

Some Stone Rings in Scandinavia

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The rock art and megalithic grave structures of Scandinavia have been interpreted to reflect connections in Norwegian and Swedish prehistory with the cultures of Western Europe and the British Isles as early as the second millennium B.C. (Marstrander 1972, 63; Kaelas 1966/67, 310–13; Kaelas 1981; Stenberger 1962, 58). It occurred to us that these same connections might be reflected by some of the stone circles and other stone rings prevalent in Norway and Sweden. With this in mind and with a view to determining whether the geometry of the stone rings of Norway and Sweden is similar to the geometry of those of Britain and Brittany, a small expedition was mounted (with Alfred E. Livingston) in May 1980 to survey some rings of standing stones in Scandinavia. We were interested in seeing whether we would find not only true circles but also flattened circles, ellipses, egg-shaped and compound rings such as are found in Britain (Thom 1967; Thom and Thom 1978; Thom and Thom 1980a). We were also interested in ascertaining whether the Norwegian and Swedish rings were set out using a standard unit of measurement, such as the megalithic yard of 0.829 m (2.72 ft) which Alexander Thom finds to be reflected in the megalithic monuments of Britain and Brittany (Thom 1962; Thom 1967; Thom and Thom 1978).

RING CHARACTERISTICS

In all twenty-two circles, one ellipse, three ship-shaped enclosures and one square were surveyed between Ringsaker in Norway and Smålandsstenar in Sweden. (Figs. Mo/1 through 15). When clear skies permitted, true North for each survey plan was obtained by sun/time observation and eighteen of the enclosures measured up were correctly orientated. The remaining rings were orientated by compass. In five rings only, namely Fjösrika, at Hallingby (roadside on Route E 68), Råde East and West, ring D and the ellipse at Smålandsstenar (Route 26), is there the slight possibility that true North is shown by a radius from the centre to a stone, or by a diameter between two opposite stones.

In general, the rings surveyed can be said to have been intended to be circular rather than roughly laid out enclosures. The only ring surveyed which is not a circle is the eleven-stone ellipse at Smålandsstenar. Almgren (1934, Fig. 37) shows two adjacent ellipses, with a common stone at one point, at Kinne-Kleva, Västergötland but we did not have any time to visit the site and do not know how many similar Swedish stone structures there are. Lili Kaelas (pers. comm. 18 November 1982) informs us that there are many instances of 'elliptic, oval and egg-shaped rings . . . found together with circular ones in the same graveyard.' We note the prevalence of constructing several rings at a given site, unlike that which is generally found in Britain.

TABLE I
STONE RINGS

FIG. NO.	NAME	DIAM. FEET	STONES PRESENT	REMARKS
1	ISTREHÅGEN (ISTREHÅGAN), JÄBERG	A 33.2	7	
	"	B 30.6	9	
	"	C 17.5	6(I)	
2	Myre, Stokke	30.0	9	One outlier
3	Moelv, RINGSAKER	83.8	12	
4	Hallingby, FJÖSVIKA	57.2	13	
5	" MIDTHAUG	44.6	5(I)	
6	JEVNAKER, (S) 1	37.7	11(I)	
7	" , (N) 2 (ROUTE 241)	47.0	5(I)	
8	Lundeby, RÅDE, E	41.9	13	
8	" " , W	42.7	13	
9	BLOMSHOLM, S	104.7	10	One more stone at centre; one outlier
10	" " , N	38.1	6	One more stone at centre
11	TROLLHÄTTAN	A 43.3	11	
11	"	B 39.7	11	
11	"	C 41.5	11	
11	"	D 31.7	9(I)	
12	TUNHEIM	21.7	7(I)	{ About 8 menhirs in the nearby burial field, one with cup markings
13	SMÅLANDSSTENAR,	A 62.0	22	One outlier
13	" Ellipse, Major	B 47.1	11	Major axis of B is drawn on AB
13	" " , Minor	B 37.7	—	
13	"	C 52.5	10	One more stone near centre
13	"	D 50.5	10(I)	
13	"	E 27.7	6(I)	
14	HÄSTEVADET, Square	45.7	8	

The number of upright stones now present in each ring surveyed is reported in Table 1. Ring diameters are given in feet, the circle drawn on each plan having been chosen carefully to give the best fit to pass through the centre of each stone. In several instances a diameter has been given to incomplete circular rings where the peripheral arc extended for more than 180 degrees. Heights of stones are shown beside each stone on our survey plans. Table 2 lists distances between centres of rings where rings occur in groups, and Table 3 lists some measurements of the ship-shaped enclosures surveyed at Elgesem and Istrehågan that are perhaps relevant.

