# The Great Cumbrian Stone Circles, their Environs and the Moon STEVEN HOOD

The purpose of this paper is to discuss the three Great Cumbrian Circles – Long Meg, Castlerigg and Swinside – their environs and the Moon. It also examines how attention to sacred places and observation of the Moon have long been subjects of curiosity to mankind. It notes that some observations of the Moon at these sites have previously been discussed in these *Transactions*.<sup>1</sup>

## **Observers of the Moon**

'Who is he who announces the ages of the Moon?' The Mystery Of Amergin (Ancient Irish Poem)

HE theory of the Moon was by far the most advanced of Babylonian astronomy with a comparatively rich source of material remaining from antiquity available to study.<sup>2</sup> The Lebed Tatars of the northern slopes of the Altai, believed to be of Finnish origin, sacrificed a horse at the full Moon, so 'that wheat may grow'. The horse sacrifice occurred on the full Moon following the summer solstice.<sup>3</sup> We can presume therefore that this full Moon may be over 20 days after solstice and important though the time of year might be, it was the Moon itself that was key to the sacrifice. The Khoikhoi people, better known as the very much degraded Hottentots, also showed interest in the Moon as demonstrated by Kolben.<sup>4</sup>

So peoples from as far as northern Scandinavia to Babylon and down to South Africa were showing an interest in the Moon, its motion and its phases. Perhaps the statement by Ashmore '... evidence for prehistoric interest in obvious astronomical events such as midwinter sunrise and sunset is almost universally accepted'<sup>5</sup> might be expanded to facilitate inclusion of the Moon and even the stars and planets.

## The Moon and lunar standstill effects

A waxing Moon shows noticeable changes in brightness from one night to the next and the full Moon is around 12 times brighter than a first quarter Moon. This is despite the fact that it is only twice the area. The reason for this is that the full Moon has a lack of self-shadowing.

If one observed the full Moons nearest the June and December solstices during a major lunar standstill season, it would be noticed that the height and depth between the two become acute with an arc of  $56^{\circ}$  or so. Observing a series of minor lunar standstills one would notice that the height and depth between the two are not so great, with an arc of roughly  $36^{\circ}$  between the two. A minor lunar standstill season occurs around 9.3 years after the major lunar standstill. At this time the full Moons nearest the solstices and the first and last quarter Moons nearest the equinoxes reach

a minimum declination. When this occurs the full Moon at the winter solstice is at its lowest in the sky over the 18.61 year period. The full Moon at the summer solstice will be at its highest in the sky over the same period.

Due to the fact that the Moon is sometimes nearer to Earth and sometimes farther away, the apparent size of its disc also changes. These changes are more noticeable during the standstill seasons. At full Moon during the minor standstill the disc is only about three quarters the size of that at a major standstill. We must also take into consideration the factor of the Moon's illusion where the disc appears larger to the eye when near the horizon than when high in the sky.

We might also keep in mind that the northerly Moons during both the major and minor standstill seasons are not visible near the summer solstice. The southerly Moons during the major and minor seasons are not visible near the winter solstice. This can be seen in the example for the major northerly standstill setting Moon in Table 1 below. The sequence of lunar phases through the season might also be noticed.

#### Terminology

Terms like 'major northerly standstill setting Moon' and 'least extreme southerly rising Moon' can perhaps be misleading, leading one to think that the circle builders had singular intentions of marking out these precise setting positions. However, just as the use of sloping ground at Long Meg has its own visual aspect with the winter solar shadow paths, so too do the lunar extremes. It is important to understand that the lunar extremes are possibly more noticeable because at these times, once a month, for a year or more, the Moon would be seen to rise and set at these same positions – the standstill positions.

Month/Year	Moon Phase	Azimuth		
December 2005	98%	325° 06'		
January 2006	97%	325° 07'		
February 2006	95%	325° 06'		
March 2006	70%	325° 54'		
April 2006	44%	325° 54'		
May 2006	28%	325° 27'		
May 2006	3%	325° 21'		
June 2006	0%	324° 43'		
July 2006	5%	325° 23'		
August 2006	21%	325° 48'		
September 2006	45%	325° 37'		
October 2006	61%	325° 46'		
November 2006	85%	325° 17'		
December 2006	95%	324° 54'		
January 2007	99%	325° 02'		

TABLE 1. Azimuth data for northerly Moon sets through the major standstill season on a flat plain at Long Meg.

