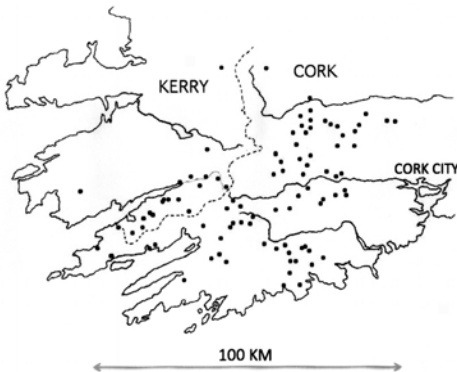


The Sun Circles of Ireland

The largest group of stone circles in Europe is found in the southwestern region of Ireland. At least 90 circles survive today and it is known that originally there were at least as many as 108, the largest homogeneous group of stone circles yet discovered. They are also quite unique with some very special characteristics that may prove to be of great importance particularly in relation to the study of prehistoric astronomy.

Known as the Cork/Kerry circles they have for a long time been recognized as a distinct group with clearly defined characteristics that set them apart from all other known circles. They constitute over a third of all the known stone circles in Ireland and half of all the circles in the southern Republic and are all situated within a radius of under 100 km in the far southwestern corner of Ireland. There is a remarkable predominance of well preserved circles in the central area whilst many of the circles in the periphery of the region are now either destroyed or badly damaged and are known only from 19th century antiquarian descriptions¹.

Fig. 1. The distribution area of the Cork/Kerry stone circles

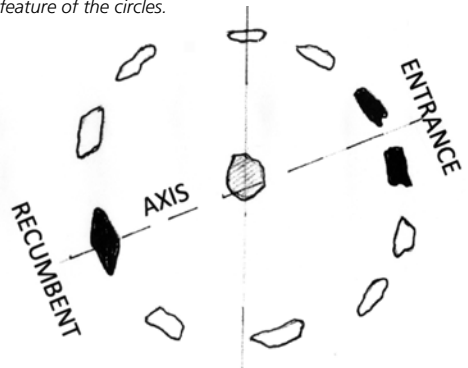


Curiously the group is almost equally divided between the larger circles, known as 'multiple stone circles', which can be comprised of up to 19 stones, and a smaller type known as 'five stone circles' because they always consist of just five stones. There is about an equal number of each type and the number of stones in the circle is always uneven². The largest circles of the group are a maximum of around 15 meters in diameter but there are over forty that are of similar size to Drombeg at around 8-10 meters while the smaller, five stone circles, vary between 3-5 meters diameter³.

To date there has been a full archaeological investigation of only six of the Cork/Kerry circles and although date of construction is still unclear it appears that they remained places of special importance for considerable period. From the earliest remains yet found it appears that the circles date from at least the Bronze Age, 2nd millennium BC⁴.

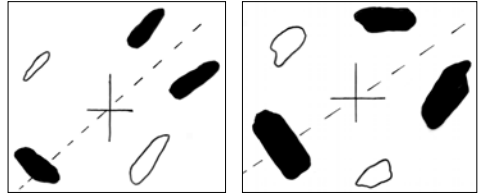
But the most important feature of the Cork/Kerry circles is that they were con-

Fig. 2. Plan of Circle at Dromagurteen showing Axial Orientation. At the centre is a boulder dolmen, a common feature of the circles.



structured in a specific style that clearly delineates an axis or axial orientation. This axis is formed by three prominent stones of the circle, a low stone as if laying on its side known as the 'recumbent stone', and two stones on the opposite side of the circle that are usually the tallest known as the 'portal' or 'entrance' stones.

This axial orientation is completely unique to the Cork/Kerry circles and a feature unknown in any circles outside of the group. This is very important and quite unique. Very few of the stone circles in the British Isles exhibit such an intentional orientation and any astronomical interpre-



Figs. 5/6. Plans of Five Stone Circles at Cloghboola Beag and Knockraheen

tation of them mostly relies on subjective or analytical interpretation. In the Cork/Kerry circles there is an obvious and intentional orientation that is in many instances aligned towards a specifically important astronomical position.

