating locally by the 1860s. It was a claim that was taken up eagerly by most subsequent guidebook writers and became the conventional wisdom.

Reading all the guidebooks and articles which contained the Snowdon claim after 1862 became slightly depressing. One copied the other, no-one checked, and after it had been repeated a certain number of times, nearly everyone assumed it must be true. A strange collective delusion was at work. Was there no one, I asked myself, who had spotted that there was a problem prior to Jesty in 1980?

It was with delight, then, that I discovered that Butt's Panoramic chart had inspired another poem, a work of a very different stamp to Corfield's. Corfield's poem was ambiguous, serious and aimed to turn the reader's thoughts to '*scenes above the Skies*'. The later poem was precise, humorous and lacked any religious message. It was however a third vicar, the Reverend Cobbold, who gave a memorable recitation of this comic poem in circumstances particularly relevant to this journal.

The Cotteswold Naturalists' Field Club visits the Wrekin

One of the most successful early Field Meetings of the Cotteswold Naturalists' Field Club was the week in June 1869 spent at Benthall Hall, a handsome sixteenth century house on a hill overlooking Ironbridge in Shropshire. The programme for the week was drawn up by a certain Mr. Maw, the owner of an encaustic tile factory, and everyone agreed his organisation was admirable. The account of this Field Meeting is derived from the report in the Proceedings of the Cotteswold Naturalists' Field Club, 1870.

The Club at this period of its history had less than a hundred members; twenty five were present for the Benthall Hall meeting, including Reverend Cobbold (Fig. 8).

On Wednesday the 9 June, the sun shone brightly as the party descended the hill into Ironbridge. The

day's events began with a visit to see the process of manufacture of encaustic tiles at Mr. Maw's factory, where '*this branch of industry, now so largely employed for decorative purposes, is carried to the highest degree of perfection*'.

They then took the train to Lawley Bank Station, where they were joined by around ten Members of the Severn Valley Field Club, another of the associations of field scientists and natural historians which roamed the country at this period. To examine the geology of the area, the party directed their course to a number of quarries, finally reaching Lawrence's Quarry at the foot of the Wrekin. Here, we are told that:

Considerable discussion took place, and the different theories of infiltration and injection were urged by their respective advocates; but, looking to the fact that the line of the dyke does not disturb the stratification which it divides, the opinion that the intrusive rock was due to injection along a line of fissure met with general acceptance.

Recovering from the excitement of these geological controversies, the party ascended steeply to find that Mrs. Maw had prepared a sumptuous luncheon for their refreshment on the grassy slope. And here they stopped for half an hour, enjoying the splendid view under the Shropshire sun, fanned by a pleasant breeze. Life was at its best. Energy renewed by the luncheon, they made their way to the summit.

Standing on the Bladder Stone, the Secretary of the Severn Valley Field Club pointed out the geological features of the surrounding district:

the Long Mountain of "Upper Silurian," capped with "Old Red," the "Lingula Flags" of the Stiperstones, the so-called "Bottom Rock," or "Cambrians" of the Longmynd, the Breidden Hills of "Lower Llandovery," with interbedded Trap, the Trap of Caer Caradoc, and the "Wenlock beds," and "Aymestry Limestones" of Wenlock Edge, and View Edge.

After this, it was clearly felt that some light relief was needed, and so Reverend Cobbold stepped forward to deliver a '*humerous poem*', which we are told was read '*amidst much laughter*'. It was entitled:

LINES ON THE WREKIN

YOU and your glass might spend a week in
Viewing the prospect from the Wrekin;
Mortal in Britain ne'er set eyes on
Such an extended wide horizon;
Indeed, the prospect from this mount is,
Over no less than nineteen Counties!

The poem then contains a list of the nineteen counties in Reverend Butt's Chart, assembled into an ingenious rhyme scheme. After this, it turns to the question of the objects that can and cannot be seen:

Notice yon batter'd skull-shap'd rock,
The British fortress Caradoc.
Those pointed summits bare of trees
Are the two barren Shropshire Clees.
Not neck of swan or maiden whiter is
Than yon cleft height of Cader Idris,
Sixty miles distant – barring two –
That peak presents itself to view.
Above the rest behold that dim 'un,
It is the lofty Welsh Plinlimmon:
And even Snowdon could be seen
Were there not other hills between.
And Ireland – oh, sad perplexity!
Is hidden by the earth's convexity.

