The Circular Archetype in Microcosm

The Carved Stone Balls of Late Neolithic Scotland

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Contents

List of Figures

Chapter Eight

Chapter Nine

Chapter Ten

Foreword and Acknowledgements

This is the culmination of seven years research into the Carved Stone Balls of Late Neolithic Scotland. It is the first complete study of these enigmatic artefacts since that undertaken by Dorothy Marshall in 1977. My aim was to research them holistically in an attempt to understand how and where they originated through the types of stone they were made from, any associations with monumental structures and consider what, if any impact, carved stone balls may have had upon the changing worldviews of people during the Late Neolithic.

For the first time it has been possible to paint a more nuanced and complete picture thanks to the visual geological characterization of approximately 33% of carved stone balls in museum collections in Scotland, England, Ireland, and Norway. This enabled a more detailed analysis of the materials used, which in turn has allowed the origin of some stone to be identified and in many cases offered an insight into how the balls or their makers moved around the landscape. It has now brought together for the first time photographic and sketch imagery of the entire known corpus, complete with dimensions, weights, historical data, and maps and considers associated artefacts and monuments found within three kilometres of their approximate findspots. This information is available in the online database which accompanies this book. Finally, Dorothy Marshall's classification/typology has been revised to add a number of newly identified types which, following careful analysis, suggests that it may be possible to see some of the individual craftspeople involved in their manufacture.

I have Beverley Ballin Smith to thank for my interest in carved stone balls. During the early days of the Udal Project at Guard Archaeology in Glasgow I helped repackage finds from a dig undertaken by Iain Crawford during the 1960s. Beverley taught me an enormous amount about material culture and archaeology which enhanced my overall knowledge and helped greatly with the undergraduate degree I was taking at Leicester University. One day in particular, while I was repackaging a Neolithic plain stone ball Beverley mentioned that it might have been a carved stone ball in the making due to its slightly asymmetrical shape. Never having seen one before, I looked them up on Google, was instantly captivated and decided to use them as the subject for my upcoming BA dissertation. As a major part of my dissertation, I produced the first Master Photographic Database of Carved Stone Balls in 2015.

A year later I applied to the University of Aberdeen to research them further for a Masters Degree. My supervisor, Professor Gordon Noble, quickly realised the potential of the research and a few months after I began suggested that I should complete it to PhD level. I am indebted to him for his continual support and unswerving encouragement over the last few years.

Although I have had a lifelong interest in geology my knowledge at best was amateur and I knew I would be unable to identify many of the rock types used to manufacture the balls without additional help. This eventually came in the form of Dr John Faithful, Curator of Mineralogy and Petrology at the Hunterian Museum in Glasgow. John supplemented my limited geological and mineralogical knowledge with his own considerable expertise, without his help I would not have been in a position to offer the interpretations presented here. He deserves my enduring gratitude for his work on the visual characterisation of Aberdeen University Museum and National Museums Scotland collections. Without it my analysis of the geological origin of carved stone balls and how they moved through the landscape would not have been possible. Thanks also go to Malcolm Coull of the Hutton Institute in Aberdeen for his help with the composition and character of soils throughout Scotland which provided the potential background to why Late Neolithic people settled where they did.

With the exception of those that are now lost, missing or have been auctioned I have personally handled and recorded all but four balls. It goes without saying that I would have been unable to even begin this research without the help of past and present museum curators and the keepers of the few balls that are in private hands. There are too many people to mention individually, and I will simply list the museums where they worked. Without exception everyone was incredibly welcoming, helpful, and genuinely interested in my research and it was a pleasure to visit them, some several times.

List of organisations with one or more carved stone ball: please note that not all balls will be exhibited, and some locations are not open to the public.