Note: Azimuth data measures the direction of a celestial object from the observer, expressed as the angular distance from the north or south point of the horizon.

By its very nature there can only be one extreme setting or rising position, all other Moons in a standstill season fall very near but do not quite reach it. Therefore there are more Moons that approach the point of the extreme than actually reach it. It is a fact that the Moon which reaches the extreme is always in first and third quarter phase and can be either impossible or difficult to view. However, many of those Moons during the season which almost reach the extreme, are visible and fall particularly close to each other. Table 1 gives azimuth data for the major northerly Moon sets through the standstill season on a flat plain at Long Meg.

We must always take into account that the horizon will alter the positions somewhat, but that this alteration will show very little discrepancy between each Moon because they all fall within such a small variance in azimuth. Apart from that in June, where the phase of the Moon is zero per cent and so is not visible, it can clearly be seen from the data in Table 1 that these azimuths are all within 1° of each other – so might this entire area not be termed the 'standstill' position? Such a standstill position could facilitate the extreme Moon and also those near the extreme position throughout the season – this is a simple and plausible possibility. The utilisation of a slightly broader area as opposed to a highly accurate specific target area has a number of advantages: it would be easier to view and set up; there would be an increased number of events to witness; it would incorporate the full Moons during each standstill season and cumulatively be visually more spectacular than witnessing a single precisely marked extreme Moon in partial phase.

#### Long Meg and her daughters

It has been noted by some that the Long Meg stone does not line up with the Midwinter sunset when viewed from the centre of the circle.<sup>6</sup> Some have even gone so far as to say that the builders of the circle may not have been capable of such a feat. This paper may help encourage more thought on the subject and demonstrate that the circle builders might have had a far more elaborate construction in mind than a single solar alignment.

Previous papers have drawn attention to the Samhain/Imbolc and Midwinter sunsets when the positioning of the Long Meg stone, along with the portal stones, creates a shadow path across the circle.<sup>7</sup> These features in themselves are rather remarkable, but when taken in conjunction with lunar alignments across the circle then we begin to understand that the Long Meg site is far more complex than first thought.

The recumbent stone circles of Sunhoney, Berrybrae, Midmar Kirk and Hatton of Ardoyne, all in Aberdeenshire, Scotland, share some common features with each other, but also with Long Meg. For instance, at Sunhoney the circle stones and flankers are of red granite and gneiss and the 4.5m-long, heavily cup-marked recumbent is of grey granite. The Long Meg stone is carved with various petroglyphs; it is a large Triassic sandstone and the author has previously drawn attention to the fact that it is the only sandstone in the monument, along with the features of other stones involved in solar alignments within the circle itself, a topic further discussed by Clare.<sup>8</sup>



FIG. 1. Long Meg Stone Circle.

When viewing Long Meg from a position at stone 7, one can see a similarity with the recumbent circles in that just as the recumbent stones are positioned between flanker stones, Long Meg is positioned between the two sets of portals. The subject of the fallen portal stones has already been mentioned.<sup>9</sup> Looking from stone 7 toward Long Meg one looks on to the Dodd Fells in the distance and these form the horizon. On many a day these fells are not visible from this position because of atmospheric conditions. They do nevertheless obstruct the view behind Long Meg and the portal stones as can be seen in Fig. 2 and do so to a level toward the height of the prominent cup and ring marks on the Long Meg stone.

At the Aberdeenshire recumbent stone circle sites it has been suggested that the minor southerly standstill Moon set has been indicated and similarly, it is this event that can be witnessed from a position at stone 7 when looking across the circle and through the middle of the portal stones to a centrally placed Long Meg stone. The southern portal stones at Long Meg have around 3° of azimuth distance between them when viewed from stone 7, ranging from around 230° to 233°12' and the Long Meg stone itself covers an area of almost 1° of azimuth. This spread can accommodate the kind of variance in azimuth over a standstill season, as seen for example in the data of Table 1.