Apart from a quibble about the distance to Cadair Idris, this is the truth. All the hills named as being visible can be seen; Snowdon could be seen were it not for the intervening hills; while as can be calculated, Ireland is hidden by the earth's convexity, in the sense that even if the Welsh hills were not in the way, no part of Ireland would be visible.

It is a very strange fact that the most accurate description of the view from the Wrekin that has ever been published occurs in a comic poem published in an early volume of the *Proceedings of the Cotteswold Naturalists' Field Club*. Normally the truth is found in school or college textbook, guidebook or toposcope, while the poet is permitted a little license. In this case, while the usual authorities were engaging in flights of fancy, the poet gave us the sober scientific facts.

But what chance did the truth stand? On the one hand, the vicar with a 'humerous poem' read to a tiny band

of naturalists and scientists; on the other, the million-selling author and a sequence of 'authoritative' guide books from Murray onwards. There were probably a thousand who read *Alone in London* for every soul who made their way through the scholarly papers on '*Some Species of the Genus* Cincta' or '*The Fossil Plants of the Forest of Dean Coalfield*' to be found in the *Proceedings of the Cotteswold Naturalists' Field Club*.

It is now possible to say how much of the information in the *Shell Guide to the Viewpoints of England* is true. Should there be another edition of that guide, let me suggest the following revision to the existing text on the Wrekin:

From its summit, at 1,334 feet, on a clear day you cannot see to the north-east Kinder Scout, 57 miles distant as the crow flies; nor to the north-west can you descry the summit of Snowdon, 70 miles distant. But you can see twenty counties; it is one of loveliest views in England.

Who wrote the poem?

There was one final mystery to be unravelled. In the *Proceedings of the Cotteswold Naturalists' Field Club* (1870), underneath the title of 'Lines on the Wrekin' appear in small font the words:

(Supposed to have been written by a Nephew of JOHN FORSTER, the Essayist.)

John Forster was easy enough to trace in the *Oxford Dictionary of National Biography* – a gregarious man of letters who knew everyone in Victorian literary London from Dickens and Thackeray down. But who was this Nephew? My suspicions were aroused when I discovered that neither John Forster's brother nor his two sisters married (Davies 1983 p.3). A pseudonym, then.

Faced with a clerical mystery I turned, as Sherlock Holmes always did, to the Crockford. And there I found some very interesting clues. The directory listed a certain Robert Henry Cobbold of Broseley Rectory, Salop – about five miles away from the Wrekin.

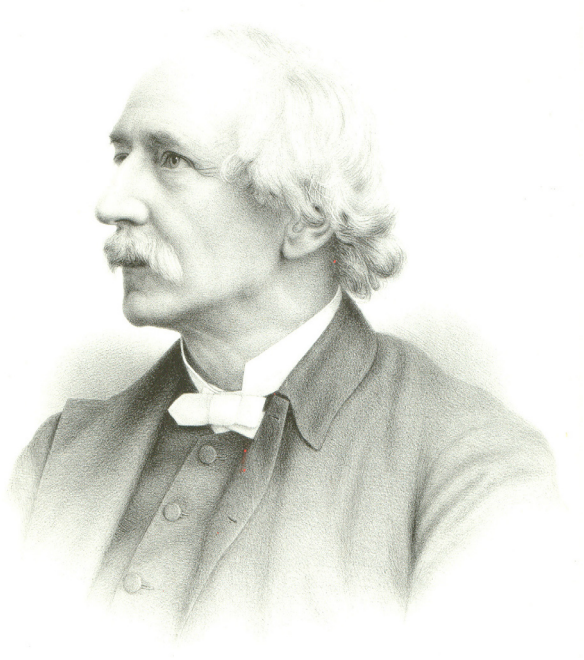

Figure 8. Rev. Robert Henry Cobbold

What was particularly interesting is that after the poem has dealt with the hills it turns to towns and villages:

But stay my Muse, 'tis useless seeking
To tell the prospect from the Wrekin;
The house and park of Squire Moseley,
Wellington, Shrewsbury, Newport, Broseley.