Aberdeenshire Council Museums Service
Mintlaw, Aberdeenshire

Aberdeen Art Gallery and Museums
Aberdeen, Aberdeenshire

Arran Museum
Brodick, Isle of Arran

Ashmolean Museum
Oxford, Oxfordshire

Auld Kirk Museum
Kirkintilloch, Dunbartonshire

Banff Museum
Banff, Aberdeenshire

Bernera Museum
Breacleit, Isle of Lewis

Bristol Museum and Art Gallery
Bristol, Avon and Somerset

British Museum
Bloomsbury, London

Bromley Libraries and Heritage
Bromley, London Borough of Bromley

Campbeltown Museum
Campbeltown, Argyll & Bute

Caithness Horizons
Thurso, Highland

Clifton Park Museum
Rotherham, South Yorkshire

Dick Institute
Kilmarnock, Ayrshire

Dumfries Museum and Camera Obscura
Dumfries, Dumfries and Galloway, South

Dunbeath Museum
Dunbeath, Caithness

Dunblane Museum
Dunblane, Stirlingshire

Dundee Art Gallery and Museum
Dundee, Angus,

Dunrobin Castle Museum
Golspie, Sutherland

Elgin Museum
Elgin, Morayshire

Falconer Museum
Forres, Morayshire

Fife Cultural Trust
Kirkcaldy, Fife

Gairloch Museum
Gairloch, Wester Ross

Great North Museum
Newcastle upon Tyne, Tyne and Wear

Glasgow Museums
Glasgow, Lanarkshire

Hawick Museum
Hawick, Scottish Borders

Highland Folk Museum
Newtonmore, Highland

Hull and East Riding Museum
Hull, East Riding of Yorkshire

Hunterian Museum
Glasgow, Lanarkshire

Hunt Museum
Limerick, Republic of Ireland

Inverness Museum and Art Gallery
Inverness, Inverness-shire

Meffan Museum and Art Gallery
Forfar, Angus

Montrose Museum and Art Gallery
Montrose, Angus

National Museums Scotland
Edinburgh, Midlothian

Orkney Museum
Kirkwall, Orkney

Paisley Museum
Paisley, Renfrewshire

Perth Museum and Art Gallery
Perth, Perth and Kinross

Stirling Smith Art Gallery and Museum
Stirling, Stirlingshire

Stornoway Museum
Stornoway, Isle of Lewis

Tarbat Discovery Centre
Portmahomack, Easter Ross

Trondheim Museum
Trondheim, Norway

Tullie House Museum
Carlisle, Cumbria

University of Aberdeen Museum
Aberdeen, Aberdeenshire

University of Manchester
Manchester

University of Oxford (Pitt Rivers Museum)
Oxford, Oxfordshire

University of Cambridge
(Museum of Archaeology and Anthropology).
Cambridge, Cambridgeshire

With the exception of the British Museum, everyone has allowed me to freely use the images you see here, waiving all copyright fees so the carved stone balls in their collections could be seen by all; for that I am especially grateful. Unfortunately, the British Museum insisted on charging £42.00 for each image despite them having been taken by me. It could have been worse as they originally wanted to additionally charge for taking the images themselves which would have cost a further £108.00 per image. Considering it is a public institution designed to describe how the human race has developed over time I felt this was iniquitous but nonetheless was forced to pay up so the complete story could be told. Had the other museums charged similar amounts this book would have never been published.

I have to thank three other people for their part in this story. Dr Elizabeth Curtis of Aberdeen University and Dr Kenny Brophy of Glasgow University were my viva voce examiners, they not only showed great interest in my thesis but also offered a number of very useful suggestions that have made this volume far more readable.

The third person is my wife Elizabeth who has provided endless support in so many ways during the past seven years. She has driven me endlessly around Scotland, England, and Ireland in the pursuit of carved stone balls and has spent hours discussing them. She has read all iterations of my thesis and this volume many times over to check both detail and grammar; she deserves so much more credit than space allows!

This book is dedicated to her.

Chapter One

Introduction

In 2015, in the final year of a six year part-time degree in archaeology at Leicester University, I chose Neolithic Carved Stone Balls (CSBs) as the subject for my final dissertation. In doing so I found it necessary to create both a Master Database and Photographic Database, as despite them being regarded by many as one of Scotland's archaeological treasures, no national database existed for them. I soon realised that, although the databases themselves were undoubtedly useful, my actual knowledge of CSBs was limited and initial research revealed that surprisingly few studies had been carried out on these artefacts and so decided to study them in greater depth. This is the culmination of a further six years' research into their manufacture, distribution, potential use, and the people who made and used them.