In most of the circles the entrance stones are placed broadside in keeping with the rest of the stones of the circles but in about thirteen of them they are set radially to the circle. Three of these circles have an additional set of stones extending the entrance whilst in one, the circle at Gurteen, has both a broadside set of entrance stones and an extra pair of radial entrance stones. It is perhaps notable that these circles have orientations aimed very far to the south below an azimuth of 205°.

Many of the smaller 'five stone circles' do not even conform to a circular pattern

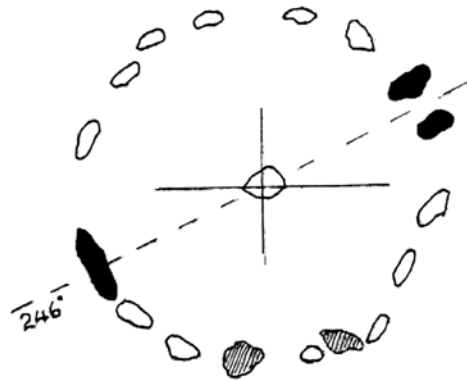


Fig. 3. Plan of Stone Circle at Carrigagulla with Radially Set Entrance Stones.

Fig. 4. Plans of Stone Circles with Extended Entrances at Gowlane, Carrigagrennane and Gurteen.





Fig. 7. 'Five stone circle' and megalithic complex at Kealkil. The radial stone cairn is in the background.

but appear almost as if they form some kind of arrangement similar to the stone rows. However the main elements, the presence of the recumbent and the general arrangement in the form of an axial orientation, shows that, circular or not, they belong within the group.

Despite their size many of these smaller circles are found in very close conjunction with other types of megalithic monuments in what are termed 'megalithic complexes'. These complex sites may consist of three or more additional structures, most usually a standing stone alignment, one or more dolmens and an exceptionally unique type of monument known as a 'radial stone circle or cairn'. Apart from one example far to the north in County Galway, these monuments are only found in conjunction with the Cork/Kerry circles⁵. Some sites, though as yet not properly examined, show evidence of multiple features such as stone platforms, serpentine wall structures and barrow like features.

The Scottish Conundrum

Curiously one other group of circles also features a low broad stone appearing as if laid down or 'recumbent' set in the west or southwest quadrant of the circle. These cir-

cles are found in the northeast of Scotland, a long way from the southwest of Ireland, and appear to entirely disconnected. These Scottish circles had been described as 'recumbent stone circles' early in the 19th century and the name was transferred to the Cork/Kerry circles after their similarity had been recognized towards the end of the century. Over seventy of the Scottish circles survive in varying states of preservation all closely grouped together within the Aberdeenshire region.

These Scottish circles also feature two exceptionally tall stones similar to the entrance stones of the Cork/Kerry circles but instead of being set on the opposite sides of the circle and forming an axis these are set alongside 'flanking' the recumbent and do not define an axial orientation.

Fig. 8. The unusually well preserved circle at Easter Aquhorthies, Aberdeenshire.