FIG. 2 Long Meg and portals from stone 7.

As already discussed, during the minor standstill season, the midsummer full Moon reaches its highest altitude in the sky, higher than any other midsummer full Moon over the entire 18.61 year period, the interesting factor here though, is that this particular midsummer full Moon and also the Moon in 98 per cent phase the day before, can also be seen to set into the Long Meg stone and portals from a position at stone 7. Both of these setting Moons fall within an azimuth of 232°-233° and an altitude of about 1°30' in the region of the Dodd Fells some 18 miles distant.

The major northerly standstill Moon rise at Long Meg circle can be witnessed from a position at the Long Meg stone, over the portals and across towards stone 68 and the road. Unfortunately the installation of the road has damaged the circle in this area. The series of northerly setting Moons during the major standstill season noted in Table 1 would be seen to set into the area within the northern portal stones, stones 54 and 55, when viewed from a position across the circle at stone 20. From here the setting altitude of the Moon is rather low, around 0°22', due to a lack of features on the horizon and the range of Moon setting azimuths fall between  $322^{\circ}-323^{\circ}$ .

So what of the major southern lunar standstill? This Moon rise can be viewed from stone 53 across toward stone 24, where in times past, a wall ran through the circle and has sadly caused some disturbance. For the season of major standstill Moon sets we look from stone 2 across to stone 32, which is the broadest stone in the southern

portion of the circle and covers almost 2° azimuth when viewed from here. If this sightline was followed we find that it would pass very close to Mayburgh Henge at Eamont Bridge, further still and it would also pass close to the Cockpit circle on Moor Divock.

At this point it may be worth mulling over another interesting possible sightline. In 1999 the author and Dave Hankin, discovered a faint spiral on stone 62, (Fig. 3) which was duly reported and recorded by Stan Beckensall.<sup>10</sup> The curious point here being that when viewed from this stone, the major southerly standstill Moons would be seen to set in the vicinity of the Long Meg stone and had the fallen portal stones 39 and 40 and stone 41 been standing, Long Meg would appear to have been framed by two 'flankers' on each side with the portal creating a space to the east and the gap in the circle between stones 42 and 43 facilitating a space to the west, which from this viewing position would give emphasis to Long Meg. Might this have been a deliberate arrangement?

Let us consider another curiosity at the Long Meg site regarding the use of Long Meg, stone 2, stone 20 and stone 53, as we find that all four stones are utilised for both a solar event and a lunar event as seen in Table 2. For example stone 2 is used in the midsummer sunrise when the Sun is at its most northerly rise position and for the major southerly Moon set when the Moon sets at its most southerly position.



FIG. 3. Long Meg stone 62 spiral and rubbing.

Astronomical Stone	Arrangement	Astronomical Event		
Long Meg	Stone 1 – Long Meg + Portal	Most southerly sun set (Midwinter)		
	Long Meg + Portal – 68 (Road)	Most northerly moon rise		
Stone 2	Stone 42 – 2	Most northerly sun rise (Midsummer)		
	Stone 2 – 32	Most Southerly Moon Set		
Stone 20	Stone 52 – 20	Most southerly sun rise (Midwinter)		
	Stone 20 – North Portal	most northerly moon set		
Stone 53	Stone 18 – 53	Most northerly sun set (Midsummer)		
	Stone 53 – 24 (Old wall area)	Most southerly moon rise		

TABLE 2: 'Astronomical Stones' at Long Meg.

So one might ask whether these 'astronomical' stones and their positioning could be a deliberate feature of the circle or are they just entirely coincidental?

## Castlerigg

Fig. 5 shows the major northerly standstill Moon on 16 December 2005 as seen from the Castlerigg Circle. The Moon rises at an azimuth of 44°59' and altitude 3°41'



FIG. 4 Castlerigg Stone Circle.