Unlike Plain Stone Balls, which have also been carved and are often similar in size, Carved Stone Balls *per se*, have between three and one hundred ninety-two knobs or discs projecting from their surface. The most commonly found type have six knobs or discs with the second most common having four. While being made from a variety of rock types, most of those seen in museum collections are grey or black which is mainly due to the acquisition of organic or mineral coatings during 5000 years of burial along with dirt and grease from handling since rediscovery. In some instances, these coatings have been removed revealing the true coloration of the stone used; as the freshly made replicas in Figure 1.1 show, the colour of many would have, at least initially, been quite distinctive. A small number were also decorated with carved or incised motifs similar to those used on tombs in the Boyne Valley in Ireland and, to a lesser degree, rock art found elsewhere in Britain and Ireland (Bradley and Chapman 1986: 131).

As a result of comprehensive research to establish which museums held collections of CSBs in Scotland and England, a series of visits were made to record them between late 2014 and mid 2015. During this period over 350 CSBs were weighed, measured, and digitally photographed and the first Master Carved Stone Ball Database and Photographic Database was produced. Although some collections were relatively close together, they were not always available at the same time. For instance, one collection was on loan to a Japanese museum for several months and National Museums Scotland were in the process of moving much of their collection to a new storage facility, entailing more than one visit to some locations. The collection of data eventually involved travelling over 15,000 miles.

One of the main problems encountered in recording CSBs was a lack of findspots or contextual information, resulting in them being labelled random or stray finds. Many were at best attributed to a farm, village, parish, or county with a few simply recorded as being from Aberdeenshire or Scotland. From the dearth of information recorded in museum accession registers it was clear that, by the time they were acquired by antiquarian collectors or museums, the findspot and context of many were lost or distorted. Some had also been curated privately as 'curios' while others were simply left in garden sheds being considered oddly shaped stones. When later generations donated or sold them to museums much or all knowledge regarding

Figure 1.1: Replica Carved Stone Balls showing fresh colouration. © C. Stewart-Moffitt 2021.

their origin was lost in the depths of time. Over the years many CSBs have been sold to private collectors at auction, and even today more continue to be sold regardless of their apparent value to the nation. At least two personal CSB collections exist in Scotland; one has been recorded and can be found in the Master Database, while the other in Kincardineshire, has so far proved elusive and remains unrecorded.

Even in the secure environment of museums, original accession registers have been lost over the years to fire and flood, and from the information recorded in some it is clear that past curators were often unaware of both the significance of the artefacts or information being recorded. Inconsistencies in some registers show the amount and quality of information recorded changed for better or worse as new curators came on the scene and even today, in some high-tech museum environments, original information in accession registers was summarized while being transferred to digital systems and is occasionally missing important and useful information. Despite these shortcomings, around two thirds of CSBs were found to have approximate locations and therefore still have the potential to provide us with an approximate idea of their distribution. Frustratingly though, the remaining third are often the ones that appear to hold the key to unlocking a more complete understanding.

The rediscovery of carved stone balls

The floruit of CSB discovery was in the eighteenth and nineteenth centuries during the Improvement Period (c. 1750 – 1850). Thousands of hectares of previously unproductive and boggy land were drained and brought under the plough by landowners restructuring their estates to increase productivity. Thanks to the Drainage Loan Acts, enacted by Peel in 1846, over £2,000,000 was distributed by the Treasury to farmers in northeast Scotland, enabling the excavation of hundreds, if not thousands of kilometres of drainage trenches and ditches to drain the land. Drainage projects in Aberdeenshire saw trenches dug at depths of between 0.9mtr to 1.1mtrs from the surface; with deeper dikes or ditches taking the drained water to the nearest burn or river (Morton 1855: 688). In 1838, renown Edinburgh lawyer Lord Cockburn, noted that he '*knew no part of Scotland so visibly improved within thirty years as Aberdeenshire*' and that '*the country between Keith and Stonehaven was little else than a hopeless region of stones and moss'* (Carter 1979: 52).

