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A NEW ARCHAEOASTRONOMICAL INVESTIGATION OF THE IRISH AXIAL-STONE CIRCLES

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Abstract

This paper presents the preliminary results of a project undertaken in 1994 to investigate the astronomical potential of the axial-stone circles (ASCs) of seven or more stones in Counties Cork and Kerry, south-west Ireland. This group of sites is of particular interest in that the monuments in the group bear a striking resemblance to the recumbent stone circles (RSCs) of Aberdeenshire, eastern Scotland, which appear to exhibit a strong pattern of alignment in relation to prominent hilltop summits and the rising and setting position of the moon. The first indications from the Irish data are that similar patterns of alignment are not evident in the Irish ASCs. The Irish sites show no preference for orientation upon prominent hilltops and no clear astronomical trends.

Introduction

Astronomical alignments were quite extensively incorporated into monumental architecture at different times during the Neolithic and Bronze Age in the British Isles. Examples such as the solar alignment of the passage grave at Newgrange (Patrick 1974) and the solar axial orientation of Stonehenge in its later phases (Ruggles 1997a) are well known. Contrary to popular belief, the sites concerned were not "observatories" in the modern sense of the word, and there is no convincing evidence that the alignments were of any great precision (Ruggles 1997b). The astronomy was, rather, symbolic; studying the nature of this symbolism, and its manifestations in different groups of prehistoric monuments, gives us valuable insights into changing customs and beliefs in Britain during the third and second millennia BC (Ruggles and Burl 1995).

An approach that has been successful in deriving meaningful evidence on prehistoric astronomy has been to examine architecturally similar groups of sites with clear orientation preferences confined to relatively small geographical areas, as suggested originally by Burl *et al*. (1970). Careful fieldwork is required, undertaken within well-researched methodological constraints, and subject to appropriate statistical analysis. Fieldwork by Ruggles in western

Scotland over some fifteen years showed that many of the short stone rows found there appear to be oriented upon the southerly limit of the rising or setting moon (Ruggles 1984, 1985, 1988), and a project to examine the ritual landscape of Bronze Age Mull, which involved a programme of fieldwork and excavation undertaken between 1987 and 1991, indicated that prominent horizon peaks may also have played a key role in the symbolism underlying the siting and orientation of these sites (Martlew and Ruggles 1997). A similar conclusion has been reached with regard to the recumbent stone circles (RSCs) of eastern Scotland (Ruggles and Burl 1985).

South-west Ireland represents a very exciting, yet little studied, area in which to extend this line of research. The area is extremely rich in oriented prehistoric monuments (much more so than western or eastern Scotland), featuring some 70 short stone rows, 80 aligned pairs of standing stones, 50 axial-stone rings (similar to the Scottish recumbent stone circles), and numerous burial monuments known as wedge graves. These sites have a very strong pattern of orientation centred around NE-SW, for which no simple explanation has been offered in the past (for a summary see Ruggles 1994).

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TABLE 1. Brief descriptions of 31 sites surveyed.

Column headings:

1 County (Co=Cork/Ke=Kerry)

2 Catalogue no. in Ó Nualláin (1984)

3 Site Name

4 Irish National Grid Reference

5 Original number of stones in circle, or most probable estimate (according to Ó Nualláin 1984)

6 Status of left (easternmost) portal (L = standing, *L* = leaning, l = fallen, – = moved or removed)

7 Status of axial stone (A = standing, *A* = leaning, a = fallen, – = moved or removed)

8 Status of right (northernmost) portal (R = standing, *R* = leaning, r = fallen, – = moved or removed)

9 (Most distant) horizon distance category in indicated horizon profile to SW

10 Highest point exists within the horizon profile indicated to the SW? (Y/N)

11 (Most distant) horizon distance category in indicated horizon profile to NE

12 Highest point exists within the horizon profile indicated to the NE? (Y/N)

TABLE 1.

