

Prehistoric Pennal

A talk by

J. R. Hoyle

Introduction and background information

Most people, on visiting a stone circle, have a quick look round and perhaps try to count the number of stones.

They then either move on, or perhaps sit on a stone and admire the view whilst having a drink and a bit of lunch.



Most people have tended to regard stone circles as crude structures, made by people with little ability or refinement.

One man **Professor Alexander Thom** regarded them in a different light.

He recognised that the builders had been able to move stones of up to eighty tons and erect them so securely that many are still standing after 4000 or 5000 years.

They also built Silbury Hill. This is the largest prehistoric mound in Europe and is 130 feet high.



They also built **dolmens**, which seem to have been for burials.

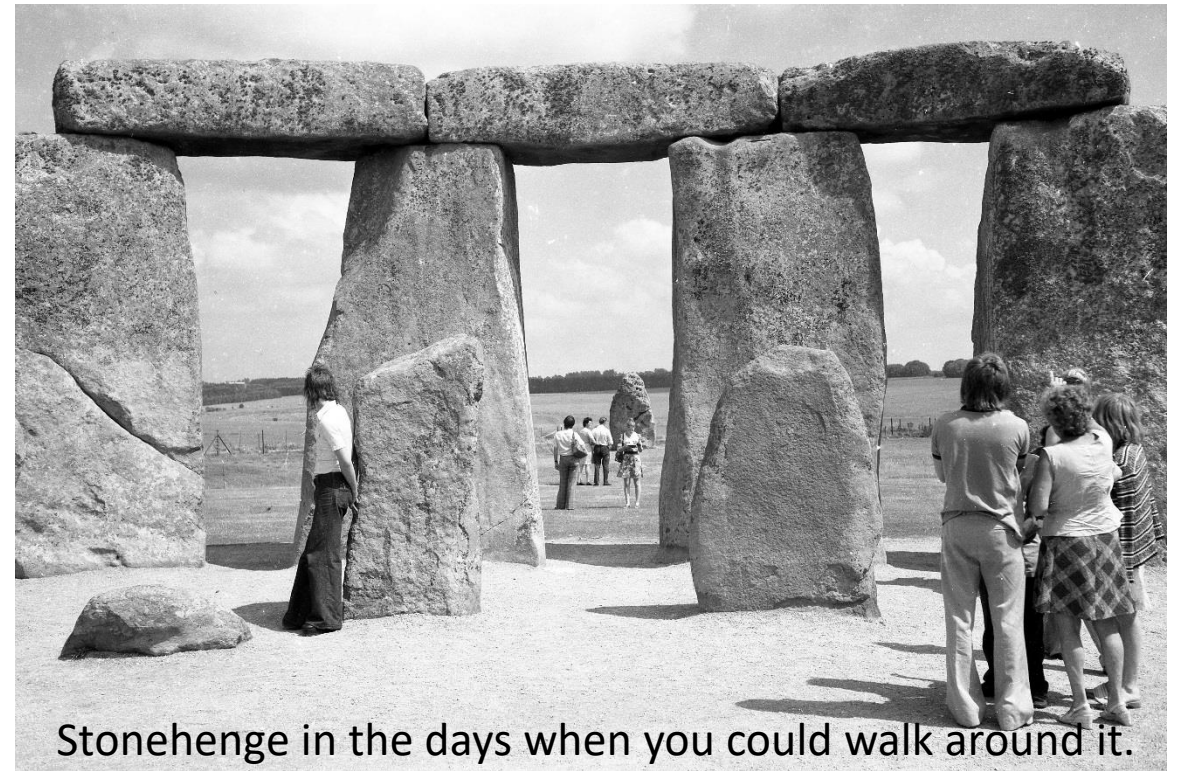
Pentre Ifan in Pembrokeshire is a fine example of one, but is by no means the only one.



My Interest in Stone Circles.

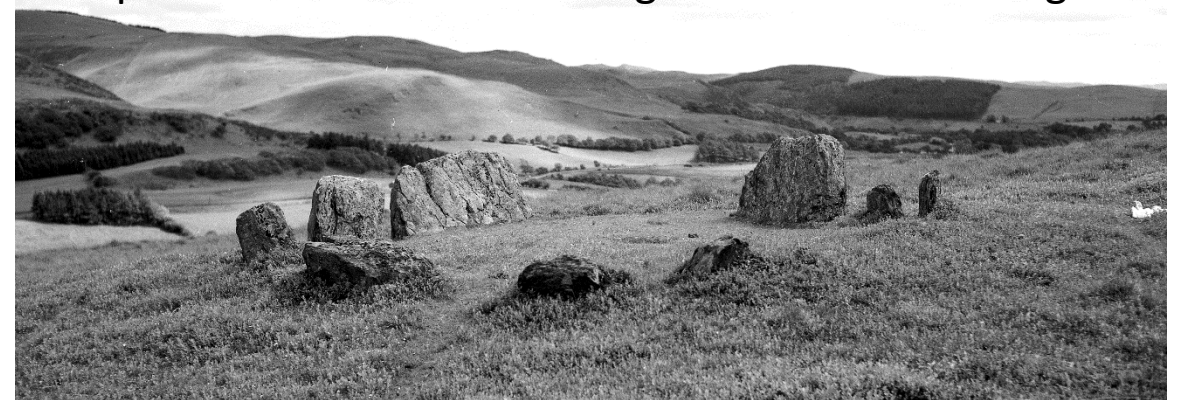
I only had a general interest until I read of the work of Alexander Thom in the 1970ties.

Castlerigg Stone Circle, near Keswick



Stonehenge in the days when you could walk around it.

Temple cairn circle. A small ring north of Devils Bridge.



Alexander Thom

Alexander Thom was not an archaeologist, but was very important as he collected a vast amount of accurate data on a large proportion of the Megalithic sites in Britain and Brittany.

Thom spent some time surveying for the Canadian railway, before becoming a professor of engineering at Oxford.

His main passion and much of his spare time, was spent surveying Stone circles and other megalithic remains.

He surveyed perhaps a thousand or more to a very high degree of accuracy. This was the first large body of highly accurate data to be produced of megalithic sites.

Whilst other researchers had made plans of prehistoric remains previously, very few were accurate and most were simply rough impressions of what was to be seen.

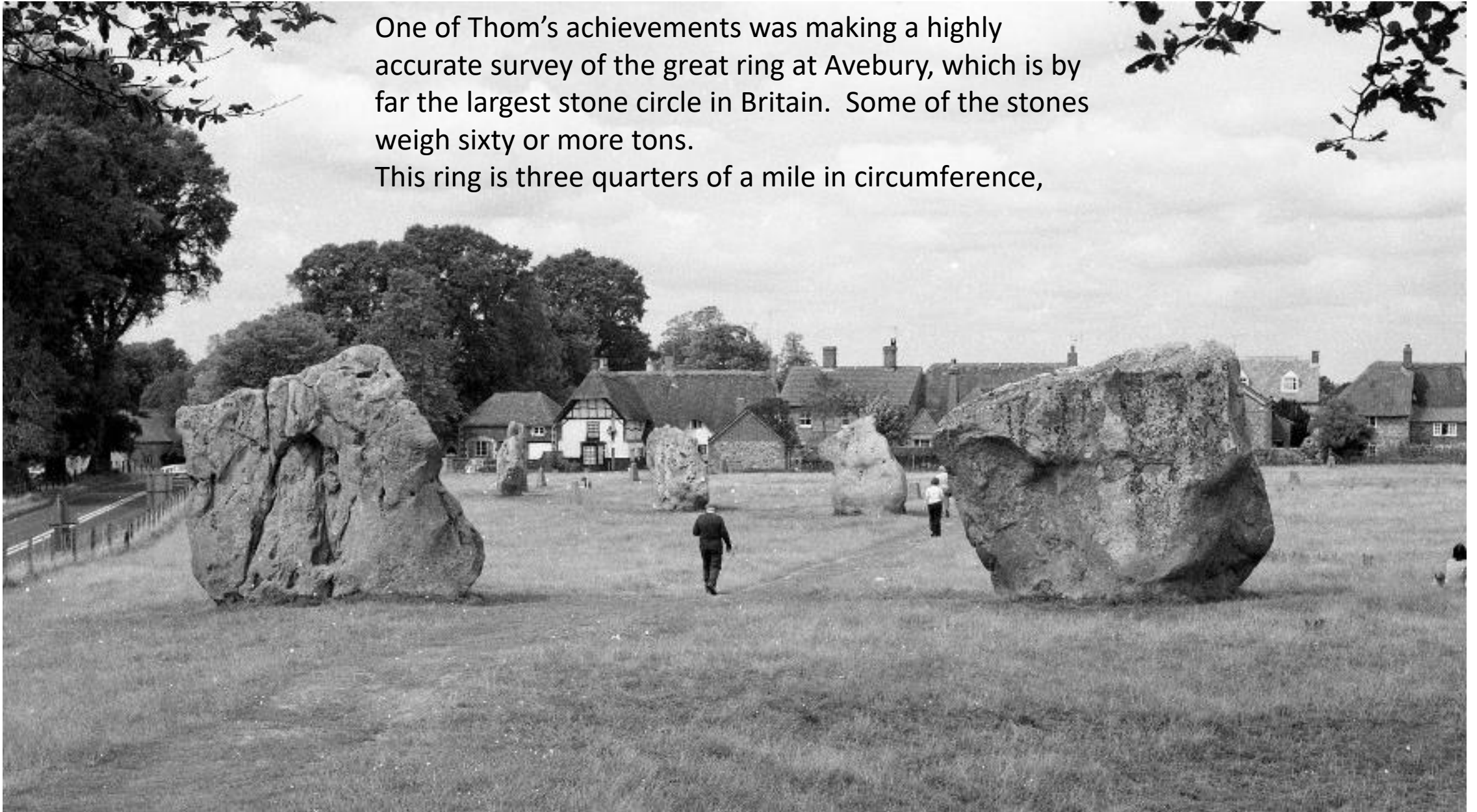
Many Archaeologists argued that as stone circles were crude structures that were not built to any degree of accuracy in the first place, it was pointless to survey them accurately.