Figure Mo/16A shows a histogram of the type shown in Thom 1967, 36-39, Fig. 5.1., with the diameters in feet. Figure Mo/17 is a diagram similar to that shown in

TABLE 2
DISTANCES BETWEEN CIRCLE CENTRES AT 4 SITES

FIG. NO.	NAME	CENTRE TO CENTRE	DISTANCE FEET
I	ISTREHÅGEN (ISTREHÅGAN), JÅBERG	AC	44.1
I		AB	40.9
I		BC	37.5
II	TROLLHÄTTAN	AB	47.2
II		BC	46.2
II		AD	112.1
II		BD	92.8
II		CD	102.7
13	SMÄLANDSSTENAR	AB	80.8
13		AC	67.1
13		AE	58.5
13		BC	59.3
13		CD	54.2
13		BE	50.4
13		BD	83.5
8	RÅDE	EW	70.9

TABLE 3
SHIPS

FIG NO.	NAME	LENGTH	SIZE FEET
15	ELGESEM	Between End Menhirs	130.0
15		Beam	24.5
15		Pitch of Ribs	5.75
15		Radius of Gunwales	248.5
I	ISTREHÅGAN	Between End Menhirs	74.2
I		Radius of Gunwales	90.5
I		Beam	24.8
I		Pitch of Ribs	8.23
I		Beam of Dinghy	8.2

Thom 1962, 247, Fig. 1. While these two Figures give some indication that the erectors of the rings used a basic unit of length when laying out the rings, we do not have sufficient data to state that there was such a unit (see Appendix). Moreover, the structures may not all have been constructed by the same cultures.

Distances between ring centres were also examined where two or more rings stand side by side. The effect of combining these distances with the diameter is shown in the histogram, Fig. Mo/16B. Again there is some indication of a basic unit of measurement but the data are not sufficient to establish the use of such a unit.

There seems to have been a preference for erecting an odd number of stones in the perimeter. Other than the twelve-stone circle at Moelv, the twenty-two-stone circle at Smålandsstenar, and the recumbent stone circles at Blomsholm and at Smålandsstenar, all the apparently complete circles surveyed have an odd number of stones in their perimeters. Since it is easier to set out an even rather than an odd number of (approximately) even-spaced stones in the perimeter of a circle, the odd numbers may have had some presently unknown special significance to the circle builders. It is not known whether the odd number of stones is typical of stone circles generally in Norway and Sweden, although from the discussions of Scandinavian circles this seems to be the case. Hyenstrand (1979, 139) states that in Sweden the 'number of stones in each circle is repeated with astonishing regularity (five, seven, nine, eleven, etc.)' and Skjelsvik (1954, 583) speaks of the recurrence of seven, nine and thirteen stones in Norwegian circles, which seem to her to suggest some belief in magical numbers.

We suggest that the single recumbent stone at or near the centre of each of the recumbent stone circles at Blomsholm and Smålandsstenar may have been intended to be counted with those in the perimeter, so that those circles also may be deemed to have an odd number of stones. In such event, of the rings surveyed which appear to be complete, thirteen out of fifteen have an odd number of stones. Of the remaining two, the twenty-two-stone circle at Smålandsstenar may be a special case of twice eleven stones.

Three of the circles surveyed, two at Blomsholm and one at Smålandsstenar, consisted of a circle of approximately even-spaced standing stones of about the same height, with a massive granite block recumbent at or near the centre of the circle. Kaeles and Cullberg (1956, 166) have described the Blomsholm circle with ten stones in the perimeter as one of the largest in Sweden and recognize the unusualness of the circle by stating: 'Stenarnas antal i en domarring är i dessa trakter vanligtvis 7 eller 9, varför Blomsholmsringens stenantal är märkligt'. ('The number of stones in a domarring [judgment ring] in this area is usually seven or nine, which makes the number of stones in the Blomsholm ring noteworthy'.) DuChailu (1889, 369-70) describes the large Blomsholm recumbent circle as a dom-ring [domarring] used for sacrificial purposes, as related in the Sagas, with the recumbent stone named Thor's stone. (See also Borlase 1897, 504-06). Unless the construction of the circle can be dated to the Viking Age by radiocarbon dating or other reliable means, it is possible that the Vikings simply used the large Blomsholm circle, constructed at an earlier time, in the manner related in the Sagas, if indeed they did use it that way.