1	2	3	4	5	6	7	8	9	10	11	12
Co	3	Glantane East S	W280833	11	L	A	R	C	Y	A	N
Co	4	Carrigagulla	W370834	17	L	A	R	B	N	C	N
Co	5	Gowlane North	W483857	9	L	A	R	B	N	B	N
Co	6	Kilmartin Lower	W452824	7	L	A	R	A	N	A	N
Co	8	Oughtihery	W413801	7	–	A	R	A	N	B	N
Co	9	Gortanacra	W203755	13	L	A	R	D	N	C	N
Co	10	Gortanimill	W208741	9	*L*	A	R	A	N	D	N
Co	12	Teergay	W291694	9	L	A	R	A	N	B	N
Co	13	Coolaclevane	W288638	9	L	A	R	D	Y	A	N
Co	15	Currabeha S	W411639	13	L	A	*R*	C	N	B	N
Co	16	Derrynafinchin	W048621	?11	–	A	–	D	N	C	N
Co	19	Knocknaneirk	W371626	9	L	A	R	B	N	D	N
Co	20	Ardgroom Outward NE	W728563	?	–	A	–	B	N	D	N
Co	21	Ardgroom Outward SW	W707553	11	L	–	R	B	N	D	N
Co	22	Cappanaboul	W033533	13	L	A	–	D	Y	D	Y
Co	23	Maughanaclea	W104565	13	l	A	R	A	N	D	N
Co	24	Breeny More	W050552	?	L	*A*	R	D	N	D	N
Co	26	Derreenataggart West	V665464	?15	L	A	R	B	Y	D	N
Co	29	Knocks S	W302443	?	L	A	–	B	Y	A	N
Co	30	Maultanvally	W264442	11	L	A	–	B	Y	A	N
Co	33	Carrigagrenane	W254432	?19	L	A	R	A	N	A	N
Co	34	Reanascreena South	W265410	13	L	A	R	D	N	A	N
Co	35	Ballyvackey	W344426	?9	L	A	–	B	N	B	N
Co	36	Bohanagh	W308368	13	L	A	R	A	N	B	N
Co	37	Drombeg	W247352	17	L	A	R	A	N	A	N
Ke	38	Lissyviggeen	V998906	7	L	A	R	D	Y	B	N
Ke	41	Kenmare	V907707	15	L	A	R	D	Y	D	N
Ke	43	Gurteen	W006698	11	L	A	R	B	N	D	Y
Ke	45	Dromroe	V880657	13	l	A	R	B	N	B	N
Ke	46	Shronebirrane	V753554	?13	L	*A*	–	A	N	B	Y
Ke	48	Drombohilly Upper	V790607	?11	*L*	–	R	A	N	D	N

In 1991, an annual programme of fieldwork was begun in Cork and Kerry with the aim of sampling the different types of site in turn. In the first season, surveys of the four- to six-stone rows showed that a significantly large proportion are oriented directly upon prominent mountain peaks, and that most (but not all) are oriented upon a limiting rising or setting position of the moon as well (Ruggles 1994). The next two seasons concentrated upon the three-stone rows, all but five of which were found to have a lunar orientation or an orientation upon a prominent hill or, in 40% of cases, both (Ruggles 1996).

The greatest problem to emerge from the south-west Irish rows is that, although the sites follow a consistent pattern of orientation concentrated around NE-SW, the apparent direction of interest at the individual sites, as evidenced both from the form of the sites themselves (stone mass and height gradation) and the "indicated" horizons (distribution of horizon distance with azimuth, presence of prominent hills, and astronomy), is as often NE as SW. This is not only different from the properties of similar sites in western Scotland, where the apparent direction of interest is invariably SW, but raises the awkward question of why a lunar interest should be confined to rising phenomena in the north and setting phenomena in the south (*ibid*.).

The fourth season of fieldwork concentrated upon the axial-stone circles, ignoring those with only five stones. Since these monuments follow a similar orientation pattern to the stone rows but are unidirectional, it was hoped that they might throw more light on the problem just mentioned. As they also follow an orientation pattern similar to the Scottish RSCs, it would be of interest to see if they had similar properties in relation to prominent hills and the moon.

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TABLE 2. Indicated horizon ranges at the 31 sites surveyed.