Why would the poet have positioned the village of Broseley so prominently, the last object mentioned? There are plenty of larger towns in view he might have chosen – unless he had some particular interest in the place.

Then again, if the poet was Cobbold, it would not have been the first time that he published under a pseudonym. He had already earned a place in William Cushing's (1888) *Initials and pseudonyms: a dictionary of literary disguises* after he wrote a poem on the Festivities at Oakley Park in September 1832 under the *nom de plume* '*An oyster from home, unaccustom'd to roam*'.

But the clincher was the information in Crockford about Cobbold's education. When he was at Peterhouse in Cambridge he had taken the Mathematics Tripos

before the Classics Tripos. Ireland is hidden by the earth's convexity! Who else talks like that but a mathematician?

It was no fluke that Cobbold realized that the line of sight to Snowdon is blocked by the intervening hills, when everyone around him was saying that it was visible. He had dusted off the mathematics he learnt at Cambridge and worked it out for himself.

Did Gerry Powell know the Snowdon claim was doubtful?

Gerry Powell, the designer of the toposcope on the Wrekin, died in 2003 and so we are unlikely now to discover his reasons for including Snowdon on the disc. There is evidence that, at least in his final years, he was aware that the claim that Snowdon can be seen is doubtful.

While most guidebook writers have accepted the conventional wisdom that Snowdon was visible, there was one which shared the skepticism so well expressed by Reverend Cobbold. This was R.E. Davies, who in 1895 published a *Handbook to the Wrekin*. He wrote:

It has been asserted that the summit of Snowdon can be seen, rising behind the Berywn range, at sunset in summer, before rain, but this is doubtful (p.14).

One hundred years after R.E. Davies wrote these words, an enterprising publisher in Wellington decided to re-issue Davies' Handbook. His name was Gerry Powell, of Coach House Studios.

So by 1995 Gerry Powell is likely to have known that the Snowdon claim was doubtful. Whether he already knew this in 1977, when the toposcope was erected, is another question.

The truth will out

The tale of the 'view' of Snowdon, and of the 'seventeen counties', is a cautionary one. Topographic tidbits such as these, which turn out to be quite false, can persist for decades, taught in schoolrooms, printed in guidebooks, engraved on toposcopes.

My interest in the Wrekin was piqued when in 2004 I noticed a discrepancy between Ferranti's Viewfinder and Gerry Powell's Toposcope. I was curious as to its origin. But while I have spent more time examining descriptions of the view from the Wrekin than any other hill, I have no reason to believe that it is a one-off. There are probably similar examples elsewhere. So when you encounter a surprising visibility claim in a guidebook, or on a toposcope, I would advise you to take it with a pinch of salt.

On the other hand, the truth has a habit of getting out, even if it appears in a comic poem in the *Proceedings of the Cotteswold Naturalists' Field Club*. Next time you visit the Wrekin, if you want to know which hills you can see, forget the toposcope and take in your rucksack a copy of '*Lines on the Wrekin*'. And if you feel inclined, raise a glass to the admirable Reverend Cobbold. His reverence for truth, even in a comic poem, was largely ignored in his lifetime, so let us salute it now.

ACKNOWLEDGEMENTS

I am grateful to the following for their permission to use the images reproduced in this article: Marc Petty and Shropshire Archives reference 1217/3 (Fig. 1), Allan Frost (Fig. 2), Chris Jesty (Fig. 3), Jonathan de Ferranti (Fig. 4), Michael Kosowsky (Figs. 5 and 6), Reverend Michael Kinna (Fig. 8). Reproduction of the article '*Can you see Snowdon from the Wrekin*?' is courtesy of the *Shropshire Star*. Figure 2 is from Allan Frost's *The Wrekin Hill*. The image of Reverend Butt's Panoramic Chart (Fig. 7) is reproduced with permission from the British Library. The copyright is with the British Library Board and All Rights are Reserved (Shelfmark 10360.cc.13). Thanks to Jonathan de Ferranti for comments.

REFERENCES

Anon, 1862. *A Guide to the Wrekin and its Environs*, 24 pp.

Anon, 1907. *A New Pictorial and Descriptive Guide to Malvern and District*. Ward Lock & Co.