Thom's conclusions.

From analyses of his surveys he drew the following remarkable conclusions.

1. Most rings were circular.
2. Those that were not circular has specific designs, such as flattened circles, ellipses, egg shapes and more complex designs.
3. They were set out using a standard unit of length, which he called The Megalithic Yard. This was equal to 2.72 feet.
4. Some of the stones were aligned to indicate astronomical events, such as certain rising and setting points of the Sun and the Moon. These he regarded as solar and lunar observatories.
5. He described in detail how these solar and lunar observatories would work to provide a calendar and to help to predict eclipses.

One of Thom's achievements was making a highly accurate survey of the great ring at Avebury, which is by far the largest stone circle in Britain. Some of the stones weigh sixty or more tons. This ring is three quarters of a mile in circumference,



My reactions to Thom's ideas.

I was aware of several stone circles in Mid Wales and I decided to survey them as accurately as possible in order to see if they conformed to Thom's theories.

These surveys are accurate to about one or two inches.

There were eight rings that were complete enough to give a good idea of the original plan and are shown in the illustration on the right.

They differed greatly in size.

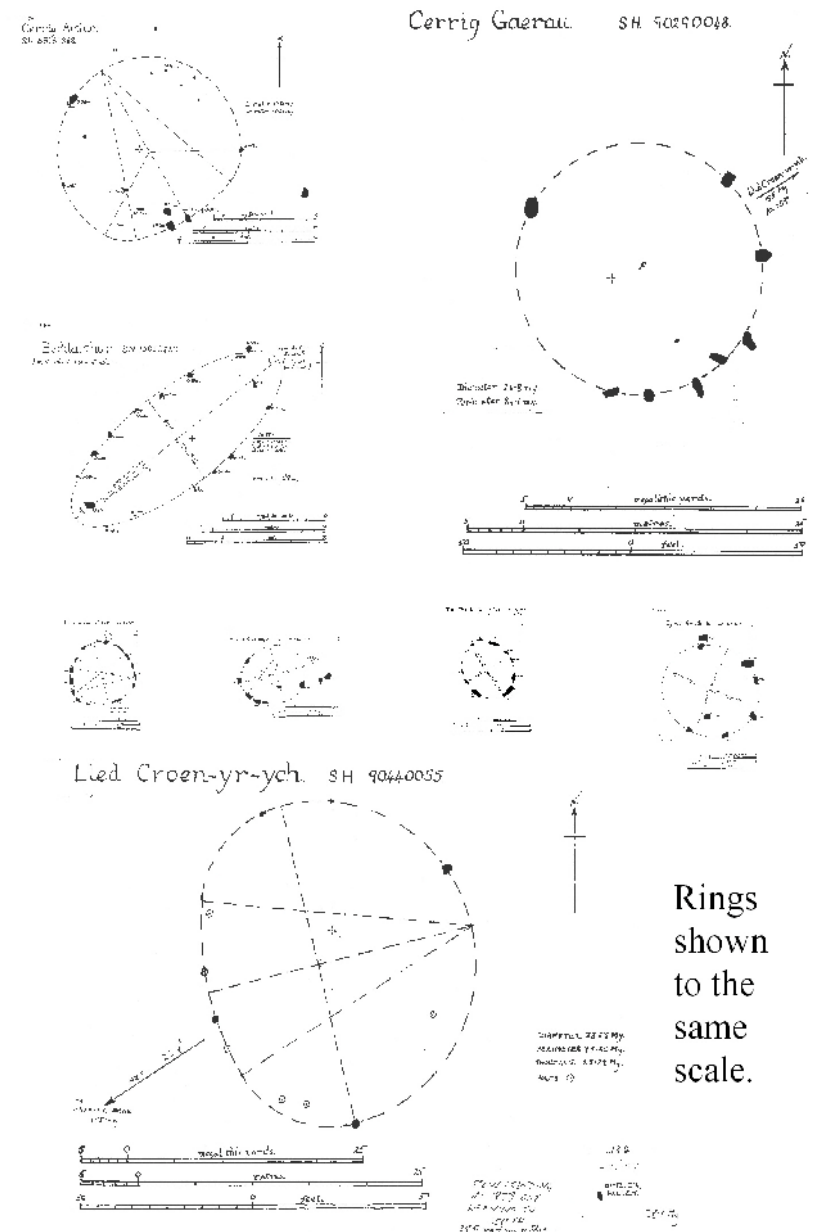
One was circular.

Two were flattened circles.

Three were ellipses.

Two were egg shaped.

All conformed to Thom's theories, except the circular ring, as its diameter was not a whole number of megalithic yards.



Surveying stone circles.

These surveys were made using an astro compass, which acted as a theodolite, and steel tapes.

A long suffering wife and children also helped.



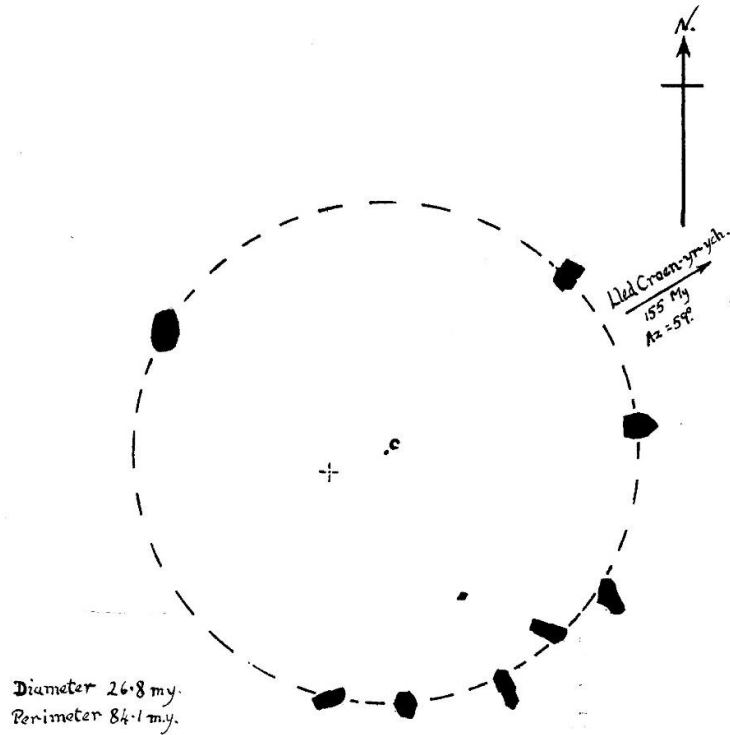
Bedd Arthur. One of the stone circles surveyed



Two rings on the hill to the south of Llanbrynmair

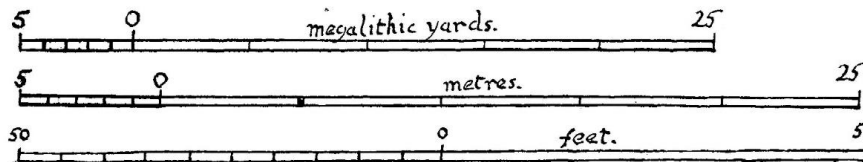
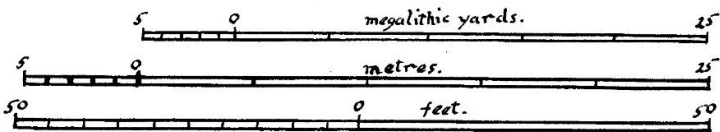
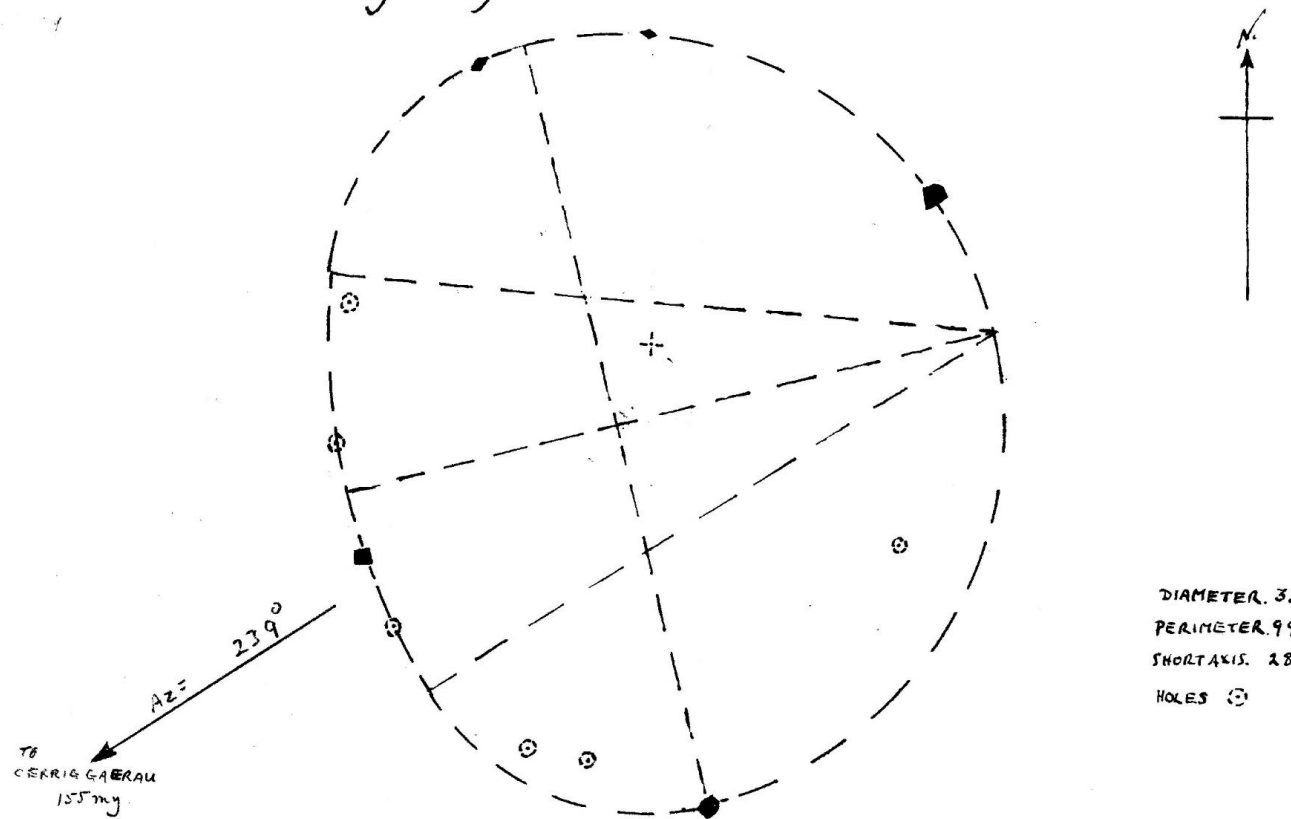
Circular ring

Cerrig Gaerau. S.H. 90290048.