The three recumbent stone circles at Blomsholm and Smålandsstenar are reminiscent of the recumbent stone circles in north-east Scotland discussed in detail by Aubrey Burl

(Burl 1969–70; Burl 1976a; Burl 1976b; Burl 1981) but they differ from the Scottish circles in that in Scotland the recumbent stone is in the perimeter rather than in the centre of the circle. The stones in the Scottish circles are graded in height, the two tallest often flanking the recumbent stone. Burl (1980, 193) observes that the recumbent stones in the Scottish circles are invariably placed between the south south-east and the south-west of the perimeter of the circle. (See also the discussion in Burl 1976b, Chapter 7, of the Cork-Kerry recumbent stone circles of south-west Ireland.)

The recumbent stone circles in Scotland (perhaps dating from about 2500 B.C. to 1700 B.C. (Burl 1981, 68)) often have ten (as in Sweden — see Figs. Mo/09 and 13C) or eleven stones in the perimeter plus the recumbent stone itself. There are also a number of stone circles in Britain with centre stones and some in north-east Scotland with recumbents and flanking pillars set inside (but not in the centre of) the stone circle (Burl 1969–70, 63). Sahlström (1943, 328–29) gives the plans of two adjacent rings at Karlsberg, Sweden, each with nine stones in the perimeter and a stone at or near the centre.

ASTRONOMICAL MEASUREMENTS

Some rings surveyed in valleys were surrounded by forest. Many of the rings were on flat plains with no readily visible horizon notches or notch-like features. From the site at Moelv, however, the horizons were visible but accurate observation of the ground surface at clearly seen notches on the wooded horizons was not possible. The altitude and azimuth of five notches at Moelv were estimated by allowing for tree height while using the theodolite. One of these notches gives a declination, after allowing for refraction, of $23^{\circ} 33' \pm 5'$. At midsummer in A.D. 500 (the date of the rings suggested by archaeologists), the centre of the sun (semi-diameter $s = 16'$) had a declination of $23^{\circ} 38'$. It is of interest to note here that the mean azimuth of the two stones almost diametrically opposite on the ring, and marked 5.4 and 5.3 ft high, is $322^{\circ} 24'$ and that the observed azimuth of the wooded notch is $322^{\circ} 07'$. No outlier was observed in line with the two stones and the notch.

Another wooded notch at Moelv gives a declination, after allowing for lunar parallax and refraction, of $28^{\circ} 12' \pm 5'$. In A.D. 500 the lower limb of the moon had a declination of $28^{\circ} 32'$ at its major standstill, giving a difference of $20' \pm 5'$, which is not acceptable as an indication of lunar observation at that standstill.

From the calculations it might, therefore, be suggested that at Moelv a possibility exists of the sun's centre having been observed at midsummer in A.D. 500, setting in the notch on the centre line of a pair of stones in the periphery of the ring and almost diametrically opposite to each other.

For the record, in 1800 B.C., an approximate date when solar and lunar observatories appear to have been in use in Britain and Brittany (Thom 1967; Thom 1971; Thom 1974; Thom and Thom 1980b, 1980c), the obliquity of the ecliptic was slightly larger than it is today and for the solar notch mentioned above the lower limb of the sun (not its centre) had a declination of $23^{\circ} 39'$. No accurate solar alignment is indicated at such an early dating. For the moon at major standstill in 1800 B.C. the notch showed a declination of some 26' lower than the moon's lower limb and so again no accurate

lunar alignment is indicated. Without an accurate survey of the notches, now covered by trees, no more can be said at present.

At Jevnaker (2), Fig. Mo/07, a notch dealt with in the same way as above gave a declination of $+10^{\circ}18'$ which does not seem to be connected with any particular astronomical body.

DATES OF CONSTRUCTION OF THE RINGS

Thorleif Sjøvald (pers. comm. 2 May 1980) and Sverre Marstrander (pers. comm. 12 May 1980) have given information that the stone circles in Norway are Late Iron Age, dating from about A.D. 400 to A.D. 600 and that so far as they have been explored they seem to have been erected in connection with graves. This generally may be so, for many stone circles are clearly associated with Iron Age mounds. But this does not necessarily mean that all the Scandinavian stone circles are Iron Age. Some stone circles which 'look' megalithic are not clearly associated with Iron Age mounds and in the absence of reliable dating from associated structures, artefacts or burials, their dates of construction can only be surmised at this time. The fact that there may be Iron Age cremation remains inside or near a circle does not necessarily date the circle as Iron Age. The early-eighteenth century burial of Charles XII's soldiers inside the Iron Age skeppssättning at Blomsholm reminds us that ancient burials sometimes were made at existing more ancient sites.

