

Is Mousa a broch?

Noel Fojut*

ABSTRACT

The Broch of Mousa, in southern Shetland, has long been considered typical of the former appearance of most brochs. However, its impressive architecture may not be representative of the whole class. Recent field survey makes it possible to demonstrate that Mousa is quite atypical, and to quantify this abnormality. As Mousa has frequently been cited in attempts to understand both the functions and the origins of these much studied monuments, it follows that these findings may have considerable archaeological significance.

INTRODUCTION: THE BROCH CONCEPT

The specialised drystone fortlets known as brochs have been an object of much investigation and even more speculation, almost since the earliest awakening of antiquarian zeal in Scotland. From time to time summaries of the current state of knowledge have appeared, from the *Archaeologia Scotica* of 1890 onwards, with notable contributions from Curle (1927), Graham (1947), MacKie (1965, 1971) and, most recently, Hedges and Bell (1980). The long-awaited publication of the excavations at Gurness broch, Aikerness, Orkney will, we understand, include a major new review of which the published views of Hedges and Bell are but a summary (Hedges, in preparation). In the recent paper Hedges and Bell note, correctly, that a number of brochs have been excavated in the recent past, and that while most of these still await publication, the information already available from these excavations makes it apparent that broch studies are once more entering a period of revolution, in which long-held views are reconsidered in the light of fresh data. As forerunners of this revision may be cited Caulfield's recent case for the significance of quern replacement in the chronology of broch evolution (Caulfield 1978) and Barrett's attempt (this volume) to re-absorb the brochs into the mainstream of Iron Age building types.

Hedges and Bell (1980) published dates for the construction phase of a solid-based broch-like structure at Bu, Cairston, Orkney, which plainly show that massive sub-circular dwellings of a similar scale to brochs were being constructed in Orkney by the mid-1st millennium bc. With the dates currently available, this gives strong support to Caulfield's advocacy of a northern, rather than a western, origin for the brochs. Although Bu is a site of great significance for many reasons, not least the internal fittings, it is without doubt the dating evidence which will arouse most initial interest, awakening the dormant debate surrounding broch origins and spread. In particular, the sequence of evolution proposed by MacKie (1971, fig 8) is apparently brought into doubt. In this sequence, the broch was seen as evolving from the galleried dun, through the D-shaped semi-brochs of Skye and environs, into a ground-galleried type of broch, which then evolved into the solid-based form when the broch idea spread from the west to the north. The

* SDD(Ancient Monuments), 3-11 Melville Street, Edinburgh.

situation is further confused by the recent work of MacKie on semi-brochs, which has produced dates consistent with his hypothesis (MacKie 1980, 55). It is becoming clear that the 'answer' to broch origins is as far as ever, if not further, from a definitive resolution.

Hedges and Bell (1980, 88) make the common assumption that Mousa is a typical broch, by citing its dimensions as those of a normal specimen, while simultaneously warning against the dangers of taking either Bu or Mousa as in any way typical. The authors take care to avoid division of brochs into two categories, and indeed, no evidence is presented to show that Bu is representative of one particular group of structures. To complete this picture, it remains for the present article to demonstrate that Mousa, also, is not representative of a group of similar brochs, but is in fact *sui generis* in both detail and dimensions. There may well be a spectrum of brochs ranging from the squat to the lofty, but just as Bu could not be cited as an example of a squat broch, so Mousa should not be cited as an instance of the taller forms.

In the same year that Scott advanced the hypothesis of a wide variety of broch forms, heights and functions (Scott 1947), Graham published an alternative view, in which all brochs were held to have been built to a considerable height (Graham 1947). While Scott's case rested upon the notoriously unreliable basis of the measurement of rubble volumes, it gains support from the evidence at Midhowe, Orkney, for the erection of an over-heavy superstructure on an inappropriate foundation (Callander & Grant 1934), and from Bu (Hedges & Bell, 1980), Crosskirk, Caithness (Fairhurst forthcoming) and Howe, Orkney (Bell pers comm) for the apparent adaptation of a relatively slight structure, by increasing the wall thickness, to make it suitable for bearing a heavy wall. Graham's argument was based upon the proposition that, because all brochs had (albeit by definition) wall foundations too massive to be explained by defence alone, then height of wall was the only explanation. Since this was the case, Graham argued, tall walls must have been built in every case. In the absence of any evidence touching upon the degree of tolerance allowed for incalculable stresses by the builders, this argument must be suspect, founded as it is upon the implicit model of Mousa as the unconscious ideal towards which all broch-builders strove. MacKie (1971, 40-1) has advanced a scheme of development which envisages a gradual refinement of broch design allowing progressively taller towers to be constructed, culminating in structures such as Mousa. This view is the starting point for the present study, for it has widespread implications, particularly affecting the position of Shetland during the broch-building episode.