Type B flattened Circle

Lled Croen-yr-ych. SH 90440055.

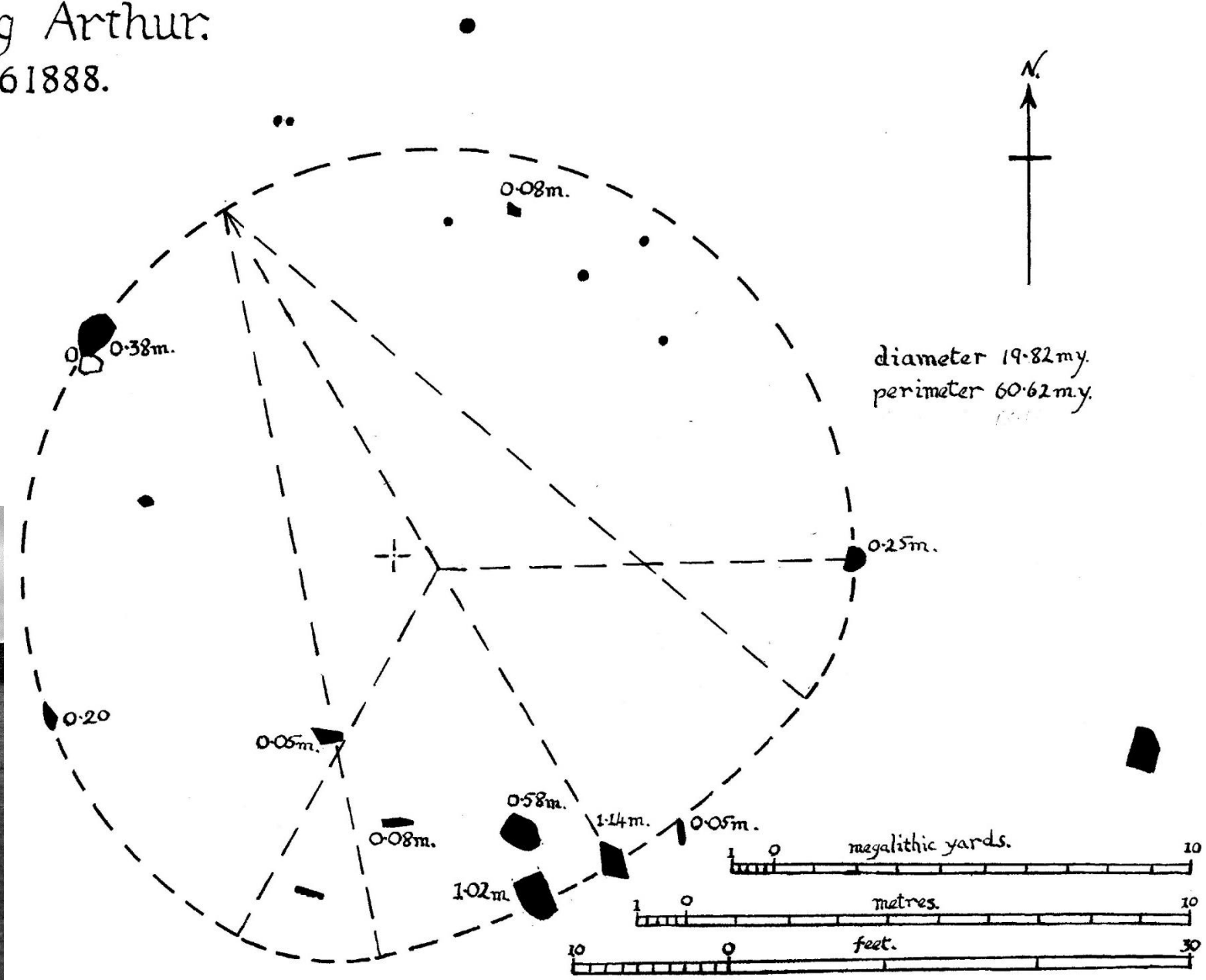


OUTLIER.
FALLEN.

This Type A Flattened Circle is situated to the north east of Barmouth, near a farm called Sylfain.

Note that the hill slope over the left hand stone marks the extreme southerly moonrise position as seen from the centre of the ring.

Cerrig Arthur.
SH 63161888.

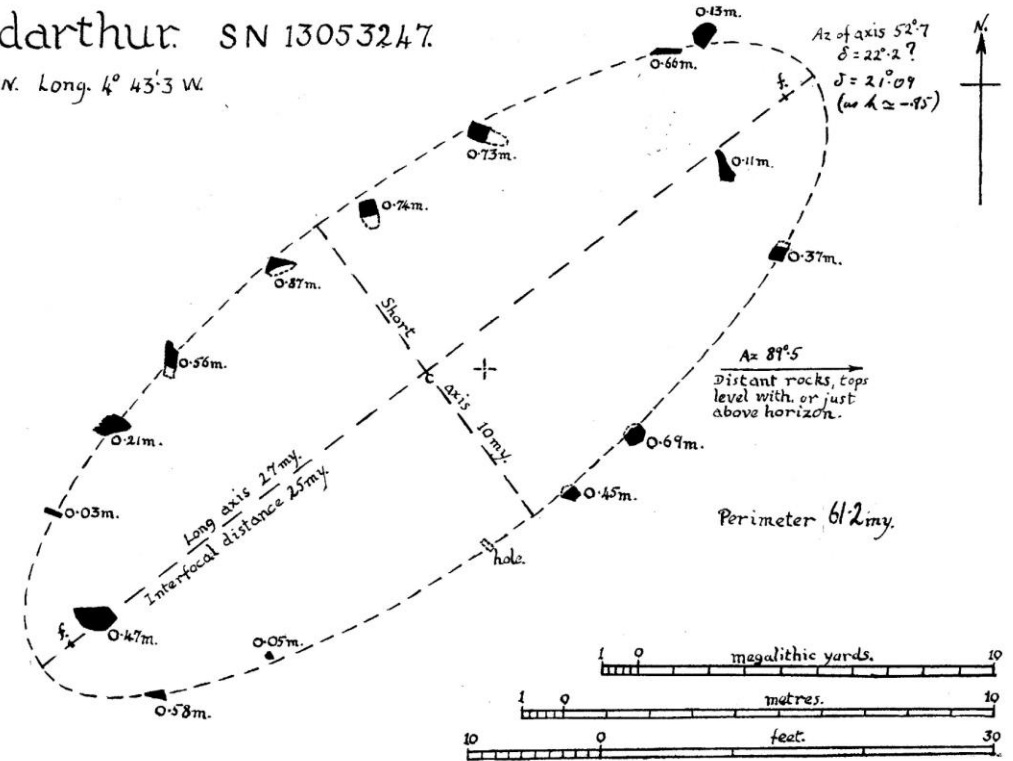


Bedd Arthur

This is an unusually long and thin ellipse, with two stones on the long axis is high up in the Prescelly hills

Long axis is 27 megalithic yards.
 Short axis 10 megalithic yards.
 Interfocal distance 25 megalithic yards.

Beddarthur SN 13053247.
 Lat. $51^{\circ}57'5''N$. Long. $4^{\circ}43'3''W$.



BEDD ARTHUR LATE NINETEEN SEVENTIES. J.R.H.