FIG. 5. Castlerigg Major Northerly Standstill Moon Rise.

out from Doddick Fell, Blencathra, and using the method employed by the author throughout this research, i.e. standing behind a stone and viewing across the circle towards a stone on the other side, this was viewed from stone 35 (Fig. 4) across to stone 4. Stan Beckensall's excellent research into prehistoric rock art in Cumbria gives more information about the rock art on stone 4.<sup>11</sup> It might also be taken into account that stone 4 across to stone 33 is the Midwinter sunset alignment, therefore involving stone 4 in the most northerly rising Moon and the most southerly setting Sun.

The major northerly standstill Moon set has a very impressive alignment as can be seen in Fig. 6. Standing at stone 23, the largest stone in the circle, then looking across stones 18 and 19 in the 'cove' over to stone 42 on the other side of the circle and toward the Moon setting into Latrigg at an azimuth of 312°08' and an altitude of 5°21'. The photo was also taken on 16 December and shows this Midwinter Moon in 98 per cent phase. Information on Castlerigg's major southerly Moon rise and set has previously been discussed in these *Transactions*.<sup>12</sup>

From the Castlerigg Circle the minor northerly standstill Moon rise can be viewed from a position at stone 36 looking over to stone 5, where the north-eastern horizon has a relatively low altitude. Stone 36 bears a distinct feature, having a lozenge mark carved into it and there is very little spacing between stones 33 to 36. When looking at the minor northerly setting Moon we find that its setting position is rather similar to that of the Beltaine/Lughnasadh Sun, as it also sets into the lower slope of Latrigg,



FIG. 6. Castlerigg Major Northerly Standstill Moon Set.

viewed from stone 23 over to stone 39 at an azimuth of around  $297^{\circ}35'$  and an altitude of  $2^{\circ}36'$ . The minor southerly standstill Moon rise is viewed from stone 43, across the western stones of the 'cove', where we find once again, that stone 23 is utilised and the Moon would be seen to rise out from the mass of the Dodd Fells at an azimuth of around  $133^{\circ}$ . The setting position of the minor southerly Moon can be observed from a position at stone 5 across to stone 32 in the direction of Catbells and Robinson Fell.

It may be worth noting that stone 5 is used in the minor northerly standstill Moon rise and again in the minor southerly standstill Moon set and that stone 23 is employed in the minor southerly standstill Moon rise and the minor northerly standstill Moon set, along with the most northerly setting positions of both the Sun and the Moon.

## Swinside

Observations have already been made of the solar alignments at Swinside Circle (SD172883, Fig. 3) and how they bear some similarities with Long Meg events, i.e. where the winter sunrise events occur involving the Swinside Circle and its portal they are also to be found at Long Meg only here the portal is involved with the winter sunsets at these periods. A similar turn of events occurs with the Moon at its minor southerly standstill.



FIG. 7. Swinside Stone Circle to Knott Hill.

The minor southerly standstill Moon rise can be viewed from a position at stone 47 through the portal. The full Moon nearest the summer solstice during this season rises with an azimuth of around 124°50' and at an altitude of about 0°25'. As we have already observed at Long Meg above, during the minor standstill season two consecutive Moons are seen to set within the portal and at Swinside we find that it is two consecutive lunar rises, one of a Moon in 97 per cent phase and the other 99 per cent phase.

The south-eastern horizon of Swinside Circle is dominated by the prominence of Knott Hill as can be seen on Fig. 7. The position of the circle in relation to this hill means that as viewed from the circle, the actual sequence of southerly standstill Moon rises during the major standstill season are hidden behind this landscape feature, that is, until they are seen to rise out of the top of the hill. Viewed from stone 54 and across the circle to stone 26 on the plan, the extreme southerly rising Moon would be seen to rise out from a notch on the summit of Knott Hill at an azimuth of approximately 159° 29' and an altitude of around 3°45' indicated by the arrow on Fig. 7.

Though the Midsummer Sun sets into Swinside Fell, the major northerly standstill Moons reach a greater azimuth and so set to the north of this fell as viewed from the circle.



FIG. 8. Swinside Stone Circle.