MOUSA AND BROCH HEIGHTS

Three lines of evidence can be pursued in reassessing the status of Mousa: original height, foundation dimensions and minor architectural details. The first of these considerations is least well served by surviving sites. Even allowing for a modest completed height for most brochs, only a handful could be said to stand substantially intact. It is interesting that the tall-standing examples are not easily explained by a lack of later settlement, and hence stone-robbing, for both Mousa and Dun Carlaway, Lewis, stand close beside later habitations, yet are less disturbed than many brochs in remote glens, which now lie in total ruin. It must be a distinct possibility that the brochs which stand tallest today were in fact among the best-built, so that their very height and solidity has acted as a deterrent to later destruction. This might be complicated by the fact that a tall broch, in collapsing, would tend to hide its foundations more effectively than a more modest structure, thus concealing the nature of the resulting mound from identification as a broch. A survey of Shetland recently completed found that the greatest difficulty in measuring dimensions of ruined broch-like structures occurred on sites where stone-robbing had been most extensive, and

that, in general, the larger the mound was, the easier was identification. This still leaves the possibility of mounds so substantial as to escape being identified as non-natural, but there are few candidates for this category in the Shetland landscape.

The tallest brochs in Scotland are listed in Table 1.

TABLE 1

Mousa	Shetland	13.26 m
Dun Telve	Inverness-shire	10.03 m
Dun Carloway	Lewis	9.15 m
Dun Troddan	Inverness-shire	7.62 m
Dun Dornaigil	Sutherland	6.70 m

This group of five stands well clear of the next contenders. In the absence of any signs of an upward continuation of the stair, it must be assumed that Mousa's uppermost surviving level represents the top of the original structure (Paterson 1922). A narrowing of the highest preserved galleries at both Carloway and Telve suggests that these, too, are close to their original stature. These are, however, all undeniably towers, and Mousa cannot be singled out merely because it is the tallest, since one example of any class of monument must always survive best.

MOUSA'S DIMENSIONS IN A SHETLAND CONTEXT

A recent survey of all known and suspected broch sites in Shetland (Fojut 1980, 160–9) makes it possible to put Mousa in the context of its neighbours, since details of ground plan are available from 27 of the 75 sites classed as *probable brochs*. This represents a greater concentration of data from one area than has previously been available. Further, it must be noted that, since ground plans are recorded for about one-third of Scotland's five hundred broch sites, a greater degree of reliance can be placed on conclusions drawn from a comparison of plans than upon those based on surviving height or architectural details, since these aspects are founded on far fewer examples.

Given the ground-plan of a broch, four parameters may be defined (Table 2).

TABLE 2

ED	External diameter at base (mean value)
ID	Internal diameter at base (mean value)
WT	Wall thickness at base (mean value)
PWB	Percentage of overall diameter taken up by wall-base.

These are inter-related thus:

$$ED - ID = 2 \times WT$$

$$PWB = \frac{(ED - ID)}{ED} \times 100$$

Percentage wall-base (PWB) was first used by MacKie (1965) as a classificatory tool. It can, however, be argued that the parameter bears a direct relationship to the stability, and hence potential height, of the structures which it categorises.

If a series of brochs were built, with constant wall thickness but each with a larger diameter than the one before, there would be a specific diameter at which the structures would cease to be stable. This would occur when the curvature of the wall became too slight to permit the equalisation of stresses around the circuit. The wall would behave as if it were straight, stress would build up at a weak point, and the wall would collapse outwards. Thicker walls would become unstable

at greater diameters, but there would always be a relationship between diameter, wall thickness and curvature. The parameter PWB summarises this relationship in such a fashion that high values of PWB are associated with the most stable proportions of broch foundations. And the more stable the foundations, the higher the broch could have been built.