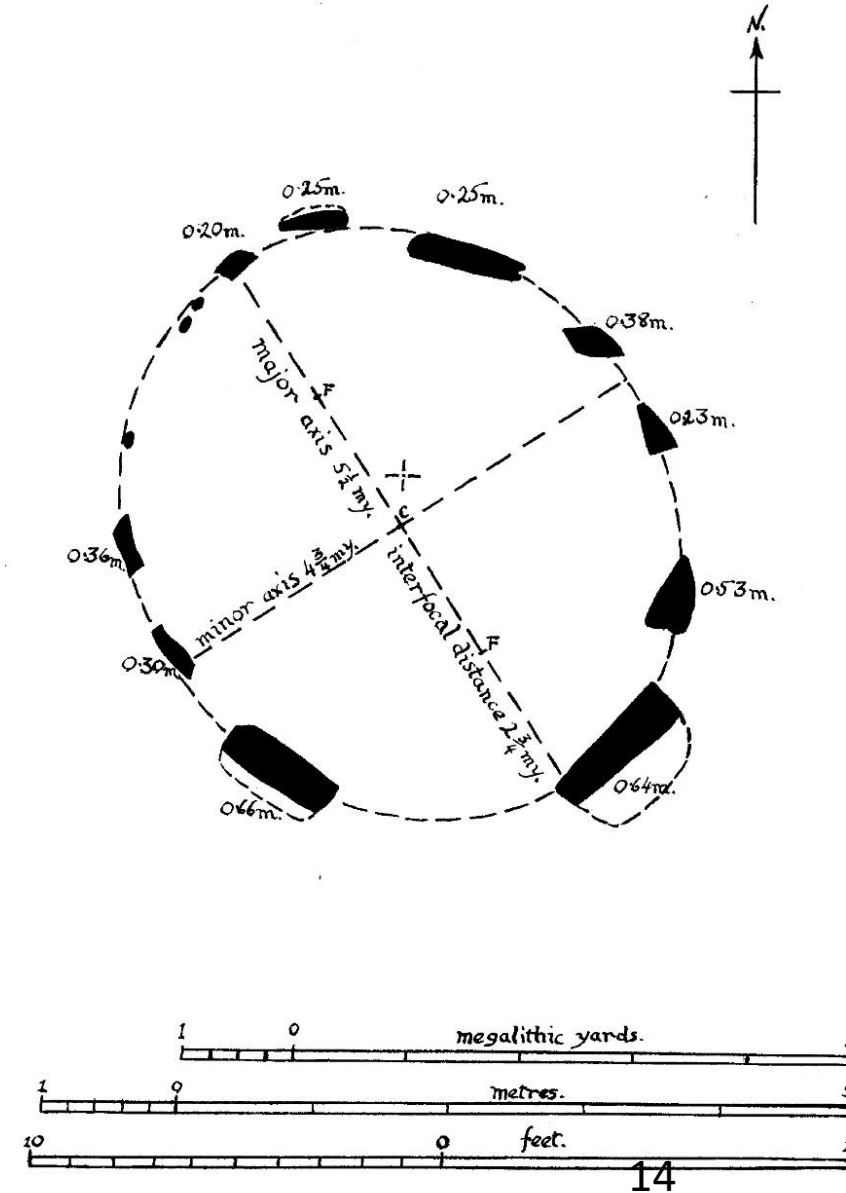
This little stone circle lies to the north of Devils Bridge.

It is an ellipse and is the same shape and exactly half the size of a ring called Ninestones in Dorset.

To the east and in the valley below lies the church of Ysbyty Cynfyn, whose churchyard wall has been built to include the stones of another existing stone circle.



The Temple Cairn Circle. SN. 746791. (BWLCH GWYN) 74577916



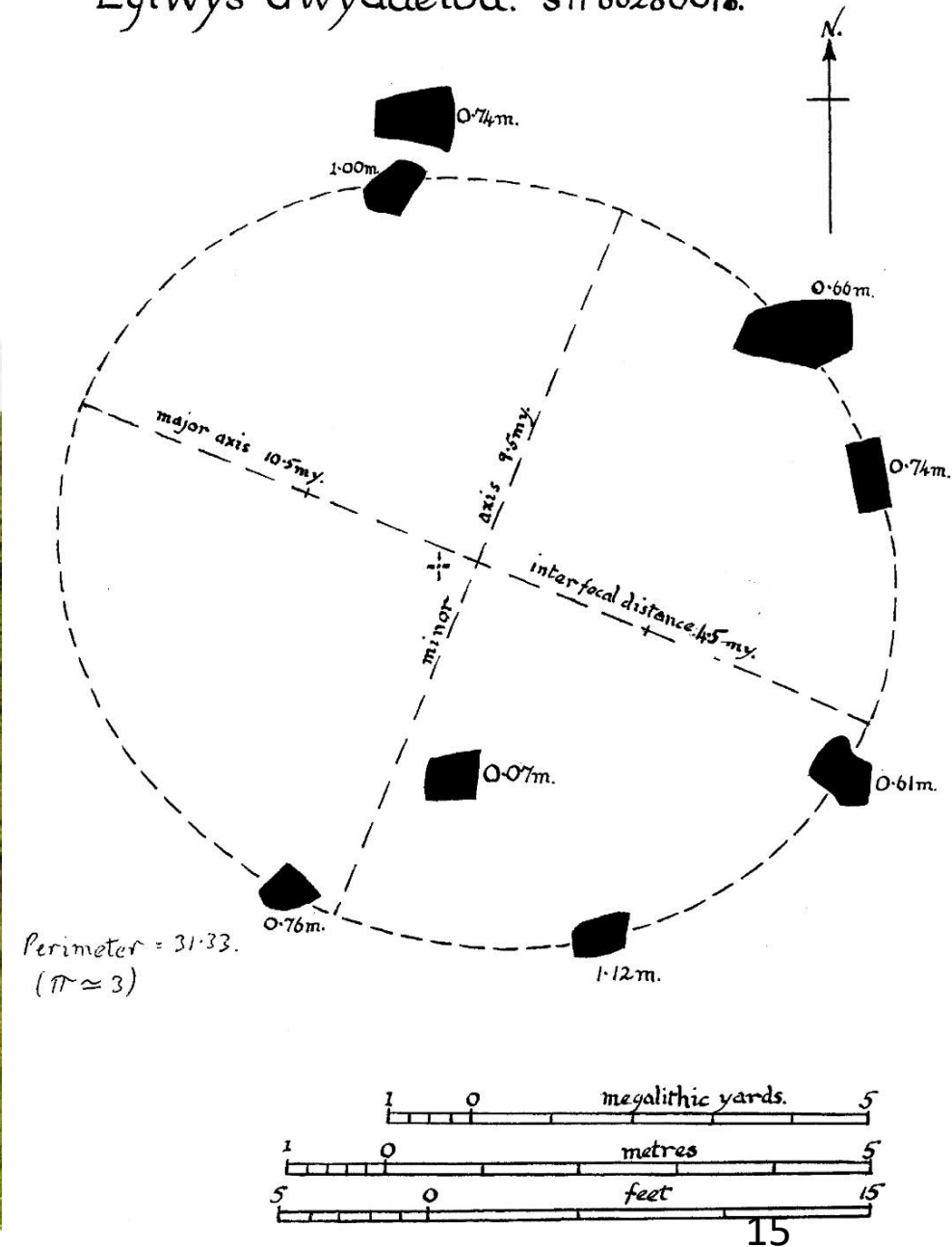
This small elliptical ring lies close to the old coach road that runs from the top of Happy Valley to Rhyd-er-onen.

The long axis points close to Tomen Las, which is near Pennal.

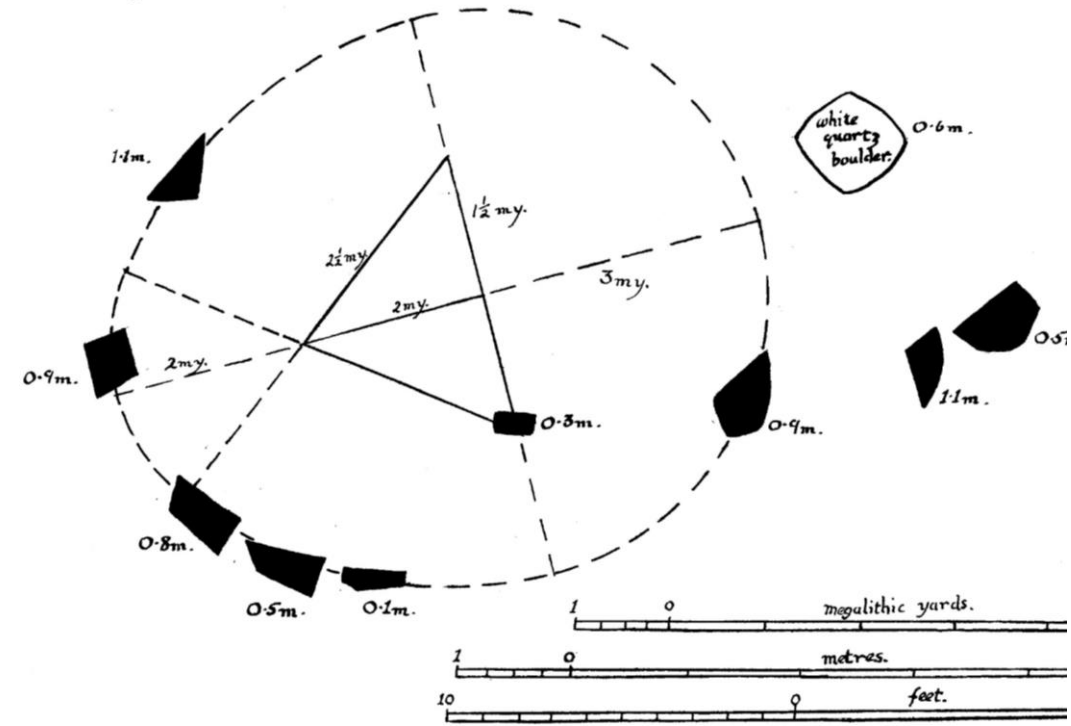
In the last few years two smallish stones have been placed around the west side, but they were not there when the survey was made about 1975.



Eglwys Gwyddelod. SH 66280018.



Arthog Standing Stones SH. 65261393.