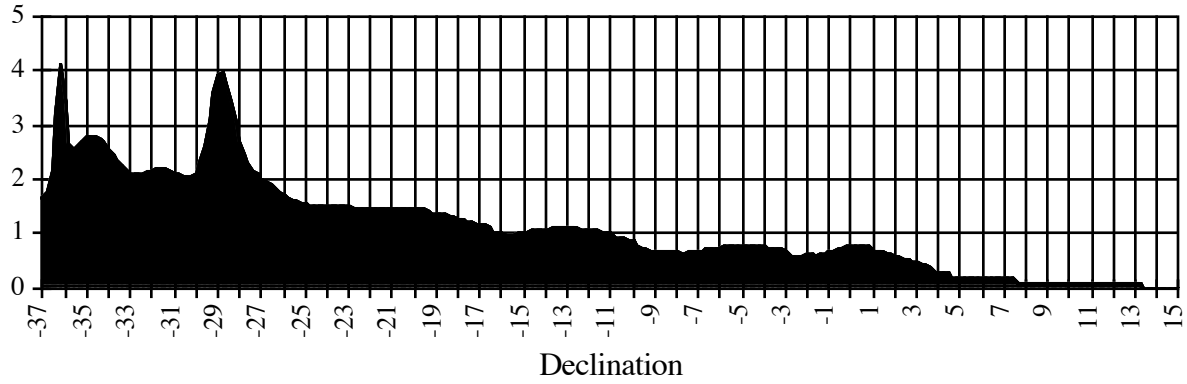
Column headings:

1 Catalogue no. in Ó Nualláin (1984)
2 Portal Left azimuth, quoted to the nearest 0·5 degrees
3 Axial Left azimuth, quoted to the nearest 0·5 degrees
4 Axial Centre azimuth, quoted to the nearest 0·5 degrees
5 Axial Right azimuth, quoted to the nearest 0·5 degrees
6 Portal Right azimuth, quoted to the nearest 0·5 degrees
7 Mean altitude within indication, quoted to the nearest 0·2 degrees
8 Portal Left declination, quoted to the nearest 0·2 degrees
9 Axial Left declination, quoted to the nearest 0·2 degrees
10 Axial Centre declination, quoted to the nearest 0·2 degrees
11 Axial Right declination, quoted to the nearest 0·2 degrees
12 Portal Right declination, quoted to the nearest 0·2 degrees

TABLE 2.