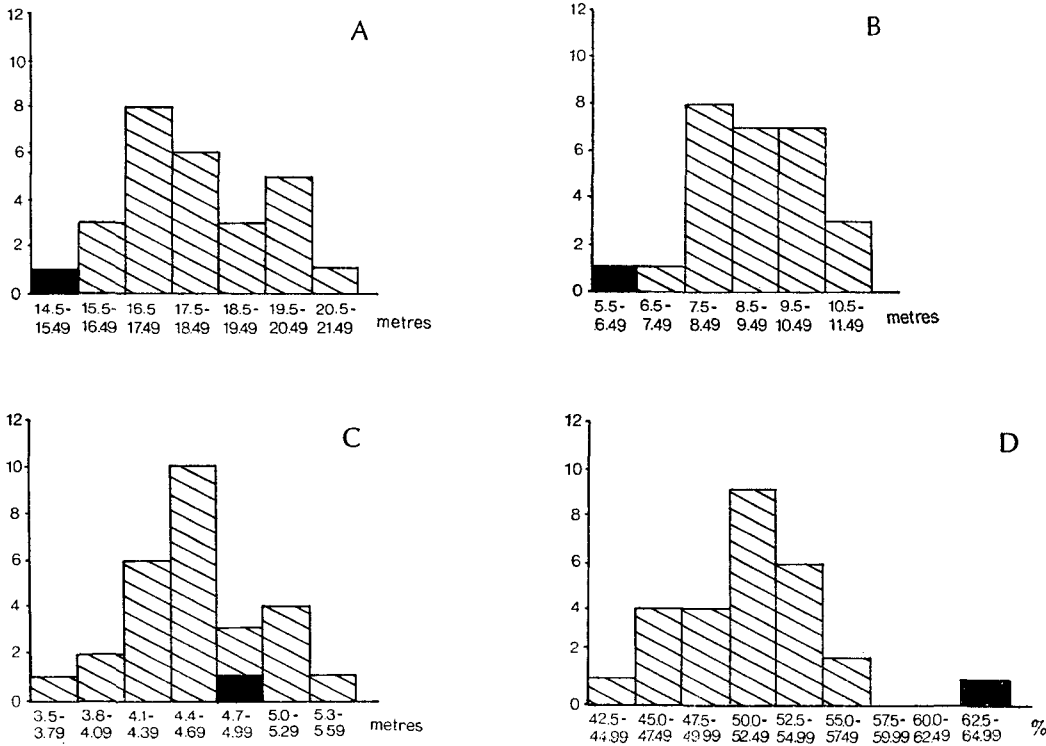


Fig 1 Distributions of dimensions for 27 best preserved Shetland brochs. A = External diameter, B = Internal diameter, C = Wall thickness, D = Wall-base as a percentage of overall diameter. Mousa shown by solid shaded area on each chart

The four parameters defined above have been calculated for the 27 measurable Shetland brochs (fig 1). It is apparent that, from these local data, Mousa has an average wall-thickness, a small internal diameter and a very small external diameter. As a result, the percentage wall-base value is remarkably high. In brief, Mousa is a broch of ordinary wall-construction for Shetland, but built to an exceptionally restricted ground-plan.

Mousa's departure from the average can be quantified statistically using the skewness coefficient for normal distributions (Spiegel 1972, 123). This is calculated in Table 3.

TABLE 3

$$\alpha_3 = \frac{\sum(X-\bar{X})^3}{N\sigma^3}$$

- where: α_3 = skewness
- X = PWB (individual values)
- \bar{X} = PWB (mean value)
- N = Number of sites
- σ = Standard deviation of X .

The coefficient measures the extent and direction of any divergence from the normal distribution. If there were no divergence (when the values of PWB would be normally distributed), then α_3 would equal zero. For all 27 brochs, α_3 equals +0.9177, while for the 26 brochs excluding Mousa, α_3 equals -0.1725. No other single site has so strong an effect upon the parameter. This indicates that, but for Mousa's anomalously large PWB value, the distribution of PWB for the other Shetland brochs does not differ markedly from the normal. It may be concluded that Mousa is a structure of exceptional proportions superimposed upon a population of sites whose dimensions are regularly distributed around a mean value.