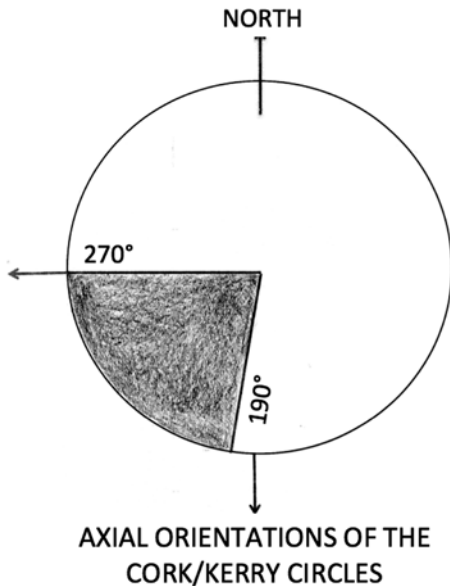


The Scottish circles are mostly much larger and there are no smaller circles like the five stone circles of the Cork/Kerry group but overall they are in a less well preserved condition. Many of the circles are quite complex in design, many having an outer ring of smaller stones or a bank or ditch around the circle. Many of the recumbent stones are profusely carved with cup and ring markings which is in sharp contrast to the Cork/Kerry circles on which any sign of carving is very rare. Despite quite extensive research, particularly in Scotland, there is a total lack of evidence of any cultural connection and it is not known which group may be earlier or if they are contemporary⁶.

Orientations

Around two thirds of the surviving Cork/Kerry circles are sufficiently complete to be able to study their basic orientation. In many of them, perhaps all of them, their

Fig. 9. All of the Cork/Kerry circles have an orientation towards the south or west, an azimuth range between 270° and 190°. Almost all of those circles with an axial azimuth between 270° and 210° could be oriented towards a significant Solar position depending on the horizon features at the site.



orientation is towards a significant astronomical feature. In the Cork/Kerry and the Scottish circles the recumbent stone is always situated in the west or southwest quadrant of the circle therefore orienting all of the circles towards the south, southwest or west.

This study focused principally upon the most significant solar positions, the solstices, equinoxes and cross quarter days⁷. From a study of published plans it is possible to identify about 50 circles that have solar orientations towards these key dates in the annual solar cycle. 22 are oriented towards the winter solstice sun set, 14 towards the cross quarter days and 14 towards the sun set on the equinoxes.

Several of the circles that have an orientation below azimuth 210° have highly elevated horizon features to the south which could designate almost any astronomical target. One of the furthest west circles of the whole group, has an orientation that is almost due south but lies close to steeply rising mountains with an horizon of between 400 and 600 meters which obscures the winter sun for most of the daylight hours. In the same area the circle at Shronabirrane has an axis oriented nearly due west but lies within a narrow valley between steeply rising mountains that lie so close that they obscure sunlight for half of the year.

Drombeg Stone Circle

The stone circle of Drombeg is by far the most well known circle of the group and perhaps its finest example since it is not only in a good state of preservation but also clearly exhibits all of the main characteristics that define the group. It is one of the larger circles of the Cork/Kerry group, but by no means the very biggest, but it is remarkably well preserved with only minor reconstruction being required during excavation and restoration by Fahy in 1959-60⁸. Two of its original 17 stones are missing, now marked by significantly smaller stones on the western side of the circle, and two had been dislodged from their sockets.



Fig. 10. Drombeg Stone Circle looking south. The two small stones in the western quadrant mark missing uprights.

The circle has been built on a deliberately constructed site, the land has been leveled and a retaining wall can be discerned on the southern boundary of the site. Originally the interior of the circle was paved with flat beach stones of the kind

that are commonly found in the area. This paving has also been noted at other circles in the region. A single burial of cremated bone was discovered within the circle dated to the late Bronze Age and several curious empty burial pits were found around the circle.

Fig. 11. View of Drombeg Stone Circle through the axis with the 'recumbent stone' in the foreground and the 'entrance stones' at the opposite side of the circle.