In lowland areas this entailed the rationalization of farm and field boundaries and the drainage of unproductive wetlands and mosses by trenching, as this comment made by William Hunter in 1862 illustrates '*... the ploughman and the drainer have enriched archaeology by the stores of relics which they have brought to light'* (Hunter 1862: 2; RCAHMS 2008: 3-4 and Welfare 2011: 31-32). As farm equipment and methods improved, steam ploughs allowed deeper ploughing and the cultivation of heavier soils than had previously been achieved with horse drawn equipment. First introduced in the northeast at Torry, near Nigg in 1858, they came into their own in Kincardineshire some eight years later, when a single set of steam ploughs was purchased by the Kincardineshire Steam Ploughing Company; so popular did they become that the company purchased a second set in 1872 (Carter 1979: 88). In the same year the first set of steam ploughs were used by the Scottish Steam Cultivation and Traction Company at Brownhills, Slains but the heavy Buchan clays seem to have been problematic for the company who moved their equipment back south to Edinburgh. Despite this apparent setback, Aberdeenshire company Philorth brought Fowler double engine steam ploughs to Aberdeenshire and very quickly had a full order book (Carter 1979: 89). While CSBs had been previously discovered through traditional cultivation methods, more were undoubtedly brought to the surface following the use of steam ploughs and subsoilers which tilled the ground to a greater depth. As improvements were made to the land many smaller farmsteads were demolished and new houses, farm buildings, townships and public buildings were constructed (Tarlow 2007: 35), along with the development of a new road and railway infrastructure needed to serve the ever-increasing population. Many CSBs were unearthed while digging post holes and trenches for foundation works, while others were discovered while digging peats for fuel. LM CSB 002 found at Jeanstown, now Lochcarron, in Wester Ross was recovered from a peat bog at a depth of 2.44mtrs and LM CSB 013 found at Dale Moss in Caithness was buried at 1.83mtrs. Documentary evidence shows that the majority of CSBs were found by ploughmen, farm labourers and groundworkers going about their daily work of trenching, digging foundations, clearing cairns and tumuli (Smith 1874: 30-51). Contemporary records also appear to show that many CSBs were subsequently acquired either by the owners of the land on which they were found or by local clergy, many of whom were antiquarians and collectors of curios. While some CSBs remained in family collections for generations others were bought, sold, swapped, exchanged and exhibited before being either auctioned or donated to museum collections. As with many other prehistoric artefacts, contextual information associated with their findspots, if it ever existed, was generally lost during these exchanges and very often the death of a collector also meant the loss of any information associated with the artefact (Smith 1874: 33).

Not all CSBs were found on land, three were found in watery contexts, in or close to rivers; whether these were deliberate depositions or accidental loss is unknown. CSB 407 was found buried at a depth of 2.44mtrs beside the Bridge of Earn at a location used for centuries as a ford. This ford was situated at a point where the tidal element of the Earn had a minimal effect on its depth at low tide, suggesting it could have been accidentally lost during a river crossing. Although found close to the bank it seems reasonable to suppose that river dynamics over 5000 years may have altered its course which, along with land reclamation and bridge building over the last several hundred years, may have restricted its width at this point, suggesting it could have originally been lost in the river itself (Bradley 1998: 5). Alternately it is possible that it may have been deliberately deposited as a votive offering (Bradley 1998: 36-40 and Bradley 2017: 180-198) or even simply discarded in the river at the end of its useful life. CSB 072 was also discovered in a watery context being dredged from the River Tay, but once again the circumstances of its deposition or accidental loss are unknown. Although, as the actual findspot is unknown, it is also possible this may have been an act of deliberate deposition at the end of its useful life. The final ball found in a watery context is CSB 017 which is said to have been discovered in the River Thurso: as the exact location and circumstances surrounding its recovery are unrecorded it is impossible to comment on whether it was an accidental or deliberate deposition.

Table 1.1: CSBs with find dates between 1827 and the 1970s. C. Stewart-Moffitt 2020.

Year	Number Found	Year	Number Found
1827	1	1902	1
1835	1	1905	1
1847	1	1910	1
1848	1	1914	2
1854	1	1915	1
1858	1	1923	1
1867	1	1930s	3
1879	1	1940s	1
1882	3	1950s	3
1891	1	1960s	3
1894	2	1970s	4
1896	1	-	-
1897	2	-	-
1898	1	-	-
1899	2	Total	41

CSB distribution

The majority of these uniquely Scottish artefacts were found along the eastern seaboard of Scotland between the Moray Firth and the Firth of Forth with an epicentre around Inverurie and Fyvie in Aberdeenshire. A few outliers have also been found scattered along the thin strip of fertile coast that exists between the Moray Firth and Caithness, on the Inner and Outer Hebrides, along the west coast of Scotland as far south as the Solway Firth and into Cumbria along the River Eden. They have also been discovered in Orkney, although the majority of these have a different and particularly distinctive form. Three were also found scattered along the east coast of England in Northumberland, Durham, and Yorkshire with a further three in Ireland and a single example in a medieval clearance cairn in Norway. It's probable that the majority of these travelled during the Neolithic but, as their history is unknown, it is also possible they could have journeyed there more recently in the hands of antiquarian collectors. The sole example from Norway was almost certainly found by Vikings during an expedition to Scotland and taken home as a curio; it is documented as being discovered in an early medieval clearance cairn (Brevik 2013: 47-49).