### The 'Ascending' Moons of Swinside

When viewed from Swinside Circle, the rising positions of the major southerly standstill Moons are obscured by the mass of Knott Hill. This instigated further investigation to see if there was anything else that might be viewed or could perhaps be considered of some significance. Interestingly, if the viewer were to venture from the circle and move to the east a few hundred meters then Knott Hill would not conceal these extreme southerly rising Moons. So might it be that the positioning of the circle in relation to the hill was of some consequence? Or might there be anything else? Calculations prompted additional visits to the circle in order to try to record the path of the summer Moons during the year prior to that of the major southerly standstill season.

On 20 July 2005 the skies were fairly clear and the Moon was in 99 per cent phase. Viewing was made from stone 54 on the plan; this position was taken because it is from this position that the full Moon was first seen to rise and was visible through the portal of the circle. It is from this stone that the actual extreme rises can be observed across the circle, mentioned above.



















Image F



The series of photos on Figs. 9 and 10 shows the path the Moon took as it rose. It can be seen that the Moon actually appears to 'ascend' up the side of Knott Hill and then, even more surprisingly, it gives the impression of rolling across the hill top for some distance.



Image G

FIG. 10. Swinside Ascending Moon above Swinside circle

When the Moon first began to rise, only the upper limb was visible and as often happens when at low altitude and near the horizon, the Moon was red in colour through atmospheric refraction. It did not appear tremendously bright because of air light.

*Image A*. The sky has darkened and the Moon thus appears to be brighter and is more discernible.

Images B, C, D. The Moon gains altitude whilst simultaneously appearing to adhere to the hill side.

*Image E.* Unfortunately clouds formed and blocked the view of the Moon at this section of the rise. Its glow can still be distinguished, however, a factor that will be discussed later.

Image F Watching from the circle one gets the impression that the Moon is rolling along the hill top. Interestingly, as the Moon moves through the sky its disc actually appears to rotate in a clockwise direction while moving from a rising position to setting. As it crosses the southern sky the Moon's north-south axis is approximately perpendicular to the horizon.

Image G. The whole of Swinside Circle beneath the light of this full summer Moon.

This was a spectacular event, but what makes it more intriguing is that this is a path that is closely followed by other Moons throughout the year approaching the major southerly standstill season and again the year following. Table 3 gives the altitude data for these 'Ascending' Moons. To better understand the similarities in altitude of these summer Moons, it may help to keep in mind that a degree of azimuth or altitude roughly equates to the width of a finger when held at arm's length and a minute of azimuth or altitude is very small, being one sixtieth of this measure. Looking at the data in Table 3 the similarities in altitude can therefore be quickly discerned. Fig. 11 demonstrates these similar paths by way of a graph displaying azimuth against altitude.

As can be seen from the data in Table 3, the phases of these 'Ascending' Moons range from full Moon to a minimum of 89 per cent phase, with the Moon's angular diameter ranging from around 30' to 33'24".

From Fig. 11 it can be seen that the rise on the 24 May 2005, 18 July 2005 and that on 04 May 2007 are slightly lower in altitude than those on 20 July 2005. They are however so near that as these Moons rise when viewed from stone 54 there is a good potential for gleaming and glow around the hillside, as witnessed to some extent in Image E where clouds obscure the Moon. It might also effortlessly be noted when comparing the size of the lunar disc on the graph to the data points.

From the said viewing position, the western edge of Knott Hill is at an azimuth of around 177°-178° and from here the western slope of the hill begins its descent. The transit azimuth for the 'Ascending' Moons falls between 179°-180° with altitudes



FIG. 11. Azimuth and altitude for the Swinside Circle 'Ascending' Moons.

Azimuth Date	144°27'	Image A 145°32'	Image B 147°33'	Image C 148°46'	Image D 150°23'	Image E 153°09'	Image F 155°10'	156°07'
24/05/05 Phase 98%	0°14'	0°40'	1°30'	2°00'	2°36'	3°28'	4°03'	4°18'
20/06/05 Phase 96%	1°36'	2°00'	2°45'	3°11'	3°46'	4°35'	5°09'	5°20'
18/07/05 Phase 89%	0°19'	0°41'	1°30'	1°58'	2°29'	3°19'	3°56'	4°08'
20/07/05 Phase 99%	0°38'	1°02'	1°50'	2°17'	2°51'	3°44'	4°22'	4°39'
4/05/07 Phase 97%	0°24'	0°52'	1°35'	2°02'	2°30'	3°26'	4°01'	4°13'
31/05/07 Phase 99%	0°54'	1°30'	2°05'	2°34'	3°01'	3°59'	4°44'	4°47'
4/06/07 Phase 91%	1°15'	1°46'	2°31'	3°03'	3°39'	4°32'	5°02'	5°20'
30/06/07 Phase 99%	0°36'	1°01'	1°51'	2°16'	2°59'	3°55'	4°26'	4°41'