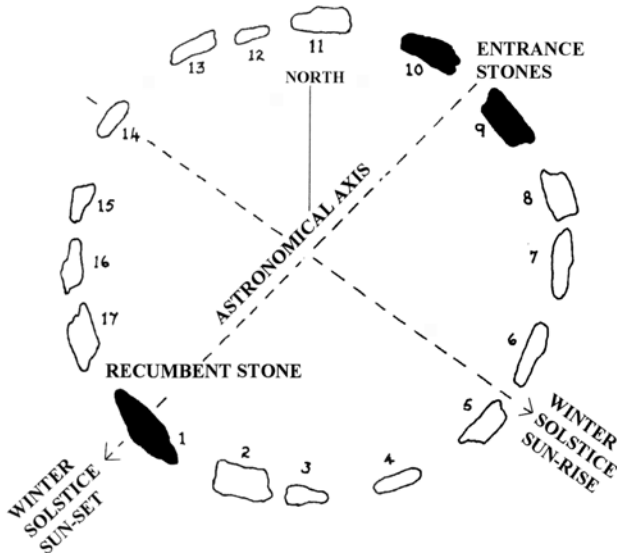


Fig. 12. Plan of Drombeg Stone Circle

The axis of the circle is oriented in alignment with the sun set on the winter solstice and is the second most well known example of astronomical orientation in a prehistoric monument in Ireland after Newgrange. Drombeg is the best example of solar orientation yet to be discovered in the Cork/Kerry circles yet the precision of its orientation has not been fully recognized as being as similarly accurate to that of Newgrange.

The solstice orientation was first recognised by the local archaeologist and

Fig. 13. View through Axis of the circle towards the sun set position



archaeo-astronomer Boyle Somerville who visited the circle in the first decade of the 20th century. Somerville is regarded as the father of Irish archaeo-astronomy and went on to survey several other stone circles in the region several of which have significant solar orientations⁹.

We do not know the full function of the three stones that form the axial orientation and although there is an obviously intentional orientation of the structure the accuracy of the solar alignment is not defined within the structure itself. It can be seen that the top surface of the 'recumbent stone' has been leveled flat and is slightly tilted inwards to align with the horizon where the sun sets. It also has the distinction of being the only such stone

of the structure.

Fig. 14.



in the whole group to bear any kind of deliberate carving and three rather worn but distinct 'cup and ring marks' can be seen on the leveled top.

At the solstice the shadows cast by the stone terminates neatly with the base of the entrance stones opposite, but apart from that it is difficult to establish with any certainty if there are any other features that may have observational function.

At Drombeg the winter solstice sun set is marked by a cleft in the hills to the west. But it is more than just a simple lining up of the sun set position and is actually system comparable to the well known sun rise alignment at Newgrange where a concentrated beam of light shines down the 20 meter long passage allowing for detailed observation of the sun's movement over a number of days prior to and after the sun has reached its maximum southerly declination.

The same accuracy is achieved at Drombeg by observing the sun as it rolls

Figs. 15/16

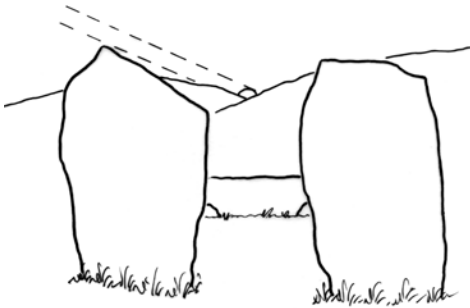


Fig. 17. Winter solstice sun set, approx. 10 minutes prior to absolute sun set.

down the horizon towards the cleft. This dissects the sun's disc in an observable sequence allowing a calculation of the days before the actual solstice while the actual solstice day is marked by the sun falling so low that it finally disappears and very quickly reappears as a sliver within the cleft.

The phenomena as currently observed is not quite the same as would have been seen by the stone circle builders. Precession has altered the sun set position so that around 4,000 years ago it would have eclipsed the horizon about its own width further to the south. This is an important factor since this slicing of the sun by the horizon would make it more visible, easier to look at in comparison to a full blazing sun disc as is seen in the present day.

Winter Solstice Sun Rise

Although the main orientation at Drombeg is towards the winter solstice sunset the position of the rising sun on the same day appears to also be marked by two stones set significantly close together on the southeast side of the circle. This forms an orientation line through the circle to a single stone on the opposite side which was missing and is now marked by a stone found lying in the area. This orientation is in completely opposite arrangement to the sunset axis and is one of the rare instances so far identified of a sunrise position being significantly marked in the arrangement of the stones of a circle.



Fig. 18. Orientation through the circle towards the winter solstice sun rise position.