Finders, collectors, museums, and dates

During my initial research it became clear that despite the majority of museum registers recording acquisition dates, few recorded find dates or indeed anything else about the artefact. This may have been due to the collecting activities of antiquarian collectors more concerned with artefact acquisition than the recording of temporal information. Even when more was known of the circumstances surrounding the discovery of an artefact this knowledge rarely survived subsequent transfer between peers or when collections were donated or sold to museums. For this reason, most of the information regarding find dates had to come from secondary sources such as the Proceedings of the Society of Antiquaries of Scotland. Today only a handful of reliable find dates exist as can be seen in Table 1.1.

One of the most active antiquarian collectors in Aberdeenshire was John Rae (1848-1891). Rae, who in 1867 aged nineteen, opened a grocer and spirit merchant business in Aberdeen, and was an active member of the Aberdeen Natural History Society and the Aberdeen Working Men's Natural History Society and was known to regularly contribute artefacts to antiquarian lectures and exhibitions (Taylor 2015: 165). His antiquarian interests and knowledge were well known in academic circles to the extent that in 1885 he and his wife were invited to Balmoral Castle for a meeting of the British Association for the Advancement of Science (Taylor 2015: 166). He was a prolific collector and by 1891 his collection was considered by his contemporary, Alexander Walker to be '*not only the best known in private hands but was superior to that of the Antiquarian Museum in Edinburgh*'. When his collection, which he unassumingly called a '*mere routh o' auld nick-nackets*', was auctioned in 1892 it comprised over 5832 items, some of which originated from overseas: much of the collection was acquired by museums (Taylor 2015: 166, 177-180). Rae began collecting in childhood and continued until his death in 1891 and although we cannot be sure of actual acquisition dates, it seems that as an adult he was probably collecting artefacts from at least the late 1860s to the early 1890s. Rae was not the only collector of CSBs during this time, many of his fellow antiquarians were also busy collecting and exchanging artefacts, some of whom no doubt had begun their collections even earlier. An analysis of antiquarian collectors, Table 1.2, shows that most were either members of the aristocracy, professionals or, like Rae, businessmen. Although not comprehensive, Table 1.3 lists some of the larger antiquarian collections sold or donated to museums on the death of their keeper.

Museum acquisition records between 1827 and the early part of this century are shown in Table 1.4. The earliest record appeared in 1827 and was followed by a few sporadic acquisitions up until the early 1850s. Between 1855 and 1871 the numbers increased slightly and became more regular and may have been due to an intensification in the amount of drainage work undertaken following the 1846 Drainage Loan Acts along with increasing amounts of building and infrastructure work. A larger and more consistent increase can be seen between 1872 and 1892 which may have been due in part to the depths achieved by steam ploughing. The increase in the National Museum of Antiquaries (now National Museums Scotland) collection, between 1896 and 1911, may also have been due to the influence of Frederick Coles during his employment as Assistant Curator between those dates. Coles great interest in CSBs and his correspondence with antiquarian collectors will be covered in more detail in a later chapter.

Treasure Trove records from the 1990s and early 2000s show many of those processed during this period had been either family heirlooms or curiosities found by previous generations which were either 'curated' at home on the mantle shelf or put in a drawer or shed and subsequently forgotten.

Recreating the past: replica CSBs

A number of cast/replica CSBs are known to have been made from originals in private antiquarian collections. While some were made to satisfy the demands of fellow antiquarian collectors, others were made professionally by the National Museum of Antiquaries to expand their collection and displays. Overall, the quality of these cast/replica CSBs was excellent; many appear to have been cast in self coloured resin and at least one seems to have been weighted to be comparable with the original. The few that were cast in plaster particularly stand out as they are light in weight and have generally not aged well. Many of those with painted surfaces are now crazed and several appear to have been dropped resulting in considerable damage. When, on the death of their keepers, antiquarian collections became available, many cast/replicas were also acquired by museums. The majority appear to have been one-offs, although in a few cases a duplicate seems to have been made, possibly for another collector or a museum (Foster and Curtis 2015: 1-27). Table 1.5 lists all known cast/replicas in museum collections along with the current location of the originals.