1	2	3	4	5	6	7	8	9	10	11	12
3	189·0	189·0	191·0	193·0	193·0	1·4	–36·4	–36·4	–36·0	–36·0	–36·0
4	240·5	242·0	246·0	250·0	252·0	4·5	–14·0	–13·2	–11·0	–8·5	–7·5
5	200·0	200·0	202·5	205·5	205·5	0·8	–35·2	–35·2	–34·4	–33·6	–33·6
6	238·0	240·0	245·5	250·5	252·0	2·8	–17·2	–15·8	–12·6	–9·6	–8·6
8	—	224·0	229·0	234·0	234·0	5·2	—	–22·0	–19·4	–17·0	–17·0
9	199·0	199·5	202·5	205·5	207·0	0·6	–35·2	–35·0	–34·8	–33·4	–33·0
10	196·0	196·5	199·5	202·5	204·0	5	–32	–32	–31	–30	–30
12	218·0	221·0	222·5	224·0	228·0	3·8	–26·0	–24·4	–23·8	–23·0	–21·0
13	241·5	247·0	249·0	250·5	257·0	0·6	–17·0	–14·2	–12·6	–11·8	–7·8
15	207·0	207·0	210·0	213·5	214·0	0·4	–33·4	–33·4	–32·6	–31·2	–31·0
16	—	197·5	200·5	203·5	—	0·0	—	–36·8	–36·0	–35·0	—
19	228·5	234·5	237·0	239·5	245·5	1·2	–23·6	–20·6	–18·8	–17·4	–14·0
20	—	192·0	197·5	203·0	—	7·4	—	–28·0	–29·0	–29·6	—
21	203·5	—	210·5	—	218·0	5·2	–28·8	—	–27·6	—	–25·4
22	266·5	268·0	270·0	272·5	—	1·2	–1·6	–0·4	+0·6	+2·0	—
23	212·5	220·0	223·0	226·0	230·0	8·0	–21·8	–20·8	–19·8	–18·4	–16·8
24	194·0	196·5	199·5	202·5	—	1·0	–36·2	–35·8	–35·2	–34·4	—
26	264·0	264·0	271·5	279·0	279·0	4·4	+0·4	+0·4	+4·2	+8·6	+8·6
29	208·5	213·0	215·5	218·0	—	3·2	–30·4	–28·6	–27·8	–26·4	—
30	248·5	254·0	256·5	259·5	—	4·0	–10·4	–6·8	–5·4	–3·4	—
33	203·5	207·0	210·0	213·5	214·5	2·0	–33·4	–32·0	–30·6	–29·4	–29·0
34	242·5	246·0	248·5	251·0	252·5	–0·2	–17·0	–15·2	–14·4	–12·2	–11·4
35	255·5	258·5	261·5	264·0	—	2·0	–7·8	–5·8	–4·0	–2·6	—
36	262·5	265·0	268·0	271·0	273·0	2·6	–3·0	–1·4	+0·6	+3·4	+3·8
37	223·0	222·5	227·0	231·0	230·5	3·0	–24·6	–25·0	–23·0	–20·2	–20·4
38	211·0	211·5	214·0	216·5	217·0	2·4	–29·0	–29·4	–28·4	–28·4	–28·4
41	257·5	263·5	265·5	267·5	272·5	1·4	–7·2	–3·2	–2·0	–0·6	+2·8
43	188·0	194·0	198·5	203·0	210·0	8·6	–25·4	–26·8	–27·6	–28·0	–27·6
45	259·5	263·5	266·5	269·5	274·0	4·2	–1·8	–0·8	+1·2	+2·6	+5·6
46	253·0	253·0	257·0	261·0	—	22·8	+6·4	+6·4	+10·2	+14·2	—
48	202·0	—	206·5	—	211·0	5·4	–29·0	—	–28·6	—	–28·0

FIGURE 1. Graphical representation of the indicated horizon ranges at the 31 sites surveyed.



Data acquisition and results

The selection of sites was undertaken using as a starting point the list provided by Ó Nualláin (1984). Details of the criteria will be given elsewhere. Aided by good weather and by the use of a gyroscopic attachment that allowed absolute azimuths to be determined without having to take timed observations of the sun, it was possible to complete our investigation of the forty axial stone circles in Cork and Kerry within a two-week period during April 1994. Theodolite surveys were deemed to be necessary at each of the thirty-one sites listed in Table 1.

Table 2 shows the azimuths indicated by the portal and axial stones as determined from a point 5m outwards from the portal stones. Notes on how these were determined and their reliability will be given in a separate publication.

In order to give a preliminary interpretation of the results, the declination curvigram in Figure 1 has been produced by taking, in each case, the minimum declination δ_{min} as the mean of the values in columns 8 and 9, the maximum declination δ_{max} as that of the values in columns 11 and 12, and then plotting a Gaussian curve with mean $(\delta_{min}+\delta_{max})/2$ and standard deviation $(\delta_{max}-\delta_{min})/2$. The area under each curve is 1·0 and the declination axis was divided into 0°·2 bins in order to produce the graph.

As an indication of whether prominent hill summits might have been of interest, without having to tackle the problem of subjective measures of prominence, we followed Ruggles (1994) and examined the point of highest altitude within each indicated range. Where this point is one or other end of the range or the altitude variation within the entire range is smaller than 0°·4 degrees, then we consider that no high-point of possible interest exists. Whether or not a highest point exists within the indicated range is listed in Table 1. Where such a point exists, the hill summit is identified and its azimuth, altitude and declination are quoted in Table 3 to an accuracy of 0·1 degree.

For comparison, the hill summits in the opposite direction, determined in a similar way, are also shown in Table 3.

Figure 2 has been produced by plotting Gaussian curves with means as given in Table 3 and a standard deviation of 0·4. The area under each curve is 1·0.

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TABLE 3. Table of highest points in the indicated horizon ranges. The first part gives data for the highest point in the portal-axial indication (to the SW or W). The second part gives, for comparison, similar data for the axial-portal direction (to the NE or E).