TABLE 3: Azimuth and Altitude data for the 'Ascending' Moons of Swinside Stone Circle.

Note: The circle at the bottom left-hand corner is a small representation of the size of the Moon in relation to the Y scale (Altitude in minutes).

between 7° and 10°. These Moons would therefore be seen beginning their journey toward setting just as they have left the vicinity of the hill top.

# Importance of place

Thou shall set bounds unto the people round about, saying, Take heed yourselves, that ye go not up into the mount, or touch the border of it: whosoever toucheth the mount shall be surely put to death: There shall not an hand touch it, but he shall surely be stoned, or shot through; whether it be beast or man, it shall not live: when the shofar [horn] soundeth long, they shall come up to the mount. (Exodus 19:12-13)

The symbolism of ascension is a constant theme employed throughout Christian mysticism, an example being 'The Ascent of Mount Carmel' by St John of the Cross, a Spanish Christian mystic and poet. In this work he describes ascetic and spiritual efforts in the form of a long, arduous ascent of a mountain.<sup>13</sup> Mountains are frequently a symbol of divinity's propinquity. Sacred mountains are found in various cultures throughout the world from Sinai to Olympus to Fuji. The ziggurat structures of Mesopotamia have been considered as architectural translations of divine mountains. Indeed the Gilgamesh epic makes mention of Mashu, the mountain on which there is a gate where the Sun appears when it rises. The native inhabitants of northern Scandinavia, the Saami, placed importance on certain sacred features of the landscape. Each family had its own sacred mountain where offerings may have been made, though the sacrificial site was not always the summit of the mountain but

sometimes just below. Mountains were on the whole the more frequently used features of the landscape, but lakes, peninsulas, caves, islands, springs and waterfalls were also used.<sup>14</sup> Interestingly the Tatars, mentioned earlier, were originally from Finland. Is it implausible that they brought their customs with them, for instance the horse sacrifice and their observance of the Moon?

Sited in and around the heart of the Lake District, the three Great Cumbrian stone circles are all within view of numerous mountains, with Helvellyn, the third highest peak in England, visible from all three sites. But let us consider for one moment the situation at Swinside. Here we have Knott Hill, which sits alone and dominates the skyline to the south of the circle. As discussed above, viewed from stone 54 there is a series of Moons that adhere to Knott Hill, making their own ascent, but also that span a time period of around three summers; the year prior to the major standstill season, through the season and on to the year after. This begs a number of questions: if observation was being made of the Moon from the site of the Swinside circle, then would the observers have missed this event? If the observers were aware of these 'Ascending Moons' then would they have ignored them, considering them of little interest or consequence?

If for one moment we were to suppose that these Moons had been recognised as being of some significance, then a host of other questions need deliberation; could this series of Moons have been employed as a whole and considered of some ritual importance? Is it conceivable that these Moons could have acted as possible indicators of the approaching lunar standstill? Might they have been of such importance and influence that the circle was constructed at this site to facilitate observation of this phenomenon? With its positioning and this lunar activity, is it plausible that Knott Hill could have been viewed as a sacred mountain?