Lost knowledge, new theories, and artistic fascination

The lack of findspot and contextual information is particularly unfortunate and has considerably hindered further investigation into their age, origin, and social use (Saville 2011: 19) and does not permit any insight into how CSBs lost either their allure or influence or indeed met their final demise. While some may have been accidentally lost others may have been subject to formal deposition or simple abandonment at the end of their useful life. Over the years a great deal of speculative discussion by both academic and lay people has taken place, but despite numerous suggestions their use is still currently a mystery. In 1954 Stuart Piggott wrote '*The use, practical or ritual, of these balls is unknown...*' (1954: 332) and so it remains today, 66 years later. Despite the obvious lack of information, museums with collections of CSBs report considerable interest in them with their displays prompting numerous questions from visitors who find it difficult to understand their purpose. Over the years National Museums Scotland, who have the largest collection of CSBs, have compiled a considerable file of letters suggesting alternative hypotheses regarding their potential use (Edmonds 1992: 179, 184). Any search for carved stone balls or petrospheres on the internet will always produce several pages of hits covering both historical and more recent research to New Age inspired ideas which suggest they may have been copies of pollen grains, platonic solids, star patterns, atoms, or shamanistic visions. Interest in these artefacts is both international and wide-ranging, with admirers not only in the academic worlds of archaeology and museology but also in the worlds of mathematics, science, architecture and particularly art as can be seen in Figures 1.2, 1.3 and 1.4.

How little we know and questions to ask

As noted earlier, despite recording and compiling two original databases and offering some original ideas regarding the origin of the material in my

Table 1.2: Titles and Professions of collectors (Individual collectors and those with larger collections). C. Stewart-Moffitt 2020.

Professions	
Titled	6
Academic	1
Medicine	8
Military	5
Religion	7
Law	3
Teaching	3

Table 1.3: Larger Antiquarian collections acquired by museums by year. C. Stewart-Moffitt 2020.

Collection	Year
John Sturrock	1889
John Rae	1892
Dr. Temple	1900
Rev. William Greenwell	1909
Wilson Collection	1910
Henderson Bishop Collection	1914
Young Collection	1927
Sir John Evans Collection	1927
Captain Hugh P Lumsden Collection	1937
Grahame Callander	1940

Table 1.4: CSB find dates/museum acquisition dates by year (where listed). C. Stewart-Moffitt 2020.

Year	Total	NMS	Year	Total	NMS	Year	Total	NMS	Year	Total	NMS
1827			1864	2	2	1901	1	1	1970s	10	1
1828			1865			1902					
1829			1866			1903	4	4	1980s	8	1
1830			1867			1904	4	4			
1831			1868			1905	1	1	1990s	14	1
1832	2		1869			1906	5				
1833			1870			1907	2	1	2000s	15	4
1834			1871			1908	3	2			
1835			1872	2	1	1909	3	1			
1836			1873	1	1	1910	5	4			
1837			1874			1911					
1838			1875	1	1	1912	1				
1839			1876	1	1	1913	2	1			
1840	1	1	1877			1914	20				
1841	2		1878	6	4	1915	1				
1842			1879			1916	1	1			
1843			1880	1	1	1917	2	2			
1844			1881	3	3	1918					
1845			1882	3	3	1919					
1846			1883			1920	2				
1847			1884	1	1	1921	2	1			
1848			1885	2	2	1922					
1849			1886	3	3	1923	1				
1850			1887	1	1	1924					
1851			1888	2	2	1925	3	4			
1852	1		1889	11	10	1926					
1853			1890	14	13	1927	13	2			
1854			1891	7	7	1928	1	1			
1855	1		1892	11	8	1929	1	1			
1856	1		1893								
1857	5		1894	1	2	1930s	20	12			
1858	1	1	1895	1	1						
1859			1896	2	1	1940s	10	8			
1860	2	2	1897	1							
1861	2	2	1898	4	3	1950s	18	6			
1862			1899								
1863	2	1	1900	4	4	1960s	8				

Table 1.5: List of Cast/Replica locations along with the original CSBs where known. C. Stewart-Moffitt 2020.