Two architectural consequences may be argued from the above. First, Mousa would have been capable of greater height than a broch of similar wall thickness but of a diameter nearer the Shetland norm, although this does not necessarily imply that Mousa was the tallest of Shetland's brochs, for builders may have allowed different margins for error in individual brochs, so that Mousa survived while taller brochs, built upon less massive foundations, collapsed. Certainly, Mousa's basal levels are the most suited of any broch yet identified in Shetland to bearing a tall superstructure. Secondly, Mousa is prominent in a region where all other brochs have quite similar basal proportions, looking almost as if they were built with a common set of dimensions in mind but without rigid adherence to the precise measurements. The observed near-normal distribution of percentage wall-base values for sites other than Mousa gives empirical support to this subjective conclusion.

Having examined the case for Shetland, a brief consideration of the pattern for Scotland as

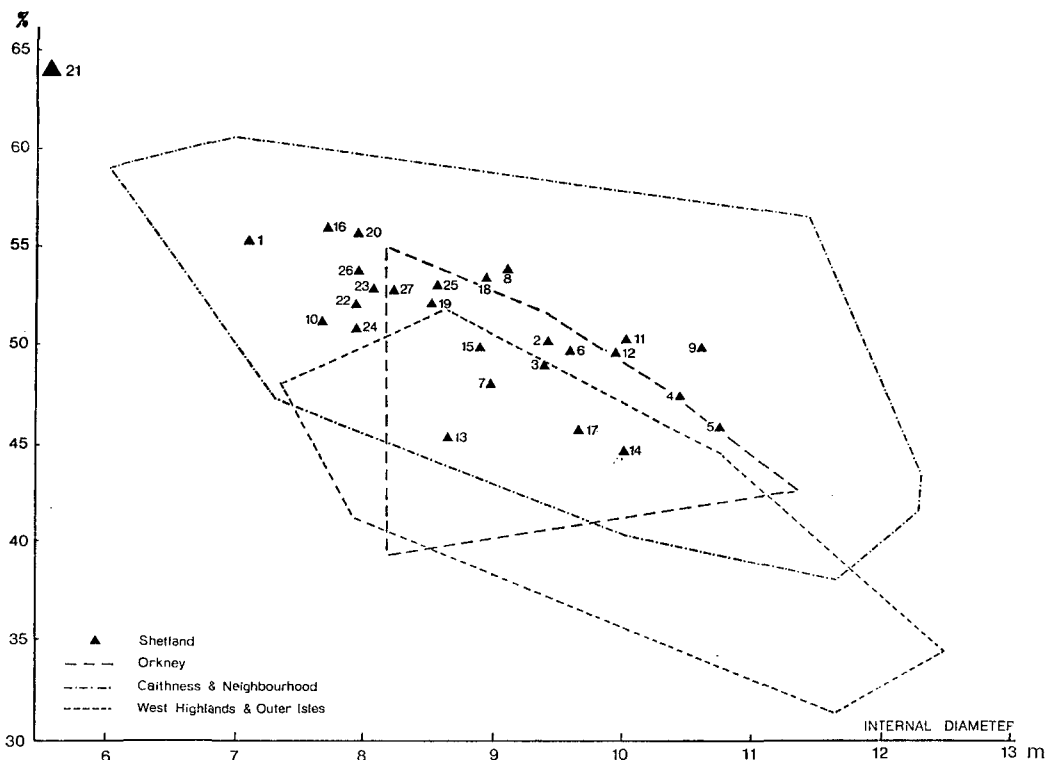


Fig 2 Distribution of percentage wall-base against internal diameter. Shetland data from Fojut (1980, iii, tables 2 and 4), other areas from MacKie (1965, Fig 1), generalised. Individual sites as Appendix

a whole is in order. From data presented by MacKie (1971, fig 1), and graphed as background to the Shetland data used above (fig 2 & Appendix), it may be seen that no broch so far measured approaches Mousa's PWB value of 64.5%. The nearest examples are 60 and 59%, at two Caithness sites, Ness and Nybster respectively. It will also be noted that the brochs of Shetland, with the exception of Mousa, form a more coherent group than those of any comparable region. Mousa is almost as atypical of Scotland as it is of Shetland, forming an extreme point on the range of broch proportions. Mousa apart, Shetland's brochs form a closely similar group which lies slightly to the massive side of the national average, but is nevertheless a good example of a set of 'mainstream' structures.