The majority of the discernable orientations in the circles of this group are oriented towards the winter solstice sun set and many of these also use a similar observational system incorporating a sloping hillside horizon feature. Using landscape features as an observational tool is a typical feature recorded at many prehistoric sites world wide. The importance of the Cork/ Kerry circles is the combination of an axial orientation of the circles towards the specific landscape feature. Although it is not apparent how the structure of the circle

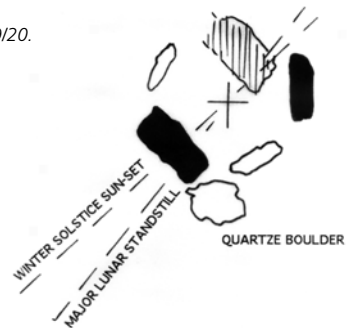
might fully function in the observational process their astronomical orientation clearly demonstrates that they are constructed as observational platforms, structures built on specific sites specially chosen for the purpose.

Lettergorman Stone Circle

Drombeg is an excellent example of prehistoric astronomy but it is not unique. Approximately 10 km north a small five stone circle in the townland of Lettergorman is



Figs. 19/20.





Figs. 21/22. Winter solstice sun set Christmas Day 1994

also oriented towards the winter solstice sun set. One of the entrance stones has collapsed but it is otherwise complete and a very large quartzite boulder lies on its southwest perimeter. The inclusion of similar stones is common to the circles as are small 'boulder dolmens', often set within the circle or close by.

The alignment is towards a cleft in the hill which marks the solstice sunset position. The horizon slopes up from this cleft towards the south and has a similar observational use at Drombeg but here there is just a smaller pronounced hump which can be used to observe the very last days over the solstice period.

Fig. 23. View of Cappanaboul stone circle towards the equinox markers



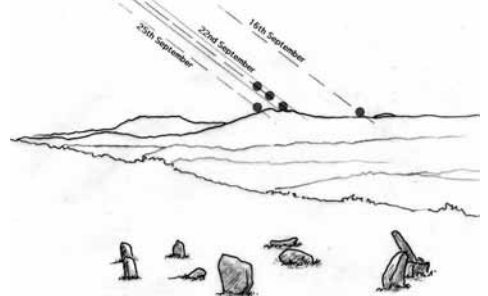
This more southerly cleft may be a moon marker and there are two possible alignments from this circle which suggest that its main astronomical function might be lunar. To the south the horizon rises to a particularly significant peak which may mark the position of the moon in its extreme southerly setting position. This hill with its prominent peak is an important element of the prehistoric landscape of this region with the largest concentration of stone circles and other types of megalithic monuments being found clustered in close proximity. It also features as a central element of what is probably the most important example of astronomical orientation, the summer solstice sun rise orientation of the passage tomb on the island of Cape Clear in the extreme southwest, and other megalithic sites in the region.

Cappanaboul Stone Circle

The stone circle at Cappanaboul is a site worthy of special attention. It is situated on a mountain side facing towards the Atlantic and the mountains of the Cork/Kerry border about 25 km north of Drombeg and at an elevation of approx. 130 meters.

It is a 'multiple stone circle' composed of much smaller stones than Drombeg and although the number of original stones it was composed of is not certain it is most probably composed of 13 eleven of which are still in situ. One of the entrance stones is missing and it has a central, very low, boulder dolmen, a feature typical of the area.

Fig. 24. Observed Sun Sets at Cappanaboul Stone Circle



Its orientation is towards the jagged peaks of Slieve na Gaibhle, the 'Forked Mountain' lying due west in direct alignment with the equinox sun-set.

Observing the sun setting positions during the period of the equinox presents a quite different challenge to marking the days over the solstices. Instead of needing to capture the slightest change in the sun set position the equinox is the period when its setting position is most rapidly changing.

This is illustrated in the graph showing three observed sun set positions over a ten day period of the equinox.