Anon, 1870. Excursion Reports. *Proceedings of the Cotteswold Naturalists' Field Club*, 5, 55-58.

Barker, Peter, 1990. The Wrekin – Shropshire's Birthstone. *Heritage – the British Review*, Issue 30. Reprinted in *Country Walking*, July 1991.

Biden, H.B. 1877. *All Round Snowdon: A Panorama Taken from the Summit with Names & Altitudes of All the Principal Mountains*.

Blakiston, John Richard, 1884. *Geographical Reader; A revised and illustrated edition of 'Glimpses of the Globe'*.

Clarke, Alexander Ross, 1858. *Account of the observations and calculations of the principal Triangulation.*

Condry, W.M. 1966. *The Snowdonia National Park.*

Corfield, Rev. 1833. Quoted in: *Shropshire Notes and Queries,* vol.1-3, 100 (1885).

Crockford's Clerical Directory, 1868. Church House Publishing.

Cushing, William, 1888. *Initials and pseudonyms: a dictionary of literary disguises*.

Davies, James A. 1983. *John Forster: A Literary Life*.

Davies, R.E. 1895. *Handbook to the Wrekin*. (reprinted by Gerry Powell, Coach House Studios in 1995).

Demers, Patricia, 2004. Sarah Smith (Hesba Stretton). *Oxford Dictionary of National Biography*.

Evans, George, 2004. *Fern Ticket to the Magic Forest of the Wrekin*.

Frost, Allan, 2007. *The Wrekin Hill*.

Hogg, Gary, 1975. *The Shell Guide to Viewpoints of England.*

Hulbert, Charles, 1825. *Museum Europaeum*.

Jesty, Chris, 1974. Surveying the View from the Summit of Snowdon. *Bulletin of the Society of University Cartographers*, 8 (2), 17-19,

Jesty, Chris, 1980. *A Guide to the View from the Summit of Snowdon,* third edition.

Johnson, Peter, 17 March 2009. Can you see Snowdon from The Wrekin? in the *Shropshire Star.* The article generated extensive correspondence and a further article by Peter Johnson ('Wrekin view 'not Snowdon") was published on 31 March 2009.

Lehn, W.H. and Sawatzky, H.L. 1975. Image Transmission under Arctic Mirage Conditions, *Polarforschung*, 45, 120-128.

Lomax, Elaine, 2009. *The Writings of Hesba Stretton: Reclaiming the Outcast.*

Mason, Charlotte, 1881. *The Counties of England*.

Measom, George, 1860. *The Official Illustrated Guide to the Great Western Railway*.

Mudge, W., Dalby and Colby, T. 1801. *An Account of the Operations carried out for accomplishing a trigonometrical survey of England and Wales*, vol. 2.

Murray, John, 1870. *Handbook for Shropshire, Cheshire and Lancashire*.

Oettermann, Stephan, 1997. *The Panorama: History of a Mass Medium*.

Palgrave, Mary, 1885. *Geography Reading Books.*

Palmowski, Jan, 2002. Travels with Baedeker – The Guidebook and the Middle Classes in Victorian and Edwardian Britain, in Koshar, Rudy (ed.) *Histories of Leisure.*

Parker, James A. 1936. The Tinto Indicator. *Cairngorm Club Journal*, 14, 110-114.

Randall, J. 1863. *Handbook to the Severn Valley Railway - Illustrative and Descriptive of Places Along the Line from Worcester to Shrewsbury.*

Smith, Cyril, 2005. The Story of the Toposcope on Top of the Wrekin. *Rotabilia*. Also available on www.wrekinfriends.com

Stretton, Hesba, [originally unattributed] 1864. A Summer Day on the Wrekin. *The Leisure Hour*, 13, 603-605.

Vale, Edmund, 1935. *The World of Wales*.

Waghorn, Tom, 1967. The Magnificent Seven Views. *The Climber*, 5 (8), 247-248.

Wood, Michael, 2001. The Mountain Panorama and Its Significance in the Scottish Context. *Cartographica*, 38, 103-117.

Websites cited

www.heywhatsthat.com

http://bubl.ac.uk/org/tacit/tac/tac61/thetrial.htm

www.theanswerbank.co.uk

www.viewfinderpanoramas.org

www.wrekinfriends.com