Column headings:

1 Catalogue no. in Ó Nualláin (1984).

2 Name of peak

3 Distance (km)

4 Azimuth of summit, to the nearest 0·1 degrees

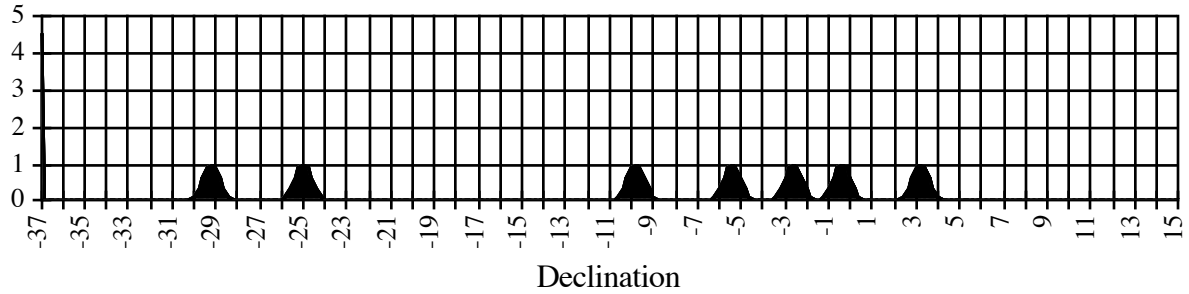
5 Altitude of summit, to the nearest 0·1 degrees

6 Declination of summit, to the nearest 0·1 degrees

1	2	3	4	5	6
13	Hill 1797ft at W150602	14	253·1	1·3	–9·7
22	Sugarloaf Mountain	16	267·8	1·5	–0·4
26	Knockgour, N end of ridge	4·5	268·5	5·5	+3·3
29	Unnamed hill	1·5	221·3	3·5	–24·9
30	Carrigradda, N end of ridge	1·5	256·4	4·1	–5·3
38	Torc Mountain	8	210·8	3·3	–29·1
41	Knocknagullin	15	264·5	1·5	–2·5

22	Nowen Hill	11	89·4	2·3	+2·0
43	Crohane	14	17·3	2·0	+37·8
46	Unnamed hill	2·0	78·9	6·9	+12·3

FIGURE 2. Graphical representation of indicated hill summits within the ranges of horizon over the axial stone.



Discussion

It is evident from Figures 1 and 2 that, despite the similar orientation pattern of the two groups, preliminary reductions of the data from the axial-stone circles show very different results from those obtained from the stone rows. A significantly large proportion of the latter are oriented directly upon prominent mountain peaks, and most (but not all) are oriented upon a limiting rising or setting position of the moon as well.

The ASCs, on the other hand, show no preference for orientation upon prominent hilltops, and only marginal evidence for an interest in the moon, in the form of a single peak at around –29°, close to the major standstill limit: it can be seen from Table 2 that six of the 31 sites have an indicated declination range that intersects the range –30° to –28°. The data in Table 3 provide no evidence whatsoever for a correlation between hill summits and the moon. There is also no evidence whatsoever for a systematic interest in the sun, despite the attention that has been given to the solar solstitial orientation of Drombeg (see, e.g., Hicks 1989).

This preliminary result was quite unexpected and raises a number of serious questions in the wider archaeological context. Despite certain orientation similarities, do the axial-stone circles represent a distinctly different ritual tradition, as manifested in the different symbolic astronomy, than the rows in the same region? Are the links between the south-west Irish axial-stone circles and the north-east Scottish recumbent stone circles less close than has been argued in the literature? If there were distinct traditions in the south-west Ireland, did they co-exist or was there a temporal separation? It seems that we might stand a better chance of beginning to answer such questions by undertaking a wider study of the ritual landscape in a particular area, along the lines of the North Mull Project (Martlew and Ruggles 1997), rather than by undertaking further studies of the orientation of individual monuments.

A fuller discussion, including further data such as patterns of the distribution of horizon distance with azimuth, will appear in a separate publication. In the meantime, these data serve to remind us that not all is straightforward in archaeoastronomy.

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