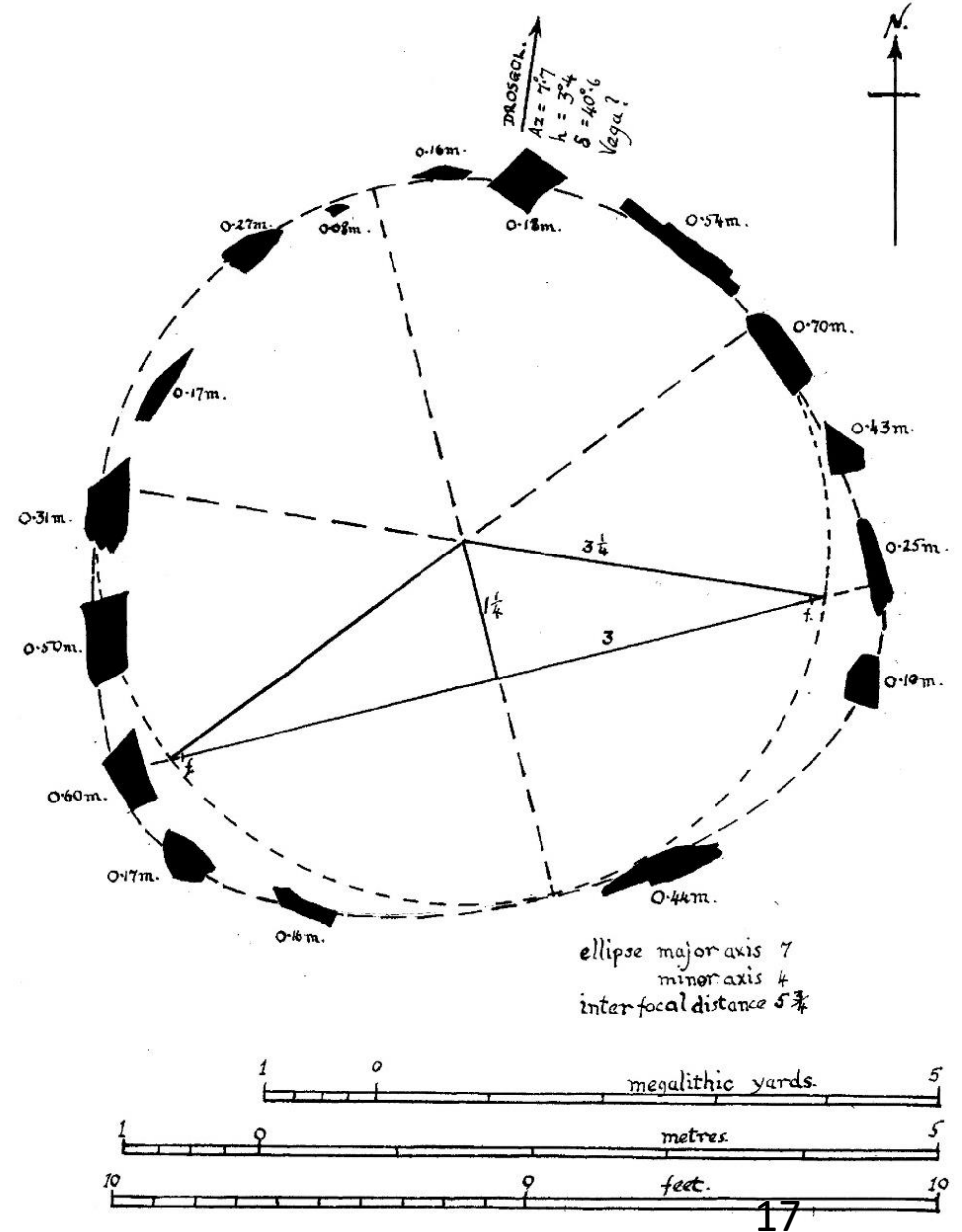
This ring, above Arthog, is an example of a type A egg shaped ring. The centres of the arcs lie at the corners of the triangles, which have sides of $2\frac{1}{2}$, 2 and $1\frac{1}{2}$ megalithic yards.

This ring, to the south of the Nant Y Moch reservoir, has been allowed to become overgrown and farm machinery has disturbed the ground near to the ring. Fairly recently two stones have been placed to fill the gaps at the south and south east sections of the ring, but they are not part of the original.

The design is fascinating in that it is an egg shape with an elliptical big end. It is the only known ring with this type of geometry.



Hirnant Cairn Circle. SN 753839



A landscape of a grassy hillside with scattered grey rocks and clumps of brown grass. The terrain is uneven, with patches of green grass and areas of dry, brown vegetation. Several large, flat, grey rocks are scattered across the slope. The overall scene is a natural, somewhat rugged hillside.

After this preamble we now move to Pennal

The strategic position of Pennal.

In the days before there were good roads or railways, the sea was often the main means of communication.

The river Dyfi was a vital lifeline and it was navigable as far as Derwenlas, which is a considerable distance upstream of Pennal.

The Romans used the river to supply the fort at Cefn Caer. The ships unloaded at the point indicated by the red arrow.

Trading Schooners were built at several boatyards in Aberdovey. These not only traded around or coasts but went to the Mediterranean and across the Atlantic.



Historic remains in the area.

Cefn Caer

A roman fort that has been well documented. On this site has been built a Medieval Longhouse

The Church

The Church is believed to be a very early one and because it has a roughly circular wall around it, some believe that it has been built on a much earlier pre-Christian structure.

Three tumuli

Tomen Las lies to the south west of the village. A smaller tumulus to the north west and a third lies across the Dyfi near Ynys Hir bird reserve and is called Domen Las.

Eglwys Gwyddelod

A small Neolithic stone circle above Happy Valley



Trip to Cefn Caer January 2004

The village of Pennal

A map showing the two tumuli and the church



Pennal Church

The church yard is roughly oval and one reason for this has been stated to be that the Devil has then nowhere to hide.

Another explanation is that the early church here was built on a pre-existing pagan site, possibly a stone circle.

There are large white quartz stones in the north wall of Pennal Churchyard that could be from the original ring.

The south wall though is not in its original position, as it has been moved at least twice to allow for road widening.

Other churches such as the one at **Ysbyty Cynfyn** are known to have been built in the interior of a stone circle, as the large upright stones are still in the Churchyard wall. To the west of this church and quite high on the hillside is the small well preserved **Temple** stone circle.

Tomen Las

This flat topped tree covered mound is about 32metres in diameter and has a height of over 4 metres. The building of it must have involved moving about 5000 tons of earth.

There are a couple of stories about it.



The North Tumulus

This is much smaller than Tomen Las and seems to have no associated tales attached to it. It does not seem to have a name.

The two should probably be treated as a pair.



Stories about Tomen Las

Story 1. Owain Glyndwr

There is a tradition that the mound was built so that Owain Glyndwr could stand on it and speak to the people. The size of the mound seems to be a little excessive for this purpose.

If a man could pile ten tons of earth on the mound each day, it would have taken fifty men about ten days to build the mound.

If there is any truth in this, then it is more likely that he stood on the top of a pre-existing mound.

Story 2. Thomas apGriffiths

This more colourful story relates how Thomas apGruffydd, a very influential man and a large land owner, killed a man called David Gough in a sword fight.

Thomas, having been injured, lay face down to recover and was himself killed by one of David Gough's followers who crept up on him.

Thomas apGruffydd was then buried and the mound of Tomen Las was built over him.

Again, if there is any truth in this story, it is more likely that Thomas was buried under the existing mound.

This story was printed in two versions in *Archaeologia Cambrensis*, 1885 page 24 and 1886 pages 542-543.

Thomas's apGruffydd's third surviving son Rhys apThomas, became the most influential Welsh supporter of Henry Tudor. He must have secretly prepared the ground for Henry, as very quickly, he was able to raise large numbers of fighters for him in Wales and he went on to fight at Bosworth. It has been suggested that he was responsible for killing Richard the Third.

The North Tumulus

The stories do not give a convincing explanation for the building Tomen Las and the North Tumulus was never mentioned.

As the tumuli are probably associated, some more convincing explanation is needed.

It seems likely that both tumuli existed before these events took place and it is possible that they are prehistoric.

When were these tumuli built and who built them?

Thom came to the conclusion that some megalithic remains that he surveyed were built to act as observatories of the Sun and Moon.

He described what properties they must have to be effective for these purposes.

These properties were quite specific and not at all vague.

1. There must be a backsight. ie. Something to mark the place where the observer must stand.
2. There must be a foresight. ie. Some distant object to mark the place where the Sun or Moon will be seen to rise or set.
3. Sufficient space to move around to observe the rising or setting on the days before or after the event being observed. This is particularly true for observations of the Moon.

The remains at Pennal have all the characteristics of a Lunar observatory, as described by Thom.

All the essentials are there and there is nothing that is superfluous.

A bit of Astronomy

Rising points of the Sun.

When seen from Pennal the Sun rises to the north east in June and to the south east in December. In March and September it rises in the east.

The rising point gradually moves from north east to south east between June and December and then back again between December and June.

The sunrise positions change fairly quickly when it rises in the east, but more slowly as it approaches the extreme positions.

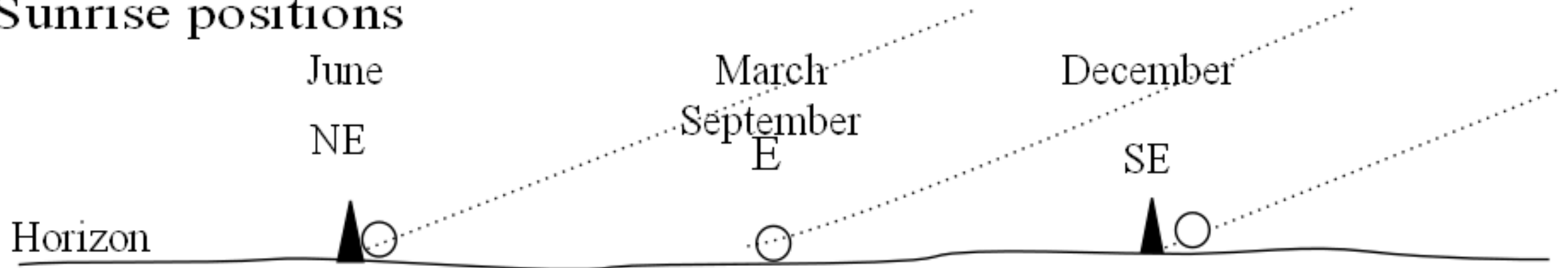
Many standing stones indicate these extreme rising (and setting) positions of the Sun and also on occasions positions between.

The Heel Stone at Stonehenge indicates mid summer sunrise as seen from the centre of the Stonehenge rings.

Extreme rising and setting points of the Sun.

2000 years ago these positions were a little wider than they are today, but the difference was only small.

Sunrise positions



There were similar extreme positions for the setting Sun.

Moonrise positions.

The Moon behaves in a bit like the Sun, but there are two significant differences.