The horizon feature with a jagged peak forms a marker by which days can be counted as the sun lands into respective notches or clefts. A wider horizon perspective with a number of possible markers probably also allowed prediction of the

equinox prior to the event. The precession difference in the sun setting position suggests that it is the tallest of the three peaks that is the main equinox marker. An equinox marker such as this may also represent an understanding of the need for an equatorial line such as is used in modern astronomy, a central coordinate by which lunar movements can be observed or to determine eclipses.

Observation At Other Stone Circles

Due to certain limitations and variables such as the weather it was necessary to target a small selection of circles on which to concentrate research. Some are easy to access but circles such as that at Cappanaboul are in relatively remote and mountainous locations requiring considerable effort to visit. Needless to say many journeys did not end with visible sun sets.

Fig. 25. Equinox sunset time-lapse photograph by Roland Paschoff



The study illustrated that solar orientation is not confined to Drombeg as had been assumed by previous researchers¹⁰, and an additional three circles with orientations towards the winter solstice were confirmed by on-site study. Another three circles with orientations towards the equinox and three with orientations towards the cross quarter sun set were also confirmed by on-site observation.

It is unclear why the south-west orientation is favored but it may be significant that in ancient mythology the southwest is regarded as the direction into which the soul travels after death.

Research was extended to some monuments on the most southwesterly peninsula. There are no stone circles in this area but contains a remarkable concentration of wedge tomb dolmens, structures that are presumed to be earlier than the stone circles. Solar orientations were observed in four of these and the direction of alignment in each is towards the Samhain or Halloween cross quarter sun-set, the time associated with death and the otherworld. In three of these the sun set alignment is marked by the southwestern peak of the peninsula which has strong mythological associations with the Sun God Balor and other mythological figures associated with death.

On the most extreme southwestern island of Cape Clear is a Newgrange style chambered cairn with Boyne style megalithic art. This is a very important monument being found in an isolated position far removed from the main concentration of such monuments in the eastern part of the island. Its orientation is towards the summer solstice sunrise which aligns with the peak featured in the alignments of the Lettergorman stone circle above.

Conclusion

Aubrey Burl, Britain's primary expert on stone circles, is open minded in regard to the astronomical association of the stone circles but is of the opinion that there was 'still a lack of solid evidence'¹¹. To rectify

this he suggests that research should be concentrated upon a group of monuments situated within a specific region with the same architecture and of the same period.

Burl and others have suggested that the Scottish recumbent stone circles might have a lunar function and this may also be applicable to the Cork/Kerry circles. Earlier studies that have suggested such non-solar associations have however lead to severe criticism and the present study concentrated on discovering verifiable solar orientations since these are less contentious than more complex lunar/stellar alignments¹².

Drombeg and the other circles illustrated here show that solar orientation is an important aspect of the circles and there are similarly clear examples to be found amongst the rest of the group. These are not isolated examples and there are many circles, which if properly surveyed, will produce similar evidence of significant solar orientation.

Study of the astronomical function of the circles is important since it also reveals a wider context such as their intrinsic relationship with the landscape which can be of fundamental importance to the question of the siting of the monuments, why certain places are specifically chosen, and the concentration of monuments in certain areas. This is particularly important in view of the fact that the circles also have a very close relationship with several other types of megalithic monuments, stone rows, dolmens, radial stone circle etc., which is particularly evident in the megalithic complex sites with which the smaller circles are associated.

The scope and possibility of research in the region is very extensive and the circles of the area provide a unique opportunity to study the astronomical methodology used in prehistoric astronomy. However the astronomical relationship may not be so easily comprehensible in regard to a number of the circles and great deal of study will be required before we can start to understand their full complexity.

It is clear from this brief study of both the stone circles and the earlier monuments in the area that astronomy played a central role in the siting and construction of the monuments throughout the whole megalithic era and supports previous claims by researchers such as Martin Brennan that astronomy is an essential element of all prehistoric monumental construction¹³.

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Endnotes

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