At Swinside there is a nearby stream which runs off from the west, round the south of the circle, toward the east for about 0.5km where it joins Black Beck. Knott Hill has Black Beck running to the east of it and Whicham Beck along to the west. Whicham Beck continues and passes below the stone circles up on Lacra Bank and onward in the direction of Giant's Grave at Kirkstanton. In fact, all three of the great Cumbrian stone circles have a nearby water source. To the south of Castlerigg there was a tarn in Naddle Valley and there is a well to the north; at Long Meg there is Peat Moor Tarn and a spring to the north of the ditch enclosure. Discussion with Mrs Todd, past resident of Long Meg farm, revealed that during building work some years ago, a well/ spring was found under the floor of one of the older farm out-buildings, placing it firmly within the bounds of the ditch enclosure. Perhaps this was the 'very fine spring' mentioned by Stukeley.<sup>15</sup>

Let us now return to Long Meg and think about its surroundings: if we were to momentarily accept that the utilisation of the astronomical stones in Table 2 is correct and then consider that the horizon was perhaps different, for example Fiends Fell was of a lower altitude, then it would require an alteration in the positioning of the stones to facilitate the midsummer sunrise and the major southerly Moon set. Indeed it is the very fact that the circle is sited with its present horizon, utilising the features of the sloping ground that allows the four astronomical stones to function. We can be sure that regardless of an awareness and knowledge of the lunar extremes, those responsible for the construction of the circle would have had to be present to witness these astronomical events within the chosen landscape, in order to incorporate them into the circle. We can therefore go on to state that even with prior knowledge of the lunar standstill seasons, these observations would still take at the very least ten years to complete, from a major standstill season to a minor standstill season.

The work of Zipf<sup>16</sup> has dealt with the concept that man seeks out methods which adhere to the Principle of Least Effort, i.e. maximising output while minimising effort. However the work of Bradley and Edmonds<sup>17</sup> has demonstrated that the stone 'axe factories' of the Langdales have proved that this is not always the case. The stone used for axes came from places that were difficult to access, often with spectacular views, though suitable material for their production was readily available in far more accessible places. The production of stone axes, the efforts and concepts of rock art and the erection of stone monuments all show a link of effort and purpose, though we may not be certain just what that purpose was. We might consider that prehistoric man may not have looked for 'least effort for most gain' when evolving their own concept of their surroundings, the Cosmos and their place within it.

This leads us to consider the importance of place and location, a topic which has been discussed by Bradley<sup>18</sup> and later by Evans.<sup>19</sup> Was the surrounding landscape the major consideration when choosing a site for construction? Were these lunar and solar rises and sets a factor of primary importance? Might the choice have involved a combination of the two? It may well have been so, especially when taking into account the complexities of the stones and their layout. Recent work indicates a relationship between the circle, the ditch enclosure and astronomical alignment giving weight to the theory that the Long Meg site might be better considered more of a complex than a simple stone circle.<sup>20</sup> If the 'astronomical stones' were utilised by those who constructed the circle and are not just coincidence, then it might be said that the positioning of Long Meg and the circle stones in relation to their surroundings is nothing short of genius.

# Conclusion

We see that there is potential at these circles for both solar and lunar alignments. There could also be what may be considered a combined event at the Long Meg circle where involving the portal and the Long Meg stone at sunset while a similar event might be witnessed through the portal at the Swinside Circle during the sunrise. These events would occur at the time of Midwinter solstice during the season of the minor southerly Moon. At this time the Moon would be new and therefore the night immediately following these events would not only be the longest but also the darkest night. Could this perhaps have been considered an important 'union' of these celestial bodies? Or even a significant ritual occurrence?

This research has studied the three Great Cumbrian stone circles, all of which have portals incorporated into their design and all constructed in a mountainous

environment. They do though have differing environs and horizons, they are different shapes and sizes and the portals are located in different areas of each circle. Regardless of the differences, these investigations indicate that they all do appear to have solar and lunar alignments that might be considered as one possible common attribute.

Finally, extreme care must be taken when assessing findings. A quick glance at a work by Kugler<sup>21</sup> who collected 17 pages of parallels between the history of Louis IX and Gilgamesh and went on to show that Louis IX was in fact a Babylonian solar hero, demonstrates how easy it is to fit a large body of evidence into whatever theory has been decided upon. So, here the observations are simply presented and their interpretation is entirely the reader's prerogative. That said, the above observations strongly suggest that much further research needs to be carried out at the stone circles to better understand their possible astronomical and spatial positioning.

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