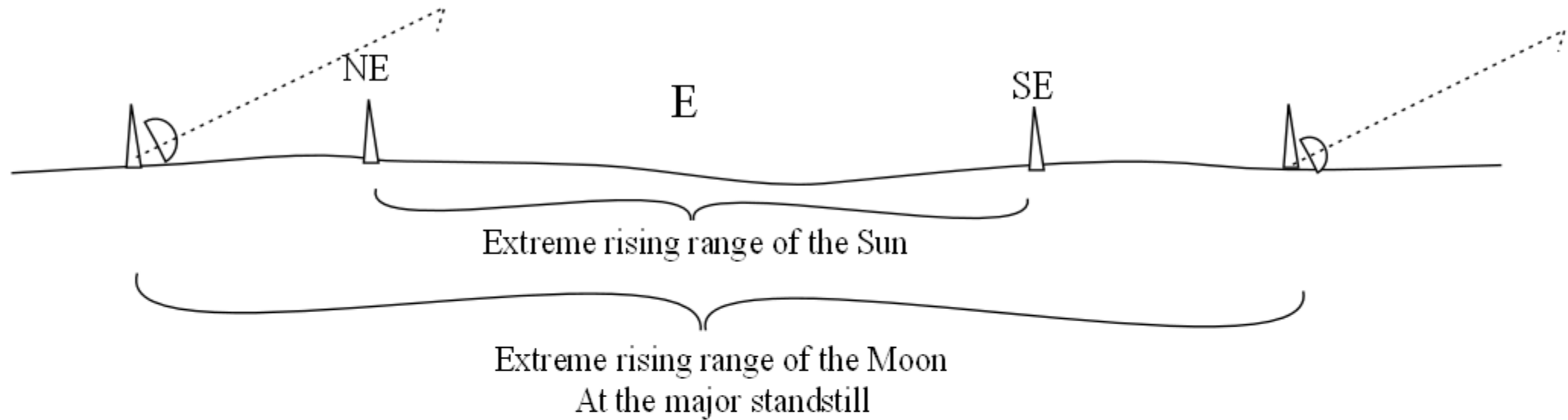
Firstly, whilst the Sun goes through its cycle in the course of a year, the Moon completes its cycle in just over twenty seven days. This means that the rising (and setting) positions change about thirteen times faster than those of the Sun.

Secondly, the extreme rising positions of the Moon gradually change over a period of 18.6 years. These extreme positions gradually widen and then slowly decrease.

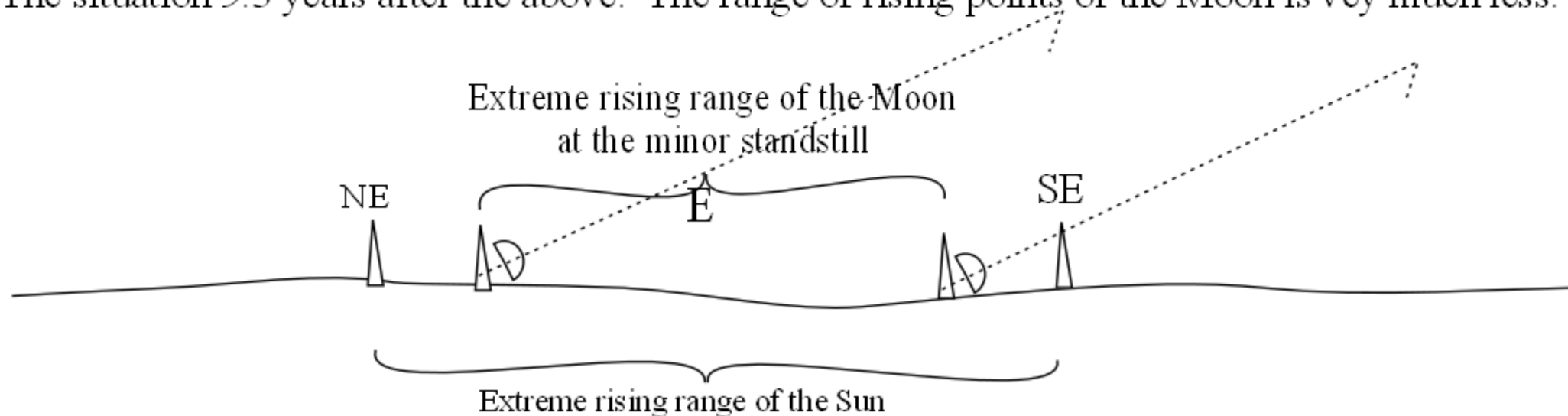
This makes it much more difficult to make meaningful observations of the Moon using methods available to Neolithic man.

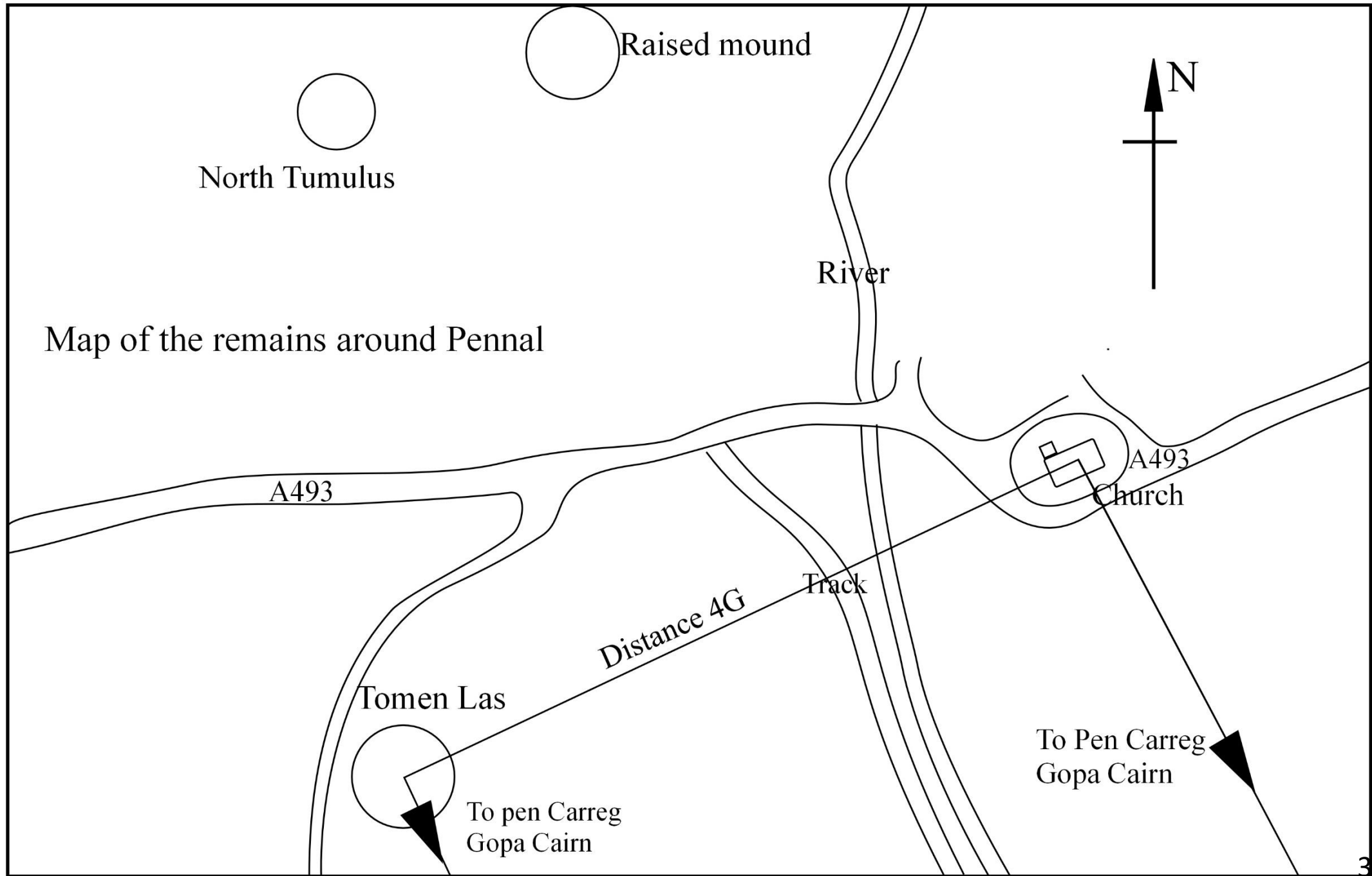
Thom's accurate surveys of megalithic remains did indicate that such observations were made at some of the sites.

Extremes of the rising points of the Moon



The situation 9.3 years after the above. The range of rising points of the Moon is very much less.