MOUSA, ARCHITECTURAL DETAILS AND THE FUNCTION OF BROCHS

Turning to comparison of architectural details, the unfortunate fact is that few brochs are well preserved above their basal levels. However, most of the individual traits noted at Mousa can be paralleled at one or more other sites. Basal cells with raised sills are visible at Dun Carloway, elevated access to the intra-mural stair at Clickhimin and absence of guard cells at Coldoch, while the unusually lofty entrance passage at Mousa is not original, but the result of 19th-century antiquarian zeal, with entry being effected by breaking through into a cell above the true passage level, as the latter then lay below the level of external debris (Anderson 1877). Even the multiple scarcements of Mousa can be seen elsewhere, notably at Dun Telve, while the upper projecting 'corbels' are present at Culswick, also in Shetland. It was the multiplicity of scarcements which enabled Graham to demonstrate that brochs must have contained wooden galleries, rather than simply roofs (1947, 67–70).

The only unique architectural feature at Mousa is one often regarded as standard to all brochs: an intra-mural stairway forming a near-continuous spiral ascent to the wallhead. Little comparative material is available, for only four brochs have stairs preserved above the level of the second gallery. These are Mousa, Clickhimin and Levenwick in Shetland and Dun Carloway in Lewis. Of these, only Mousa exhibits a continuous ascent, broken only by a short landing at the second floor level. In the other three brochs, the head of the first flight of stairs is separated from the foot of the next by a considerable stretch of level gallery. At Dun Carloway the foot of the second flight lies almost a full circuit from the head of the first. Several less well-preserved brochs hint at a similar trait. So far as the scanty evidence shows, the typical broch did *not* have a spiral stair running upwards in an uninterrupted ascent.

It is unfortunate that so little evidence survives upon this point, as the relationship of the stair to the intra-mural galleries is a key to understanding the way in which brochs functioned. If a discontinuous stair were the norm, then part of each gallery would have been useless as living or storage space if the stair was to be used. At Dun Carloway the entire first gallery would have been unusable, except as a long landing. More importantly, a discontinuous stair would have slowed access to the wallhead, thus reducing the defensive advantages gained by height. From a constructional viewpoint, however, the interrupted ascent had advantages, as it spread the weak points, caused by the bonding of the stair lintels into the wall, around the circuit. In view of the arrangements at Dun Carloway it may be doubted whether this is a valid consideration, as there the sections of the interrupted ascent are directly one above the other. Despite this, it may be observed that a large proportion of semi-ruined brochs do seem to have collapsed first around the stairway, thus supporting the argument while destroying the evidence.

Excavation has suggested wooden internal structures at most, if not all, brochs, even in treeless Shetland. These are normally thought of as annular galleried floors supported upon a ring

of posts, with their outer edges resting upon the scarcement(s). In fact, a combination of multiple scarcements, voids and recesses in the inner wall-face and upper projecting stones at Mousa and some other sites might argue for a more elaborate inner structure, with wooden living space fitted to a braced timber framework. Access is assumed to have been gained from the intra-mural galleries, through apertures in the inner wall-face. Such points of access are, indeed, noted just above scarcement level at some sites. However, if the idea of timber tenements is accepted, then access to these would have been most readily gained by wooden stairs or ladders. Use of the stone stairway seems a most clumsy alternative, since this would have necessitated a partial circuit through a narrow passage merely to reach a level perhaps two metres above the starting point. It may be that the scarcement-level openings at Mousa and Dun Telve were not points of egress from intra-mural gallery to wooden floor, but rather the reverse, allowing access from the timber living-area to the intra-mural space. This interpretation envisages the use of the timber floors as the main living area, with each floor reached by wooden ladders or stairs from the central area, with the intra-mural galleries serving as storage space. The stone stairway was at best an attic stair and at worst a relict constructional convenience. Access to the wallhead was easy: directly up the internal wooden ladders.

DISCUSSION: MOUSA AND THE DATING OF SHETLAND BROCHS

Having examined the effect of Mousa's atypical stair arrangements upon the accepted interpretation of broch internal structures, and noted the evidence showing that Mousa is little more typical of Scotland than of Shetland, it remains to consider the relationship of these observations to the date of Shetland's brochs. The recent dates from Orkney must be borne in mind (see above, p 220).