Number	Cast/Replica Held By	Accession Number	Original Held By	Details
CSB 016	National Museums Scotland	NMS X.AS 38	Hunterian Museum	Cast/Replica of CSB 046 in the Hunterian Museum numbered GLAHM B.1914.357.
CSB 204	Cambridge Museum of Archaeology and Anthropology	Z 21546/ Record 2	Dunrobin Castle Collection	Cast/Replica of CSB 471 in Dunrobin Castle Collection.
CSB 205	Glasgow Museums	ARCHNN.1303	National Museums Scotland	Probable Cast/Replica of CSB 455 in NMS numbered NMS X.AS 111.
CSB 253	National Museums Scotland	NMS X.AS 32	National Museums Scotland	Cast/Replica of CSB 494 in NMS numbered NMS X.HA 658.
CSB 278	Elgin Museum	ELGNM 1957.12.1	National Museums Scotland	Cast/Replica of CSB 388 in the NMS numbered NMS X.AS 217.
CSB 285	National Museums Scotland	NMS X.AS 8	Aberdeen University Museum	Probable Cast/Replica of CSB 136 in Aberdeen University Museum numbered ABDUA 16277.
CSB 289	National Museums Scotland	NMS X.AS 11	National Museums Scotland	Cast/Replica of CSB 388 in the NMS numbered NMS X.AS 217.
CSB 291	National Museums Scotland	NMS X.AS 17	Perth Museum	Cast/Replica of CSB 073 in Perth Museum numbered 1290B.
CSB 292	National Museums Scotland	NMS X.AS. 19	Aberdeen University Museum	Probable Cast/Replica of CSB 127 in Aberdeen University Museum numbered ABDUA 16268.
CSB 293	National Museums Scotland	NMS X.AS 20	N/A	Possible Cast/Replica of CSB 116 in Aberdeen University Museum numbered ABDUA:16257.
CSB 294	National Museums Scotland	NMS X.AS 21	N/A	There may be another Cast/Replica similar to this numbered CSB 463 or A1455 in the Stirling Smith Museum, Stirling.
CSB 295	National Museums Scotland	NMS X.AS 22	N/A	N/A
CSB 296	National Museums Scotland	NMS X.AS 24	National Museums Scotland	Cast/Replica of CSB 444 in the NMS numbered RSM 1905-950.
CSB 297	National Museums Scotland	NMS X.AS 25	National Museums Scotland	Cast/Replica of CSB 445 in the NMS numbered RMS 1905-947.
CSB 298	National Museums Scotland	NMS X.AS 26	Montrose Museum	Cast/Replica of CSB 228 in Montrose Museum numbered M1977.84.
CSB 304	National Museums Scotland	NMS X.AS 87	Ashmolean Museum	Cast/Replica of CSB 013 in Ashmolean Museum, Oxford. numbered AN 1927.2730.
CSB 305	National Museums Scotland	NMS X.AS 33	Skara Brae Visitors Centre	Cast/Replica of CSB 493 in the NMS numbered HA 657.
CSB 308	National Museums Scotland	NMS X.AS 47	Aberdeen University Museum	Original is probably CSB 144 in Aberdeen University Museum numbered ABDUA 16286.
CSB 309	National Museums Scotland	NMS X.AS 48	Hunterian Museum	Cast/Replica of CSB 047 in the Hunterian Museum numbered GLAHM B.1951.1.
CSB 310	National Museums Scotland	NMS X.AS 49	N/A	N/A
CSB 311	National Museums Scotland	NMS X.AS 51	Aberdeen University Museum	Probable Cast/Replica of CSB 115 in Aberdeen University Museum numbered ABDUA 16256.