Pennal Churchyard

Surveyed 11th August 2018

By J R Hoyle, D J Hoyle and E M Hoyle

Long axis 46.43m 56My

Short axis 38.1m 46my

Interfocal distance 26.53m 32my

Scale: 1 inch on plan is 5m on ground

5m

ST1

ST2

F2

F1

The gate is situated here to give entry to the churchyard

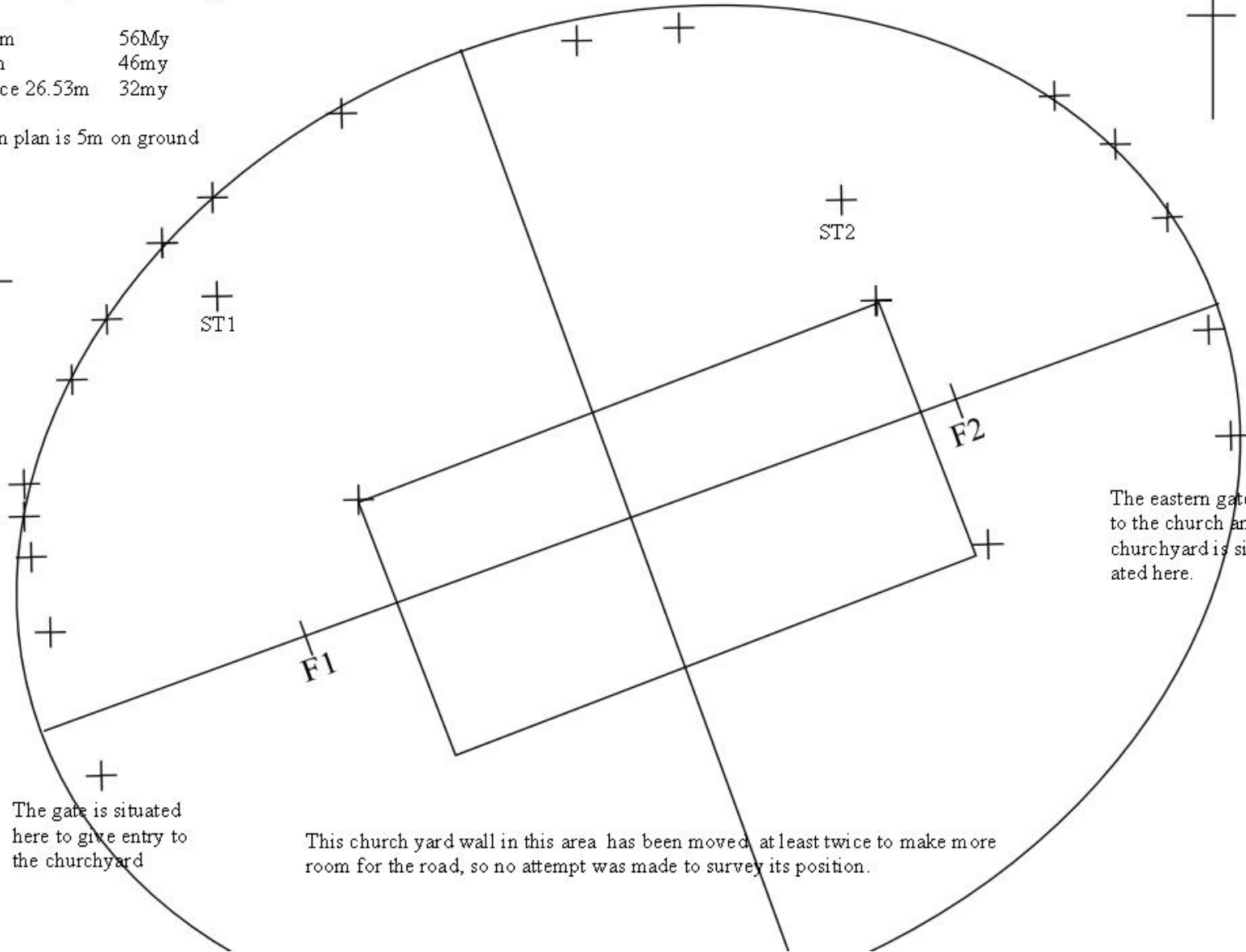
This church yard wall in this area has been moved, at least twice to make more room for the road, so no attempt was made to survey its position.

The eastern gateway to the church and churchyard is situated here.



This is an accurate survey of the northern half of the inside edge of the churchyard wall.

The position of the main part of the Church is accurately placed with respect to the wall.



Pennal Sightlines to Pen Cerrig Gopa Cairn

This is a view looking south east from close to **Tomen Las**.

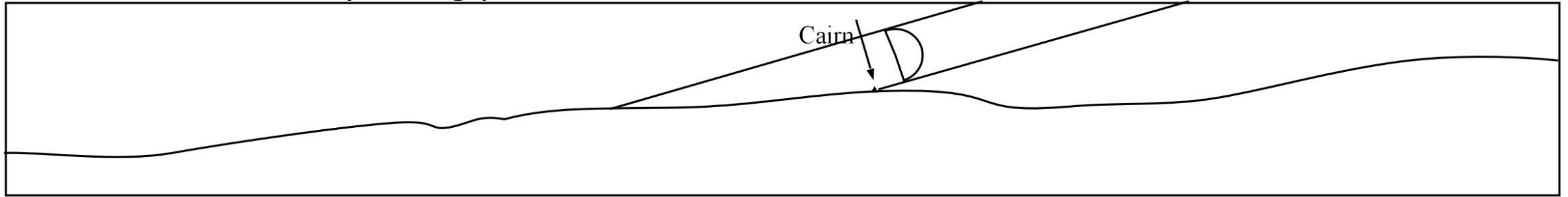
On Pen Cerig Gopa indicated by the arrow is a **cairn**. It is the only cairn that is visible on the horizon between east and south.

The lower limb of the Moon would be seen to skim this cairn when rising at its extreme southerly rising position when viewed from **Pennal Church**.

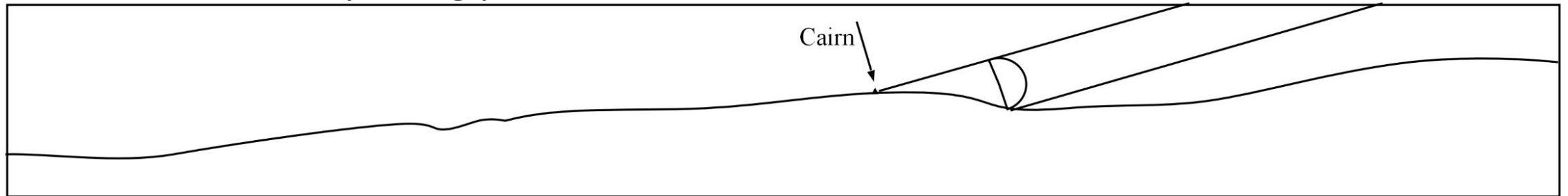
The lower limb of the Moon would be seen to skim this cairn when rising exactly **one day before, or after**, it reaches its extreme southerly rising position when viewed from **Tomen Las**.



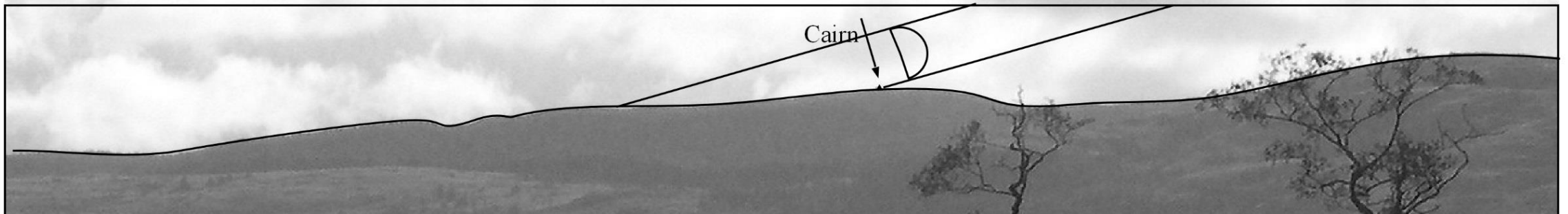
Extreme southerly rising point of the Moon as seen from Pennal church.



Extreme southerly rising point of the Moon as seen from the North Tumulus



Moonrise seen one day before, or one day after, the time of its extreme position., as seen from Tomen Las



Why it is likely that this was a Lunar Observatory for observations of the extreme Moonrise position at the time of the Major Standstill

Pennal Church, Tomen Las and the **North Tumulus** are in exactly the correct places to use the cairn on the top of **Pen Cerrig Gopa** for observations of the extreme southerly moonrise.

The distance between Pennal Church and Tomen Las is that required by Thom's theories, to make the observations work.

The line between Pennal Church and Tomen Las is exactly at right angles to the line joining it to the cairn on Pen Cerrig Gopa.

This observatory would have worked in 2000 B.C.

Today, because the tilt of the Earth's axis has decreased by about half a degree, the equivalent rising points of the Moon would be seen a little to the left of the cairn, when viewed from these positions.

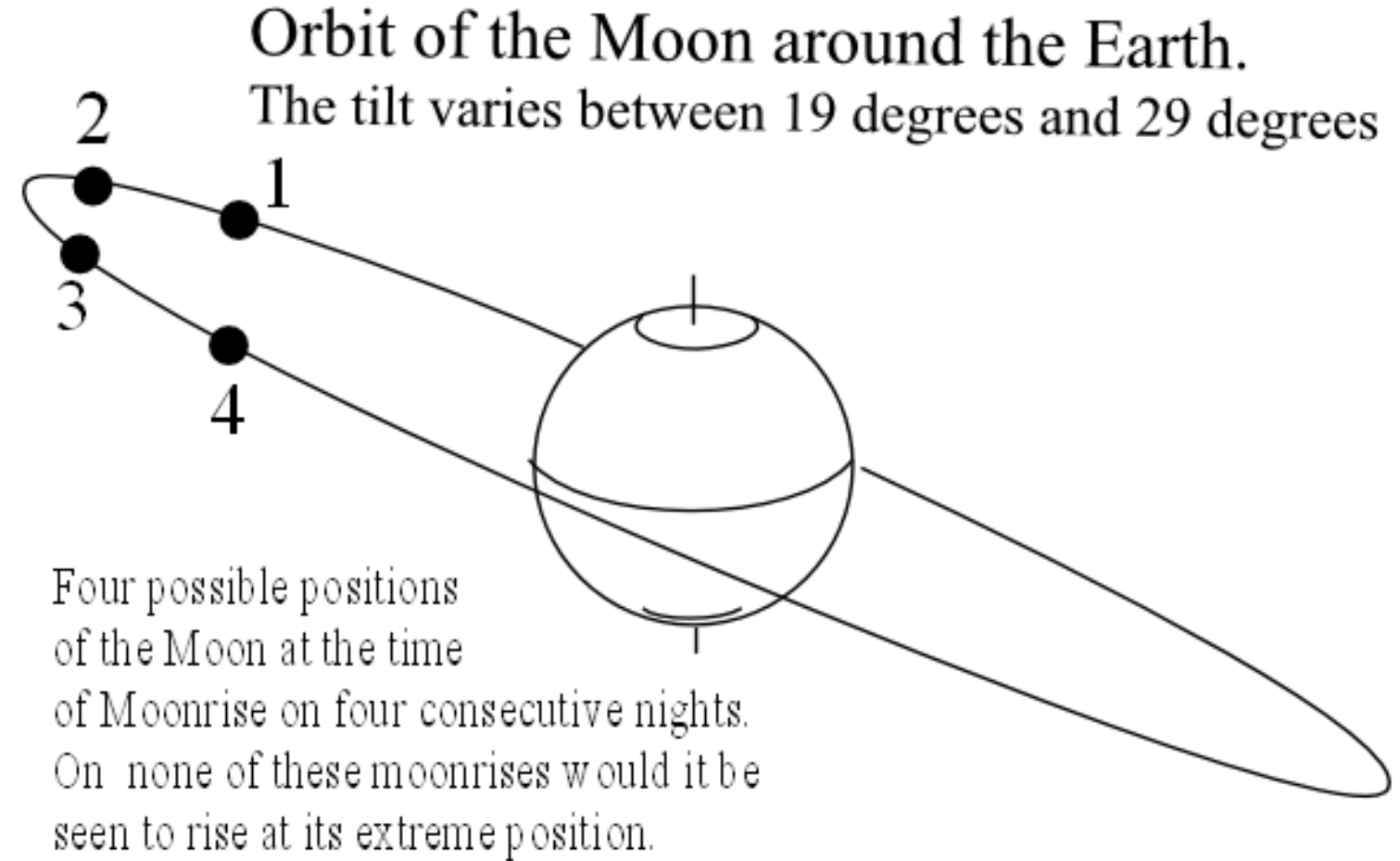
Practical difficulties finding the extreme Moonrise positions.