The fact that Mousa is so unlike its neighbours means that any inferences drawn from its location in Shetland are invalid. Thus the argument that, since Mousa was the 'fully-developed' type of broch and occurred in Shetland, then the building of brochs in Shetland must have been relatively late in the Scottish context is invalidated. MacKie's typology would place the Shetland brochs *as a group* late in the sequence, for they represent the solid-based form, with deep-set doorways and relatively massive proportions, which is the final phase of the ground-galleried/transitional/solid-based sequence. However, the evidence from Bu (Hedges & Bell 1980) suggests that there were massive solid-based structures in the Northern Isles before the appearance of galleried structures in the Western Isles. Clearly, this state of affairs can only be a temporary one, and could be overturned by early dates from the Hebrides. Nevertheless, the appearance of a plausible mid-point between the roundhouse of Howmae type (Traill 1885) and a fully-fledged solid-based broch, the evidence from Howe, Orkney (*Discovery Excav Scot*, 1980, 23-4) for the addition of a thickening wall to a lightly built broch, and the evidence from Midhowe for experimentation with ground-galleried walls, provide at last a substantial body of proof that there was improvisation in broch building in Orkney, thus supporting Caulfield's artefactual evidence for the early date of Orcadian brochs (Caulfield 1978). Thus there is now a northern sequence of structures to be set against the western sequence established by MacKie (1965).

However, the extended time-scale provided by the dates from Bu takes much of the pressure away from broch evolution, allowing a period of five centuries or more for experimentation. Thus it is no longer necessary to picture the broch as the development of a small area which, when perfected, spread with lightning speed across Atlantic Scotland. Rather, the gradual development of broch traits may have taken place in several areas, each aware of the experiments of the others. This would allow Bu, the Hebridean semi-brochs and the Shetland blockhouses an equal part in

broch genesis. Each region's defences would gradually have approached the broch-like, as local practices were modified in the light of trial and error. The question of where the first broch was built is as sterile as it has always been, since the distinction between broch and proto-broch is solely a matter of definition. In brief, an extended period of development provides a mechanism whereby convergence of design could have occurred in all areas where brochs were later built, thus explaining the similarity of brochs in areas where their local ancestry is different.

The second century AD, suggested by sound artefactual evidence, still remains an acceptable date for the end of broch-building in Shetland, but the beginning of this era is no longer capable of being determined with any degree of certainty. While conclusive dates are absent, there seems to be little reason for Shetland to have been far behind Orkney in developing broch architecture towards the solid-based form native to northern Scotland. In fact, Shetland displays more evidence for experimentation in hollow wall building than does Orkney. The false cells at West Burrafirth broch (Low 1879, 126), the hollow-based galleried gatehouse at Loch of Huxter (Mitchell 1881) and the similar blockhouse at Clickhimin, where it predates the broch (Hamilton 1968, 54-62), all suggest that this most northerly group of islands played a far from passive role in the development of architectural techniques. There is no reason to suppose that the Shetlanders were at all laggardly in acquiring and developing the skills required to construct substantial drystone defences of broch type.

Turning once more, in conclusion, to Mousa, we may well agree with the proposition that Mousa is, indeed, a very late exposition of the broch builders' art. However, it has been demonstrated that Mousa's location in Shetland is largely irrelevant to the role of Shetland in the broch-building period. It is to be hoped that these islands will be able to emerge from the tall shadow of Mousa, that most exceptional of monuments. And as regards that splendid edifice, in light of its demonstrable difference from its associates, a justifiable reply to the question 'Is Mousa a broch?' must be 'Yes, but no other broch is a Mousa'.

ACKNOWLEDGMENTS

This article derives from part of a thesis completed at Glasgow University under the supervision of Professor L Alcock and Dr E W MacKie. The latter gave freely of his time to discuss the views presented here, and also allowed reference to as yet unpublished work, as did J Barrett, B Bell, Dr H Fairhurst and J W Hedges. Ms Paula Love gave invaluable assistance at all stages of preparation and provided information from her own studies of northern brochs; while P J Ashmore, Dr D J Breeze and I MacIvor made helpful suggestions on the first draft.