POSSIBLE CULTURAL CONNECTIONS AND INFLUENCES

While there are no known megalithic tombs or other identified megalithic remains in Norway other than possibly a dolmen once located (and now removed) in Skjeberg, Östford, there are many megalithic remains in southern Sweden, including not only dolmens but large megalithic passage graves and chamber-tombs which reflect strong influences from western Europe and which apparently represent different traditions, socio-economic systems and time periods. (Stenberger 1962, Chapter III, particularly at 42-46 and 55-58; Hyenstrand 1979, 130-46.) While it does not necessarily follow that if such influences extended to Scandinavia such influences also are reflected in the construction of stone rings in Scandinavia, this possibility should not be dismissed without further study.

Marstrander (1972) has suggested that West European megalithic art and West Norwegian Bronze Age rock carvings can be interpreted to reflect prehistoric connections. Marstrander (1972, 63) finds it difficult to believe that certain 'extraordinary line constructions [panels of semicircular concentric arcs on both sides of a central axis] in Brittany and West Norway [are] to be explained only as convergence'. He suggests that rock art influences from the Atlantic coast could have reached Scandinavia during the final stages of megalithic grave art, corresponding to the transition to or at the beginning of the Nordic Bronze Age, roughly the centuries of the first half of the second millennium B.C.

Likewise, Kaelas (1966/67, 63) has suggested that 'in our opinion the megalithic tomb-building in South Scandinavia cannot be explainly *only* by cultural influence and without the hypothesis of long distance movement of small groups that settled there'. (See also Kaelas 1981.) Further, Mårten Stenberger (1962, 58) poses the question (as did

Oscar Montelius in the nineteenth century) whether certain mid-Swedish long, narrow burial chambers having a hole in the end wall and closely resembling graves in England and France (particularly the *allées couvertes* of the Seine-Oise-Marne culture in northern France) 'can be interpreted as evidence of the direct cultural influence on southern Scandinavia of west European megalithic ideas introducing a new religious view of death; or is there more to it than that? Is it evidence of a wave of actual immigrants from over the sea, who settled on the Swedish west coast? As yet, we cannot say.'

NEED FOR FURTHER STUDIES

These observations, based on a very small number of surveyed sites, are intended to suggest lines of inquiry for further Scandinavian (and British) studies. For example, archaeologists should seek to explain the cup marks found on a standing stone at Tunheim (see Plate II) near the stones shown in Fig. Mo/12. Is it possible to date the cup marks and are they indications of early Scandinavian connections with the cultures of Western Europe and the British Isles? (See Marstrander 1972, 46, and articles by P. V. Glob and E. McWhite there cited.) Lili Kaelas (pers. comm. 3 February 1982) has given information that some cup marks on standing stones in Sweden 'can archaeologically be dated to the Late Neolithic. However, cup marks continue to the very end of our prehistoric period (Viking Age).' (For discussions of cup marks, see Haddingham 1975, Chapter 9; Burl 1976; Thom and Thom 1978, Chapter 5; Burl 1981, 68.)

Other important questions should be addressed. If the Norwegian and Swedish stone circles are all late Iron Age, why did they develop so late as compared to Britain and why did the major period of circle-building in Britain (see Burl 1976, 11) end some two thousand years earlier rather than continue on into the late Iron Age?

The importance of obtaining reliable dates for the Scandinavian rings is emphasized by the differences in the dating attributed by different researchers to megalithic structures such as the ship-shaped formation (*skeppssättning*) known as Ales stenar (Ale's Stones), at Kåseberga, near Ystad, Skåne, Sweden (see Lind 1977; Carter and Malmstrom 1979; Malmstrom 1981; Roslund 1979; Roslund 1980), and the ten stone circles at Odry, near Czersk, Poland (see Sahlström 1942; Stephan 1914; Müller 1934; Müller 1970; Sadowski *et al.* 1982).

Carter and Malmstrom (1979), and Malmstrom (1981), develop an extended argument that the *skeppssättning* known as Ale's Stones was constructed about 2600 B.C. \pm 800 years. They point to the great size of the stones involved; the probable origins of the bow, stern and rudder stones, all of which are a cream-coloured quartzite unlike the 'gunwales' of the ship which are red granite and gneiss; the distance over which the latter had to be transported; the location of Ale's Stones in an area rich in megalithic burials; and the unsettled social and political conditions prevailing in Iron Age Sweden. However, Roslund (1980, 26) states that 'strong archaeological evidence supports a much later construction date'. Roslund (1980, 27-28) suggests a possible date of 450 B.C. \pm 350 years, based on the azimuth of the rising midsummer solstice sun when looking from the rudder stone towards a small hill eight miles away at Borrby. The plaque erected at the site by the Swedish Central Board of National Antiquities postulates a late Iron Age construction date.