The weather is frequently a problem.

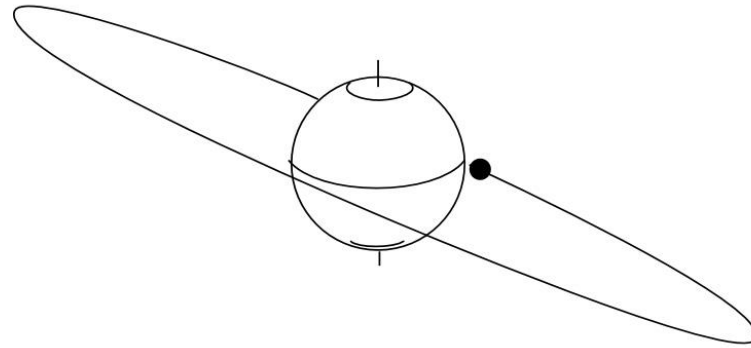
The Moon's rising position changes so quickly that it will only rise at the extreme position on rare occasions.

To see the Moon rise so that its lower limb just skims the cairn, the viewer would have to be somewhere between the Church and Tomen Las.

If observations are made of two consecutive Moonrises, it is possible to determine where the extreme position would be.



Orbit of the Moon around the Earth.
The tilt varies between 19 degrees and 29 degrees



A landscape photograph of a grassy hillside. The foreground and middle ground are covered in green grass interspersed with clumps of tall, dry, golden-brown grass. Several large, grey, rectangular rocks are scattered across the slope. In the background, a wooden fence line runs across the top of the hill. The overall scene is bright and natural.

The Astronomical Significance of

Eglwys Gwyddelod

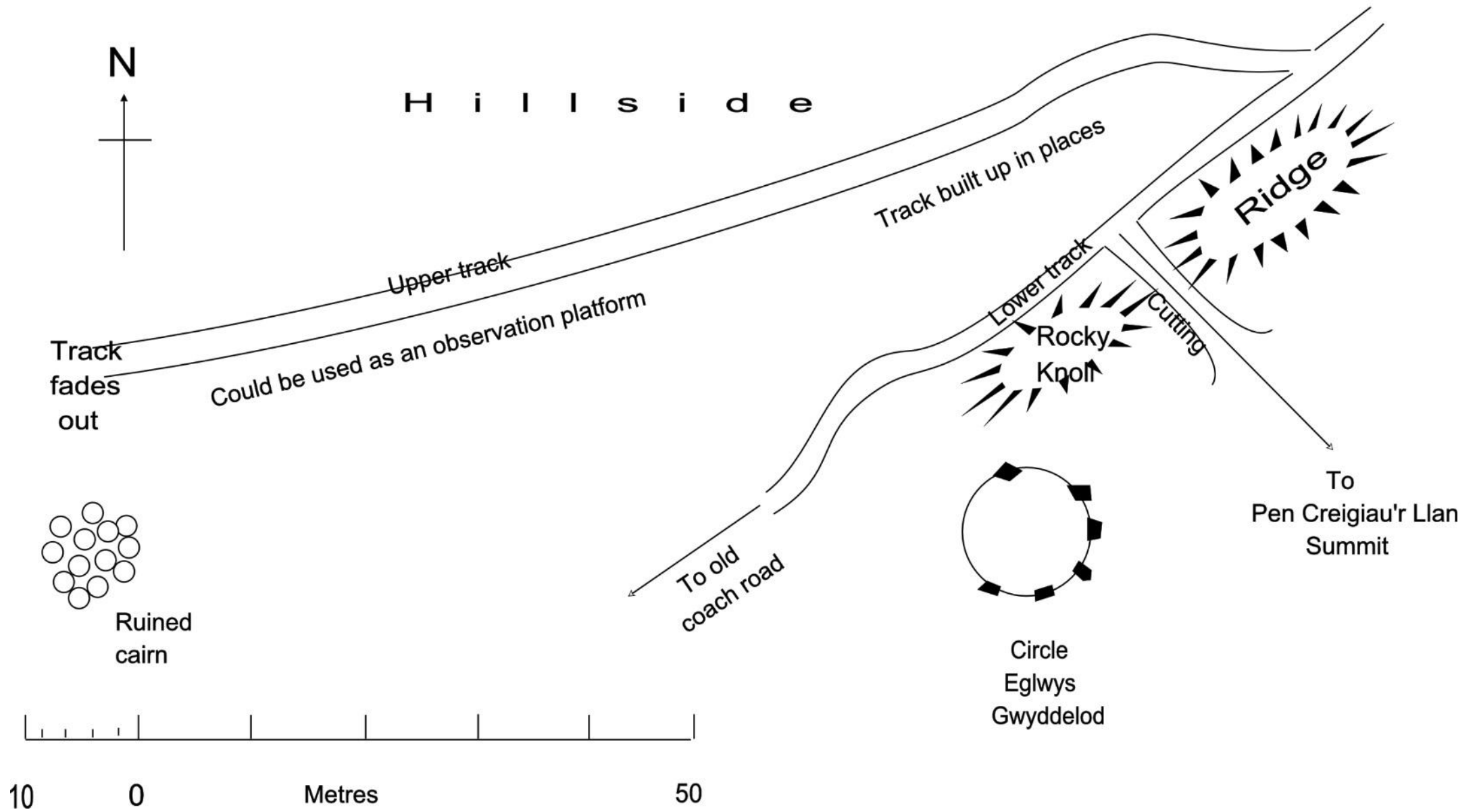
The ring of Eglwys Gwyddelood

This is a photograph of the ring looking at it from the north.

The ring is not in an elevated position and only has good views to the east and to a lesser extent to the west.



Sketch map of Eglwys Gwyddelod and Area



Pen Creigiau'r Llan is a rather insignificant hill top.

However in 2000 B.C. this hill would have indicated the extreme southerly moonrise position at the time of the Minor Standstill when viewed from the hillside above the ring.

The problem for the observer would be to recognise which hill top would be the indicator for the moonrise observations. There seems to be nothing to guide the observer's eye to this small hill top.

Though not obvious, there is an accurate method for indicating this hill.

This photograph shows part of the track to the north of the ring and the cutting which point south east. This had always puzzled me.



The Eglwys Gwyddelod Area.

By itself the ring of Eglwys Gwyddelod is of no use as a Solar or Lunar observatory, as the view between south east and south west is blocked by a nearby hill.

To the north of the ring there is a track that runs up the hill to the northeast.

About 50 metres up this track, it is joined by another higher track that doubles back.

From most of this upper track all the hills of Mid Wales can be clearly seen.



At the right hand side is Plymlimon, the highest hill in Mide Wales.

Left of centre and much nearer is Pen Creigiau'r Llan, indicated by the blue arrow.



The upper photograph shows the skyline as seen from the track by the end of the cutting. Pen Creigiau'r Llan is not quite visible, due to the nearby hillside.

Two metres along the track to the north east, the hill comes clearly into view, as shown on the lower photograph.



Work of Clive Ruggles

The method for indicating Pen Creigiau'r Llan seemed strange to me and I was inclined to think that it may be a coincidence.

That was until I read of the work of Clive Ruggles on the North Mull Project. (A quotation from his book, page 123 is shown across)

As Ruggles had found the same procedure being used in the distant Scottish island of Mull, it gave me confidence that what I had found was the original method that was used to indicate the foresight.



A question of considerable interest is what might have been the reason for constructing a monument in a place from which a prominent peak—a sacred hill or mountain, perhaps—or a special astronomical event, again possibly of great sacred significance, was on the very limit of visibility. Why should it not be easily visible from all around the monument? An obvious

There is little doubt that 4000 years or more ago, people, probably astronomer priests, were active around Pennal and making observations of the Moon. The remains are still here today and tell us, at least in part, what they were doing.

People today can be forgiven for thinking that the Moon is of little significance. To older generations it was immensely important.

The timing of the most important Christian festival of Easter is based on the phase of the Moon.

In 725, [Bede](#) succinctly wrote, "The Sunday following the full Moon which falls on or after the [equinox](#) will give the lawful Easter."¹

Changes have been made, but the date of Easter still depends on the phases of the Moon

Ramadan) is the [ninth month](#) of the [Islamic calendar](#).

The month lasts 29–30 days based on the visual sightings of the [crescent moon](#).

(These months are Lunar months)