APPENDIX

Shetland broch sites shown in fig 2

1	Balta	Unst	HP 660090
2	Belmont	Unst	HP 558006
3	Burgan	North Mainland	HU 344775
4	Burland	East Mainland	HU 447361
5	Burraland	South Mainland	HU 448232
6	Burra Ness	Yell	HU 557958
7	Clevigarth	South Mainland	HU 407130
8	Clickhimin	East Mainland	HU 464409
9	Clumlie	South Mainland	HU 404181
10	Culswick	West Mainland	HU 253448

11	Eastshore	South Mainland	HU 403113
12	Feal	Fetlar	HU 629901
13	Greenbank	Yell	HP 539051
14	Holm of Copister	Yell	HU 472780
15	Houbie	Fetlar	HU 620904
16	Housabister	East Mainland	HU 487578
17	Huxter	West Mainland	HU 173570
18	Jarlshof	South Mainland	HU 399096
19	Levenwick	South Mainland	HU 416198
20	Loch of Houlland	North Mainland	HU 213793
21	Mousa	South Mainland	HU 457237
22	Sae Breck	North Mainland	HU 210781
23	Snabrough	Unst	HP 568028
24	Underhoull	Unst	HP 574045
25	West Burrafirth	West Mainland	HU 257573
26	Windhouse	Yell	HU 488922
27*	Southvoe	South Mainland	HU 401148

* Broch ruinous, but reliable recorded dimensions.

REFERENCES

- Anderson, J 1877 'Notes on the structure, distribution and contents of the Brochs . . .', *Proc Soc Antiq Scot*, 12 (1876-7), 314-55.
- Archaeologia Scotica*, 5 1890 (a number of articles on the brochs of different regions).
- Barrett, J 1981 'Aspects of the Iron Age in Atlantic Scotland', *Proc Soc Antiq Scot*, 111 (1981), 205-19.
- Callander, J G & Grant, W G 1934 'The Broch of Midhowe, Orkney', *Proc Soc Antiq Scot*, 68 (1933-4), 444-516.
- Caulfield, S 1978 'Quern replacement and the origin of the brochs', *Proc Soc Antiq Scot*, 109 (1977-8), 129-39.
- Curle, A O 1927 'The development and antiquity of the Scottish Brochs', *Antiquity*, 1 (1926-7), 290-8.
- Fairhurst, H forthcoming *Excavations at Crosskirk, Caithness. Soc Antiq Scot Monogr Ser.*
- Fojut, N 1980 *The Archaeology and Geography of Shetland Brochs*. Unpublished PhD thesis, Glasgow University.
- Graham, A 1947 'Some observations on the brochs', *Proc Soc Antiq Scot*, 81 (1946-7), 48-99.
- Hamilton, J R C 1956 *Excavations at Jarlshof, Shetland*. Edinburgh.
- Hamilton, J R C 1968 *Excavations at Clickhimin, Shetland*. Edinburgh.
- Hedges, J W in preparation, *Gurness broch, Aikerness, Orkney: Excavation report*.
- Hedges, J W & Bell, B 1980 'That tower of Scottish prehistory - the broch', *Antiquity*, 54 (1979-80), 87-94.
- Low, G 1879 *A Tour in Orkney and Shetland in 1774*. Kirkwall.
- MacKie, E W 1965 'The origin and development of the Broch and Wheelhouse building cultures of the Scottish Iron Age,' *Proc Prehist Soc*, 31 (1964-5), 93-146.
- MacKie, E W 1971 'English migrants and Scottish brochs', *Glasgow Archaeol J*, 2 (1971), 39-71.
- MacKie, E W 1973 *The origin and development of the Broch and Wheelhouse building cultures of the Scottish Iron Age*. Unpublished PhD thesis, Glasgow University.
- MacKie, E W 1980 'Dun an Ruigh Ruaidh, Loch Broom, Ross & Cromarty: excavations in 1968 and 1978', *Glasgow Archaeol J*, 7 (1980), 32-79.
- Mitchell, A 1881 'Notice of buildings designed for defence on an island in a loch at Hogsetter [sic], in Whalsay, Shetland', *Proc Soc Antiq Scot*, 15 (1880-1), 303-15.
- Paterson, J W 1922 'The broch of Mousa: a survey by HM Office of Works', *Proc Soc Antiq Scot*, 61 (1921-2), 172-83.
- Scott, L 1947 'The problem of the Brochs', *Proc Prehist Soc*, 13 (1946-7), 1-36.
- Spiegel, M R 1972 *Theory and Problems of Statistics*. New York.
- Traill, W 1885 'Notice of excavations at Stenabreck and Howmae, in North Ronaldsay, Orkney', *Proc Soc Antiq Scot*, 19 (1884-5), 14-33.