Sahlström (1942, 118) states that based on the finding by A. Lissauer of some Stone Age tools in the area during a dig about 1874, Lissauer concluded that the ten stone circles at Odry are from the Stone Age and that Odry is an example in Central Europe of structures contemporaneous with the era of the construction of the menhirs of Western Europe. Sahlström (1942, 119) also states that in 1914 P. Stephan determined that two of the rows of stone circles at Odry marked the spring and fall equinoxes and another row marked star positions for 1760 B.C. Sahlström himself, however, attributes an Iron Age date to the Odry circles. Sadowski *et al.* (1982) disagree with the astronomical interpretations of Stephan (1914) and Müller (1934 and 1970) of the Odry site. They state that archaeological evidence now establishes that the Odry rings were constructed about A.D. 150 and that their survey plan of Odry differs from that of Müller (who refined Stephan's measurements), the mean deviation being as high as + 2.43 degrees. Their paper contains an extensive bibliography, listing numerous publications which discuss the archaeology as well as the astronomy of the stone rings of Sweden, Poland and Germany.

CONCLUSION

From the small number of sites surveyed no statement can be made as to the use of a standard unit of measurement in laying out the Scandinavian rings. Possible astronomical significance requires further investigation. The only ellipse surveyed is deliberately set out as an ellipse and not a circle but for no apparent reason. The Scandinavian rings require more extensive study before definitive statements can be made about them.

APPENDIX

DO THE SCANDINAVIAN RINGS EVIDENCE THE USE OF A STANDARD UNIT OF MEASUREMENT?

Were the Scandinavian stone rings set out using a basic unit of measurement? Without a much larger sample to study than that referred to herein, a definitive answer cannot be given. The data are presented here for the use of researchers who may in the future develop sufficient additional data to permit definitive conclusions to be reached.

Herein recorded are the surveys of twenty-three rings and one square, the distances between centres of rings where rings occur in groups, and some measurements of three ship-shaped enclosures. The data are obtained from the survey plans, which have sizes, north points (compass or true), map references, scales, etc. (See Figs. Mo/1 to 15).

Particulars of the twenty-three rings are given in Table 1. Since one of the rings is clearly an ellipse with major and minor axes, there are twenty-four measurements connected with rings. When the square at Hästevadet is included the sum total of 'ring sizes' amounts to twenty-five. Sixteen distances between circle centres at four sites are listed in Table 2, and nine sizes related to ship-shaped enclosures are given in Table 3.

In the fixing of the circle centres drawn on the plans it was assumed that the erectors had probably set the rings out by placing the centre of each stone on the arc drawn with the correct radius. Perhaps the inside edges or the outside edges of the stones were used instead.

A histogram of the type shown in Thom 1967, 36-39, Fig. 5.1, has been drawn for the twenty-five ring sizes (see Fig. Mo/16A) and for the twenty-five ring sizes plus the sixteen ring

distances (see Fig. Mo/16B). Examination of the hump spacing in the two latter Figures raises the question whether we are dealing with something real. Another way of presenting the information is given in Fig. Mo/17, where the lengths are arranged in order of magnitude and plotted consecutively, as was done in Thom 1962, 247. Some evidence of the use of a quantum comes from the elliptical shape drawn through the stones in ring B at Smålandsstenar (Fig. Mo/13). The 'best' ellipse drawn on the plan is based on a three, four, five right-angled triangle and its major and minor axes are respectively $2a = 47.1$ ft and $2b = 37.7$ ft. Thus $a = 23.55$, $b = 18.85$, and $c = \sqrt{a^2 - b^2} = 14.12$ feet where $c =$ the distance between foci. When each one of these is divided respectively by five, four and three, the result each time is, surprisingly, 4.71 feet. Nevertheless, because of the small amount of data available from the limited surveys, it is not possible to test for a quantum using Simon Broadbent's Monte Carlo method. (Broadbent 1956. See Thom 1967, 10-11; Kendall 1974. See also Broadbent 1955. But see Freeman 1976; Burl and Freeman 1977.)

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MICROFICHE INDEX

Mo/01	Istrehågen, Jåberg	Mo/10	Blomsholm (N)
Mo/02	Myre, Stokke	Mo/11	Trollhättan
Mo/03	Moelv	Mo/12	Tunheim
Mo/04	Fjösvika	Mo/13	Smålandsstenar
Mo/05	Midthaug	Mo/14	Hästevadet
Mo/06	Jevnaker (1)	Mo/15	Elgesem
Mo/07	Jevnaker (2)	Mo/16	Histogram of Dimensions
Mo/08	Lundeby, Råde	Mo/17	Plot of Diameters
Mo/09	Blomsholm (S)		