CSB 313	National Museums Scotland	NMS X.AS 53	National Museums Scotland	Probable Cast/Replica of CSB 412 in the NMS numbered NMS X.AS 176.
CSB 314	National Museums Scotland	NMS X.AS 54	Glasgow Museums	Probable Cast/Replica of CSB 220 in Glasgow Museum numbered 1892.106.l.
CSB 315	National Museums Scotland	NMS X.AS 55	National Museums Scotland	Cast/Replica of CSB 435 in the NMS numbered NMS X.AS 204.
CSB 316	National Museums Scotland	NMS X.AS 56	Aberdeen University Museum	Cast/Replica of CSB 132 in Aberdeen University Museum numbered ABDUA:16273.
CSB 317	National Museums Scotland	NMS X.AS 57	N/A	N/A
CSB 318	National Museums Scotland	NMS X.AS 59	Hunterian Museum	There are two Cast/Replicas of this in the NMS. The original is in the Hunterian Museum numbered GLAHM B.1914.355.
CSB 320	National Museums Scotland	NMS X.AS 64	N/A	N/A
CSB 321	National Museums Scotland	NMS X.AS 65	N/A	N/A
CSB 322	National Museums Scotland	NMS X.AS 66	Aberdeen University Museum	Cast/Replica of CSB 151 in Aberdeen University Museum numbered ABDUA:16294.
CSB 323	National Museums Scotland	NMS X.AS 67	Aberdeen University Museum	Cast/Replica of CSB 139 in Aberdeen University Museum numbered ABDUA 16280.
CSB 325	National Museums Scotland	NMS X.AS 69	N/A	Cast/Replica of CSB 218 in Glasgow Museums numbered A.1995.96.so.
CSB 341	National Museums Scotland	NMS X.AS 89	N/A	Cast/Replica of CSB 484 in the Pitt-Rivers Museum numbered PRM 1892.60.13.
CSB 387	National Museums Scotland	NMS X.AS 50	National Museums Scotland	Cast/Replica of CSB 394 at the NMS numbered NMS X.AS 155.
CSB 399	National Museums Scotland	NMS X.AS 161	N/A	N/A
CSB 400	National Museums Scotland	NMS X.AS 162	Montrose Museum	Cast/Replica of CSB 229 in Montrose Museum numbered M1977.85.
CSB 401	National Museums Scotland	NMS X.AS 163	National Museums Scotland	Cast/Replica of CSB 405 in the NMS numbered NMS X.AS 167.
CSB 402	National Museums Scotland	NMS X.AS 164	Glasgow Museums	Cast/Replica of CSB 211 in Glasgow Museums numbered A.1995.96.sq.
CSB 403	National Museums Scotland	NMS X.AS 165	National Museums Scotland	Cast/Replica of CSB 453 in the NMS numbered NMS X.AS 165a.
CSB 415	National Museums Scotland	NMS X.AS 179	National Museums Scotland	Cast/Replica of CSB 405 in the NMS numbered NMS X.AS 167.
CSB 437	National Museums Scotland	NMS X.AS 207	Hawick Museum	Cast/Replica of CSB 001 in Hawick Museum numbered 4055.
CSB 463	Stirling Smith Museum	**A 1455**	Glasgow Museums	The original is probably CSB 218 in Glasgow Museums numbered A.1955.96.so.
CSB 464	Stirling Smith Museum	A 1458	Aberdeen University Museum	Cast/Replica of CSB 139 in Aberdeen University Museum numbered ABDUA:16280.
CSB 465	Stirling Smith Museum	**A 1456**	Aberdeen University Museum	Probably a Cast/Replica of CSB 151 in Aberdeen University Museum numbered ABDUA:16294.
CSB 468	Museum of Islay Life	IMT xx.xxx	National Museums Scotland	Cast/Replica of CSB 376

Figure 1.2: Glass Carved Stone Ball and hand, 'Mine' by Louise Tait. Courtesy of Bam Hyslop.

undergraduate dissertation, it soon became evident how little I or anyone knew about these enigmatic artefacts. I began to realise that my inability to answer the many questions I was asked showed the need for a greater depth of study and so began a research degree in 2016 formulating six key research objectives based upon my previous two years' work.

1. Carry out a complete and detailed re-analysis of the corpus taking into account the striking similarities between CSB materiality and decorative/constructional elements, to investigate the possibility that individual craftspeople might be identifiable within the corpus. Following this re-analysis to update and revise Dorothy Marshall's 1977 Classification/ Typology by adding new types where necessary. Also, to reanalyse CSB decoration and make comparison with other Late Neolithic decorative motifs in an attempt to establish why and when the decoration on some CSBs may have been made and what it might have meant to those who made and saw it.
2. It appeared that, in the past, little geological or mineralogical characterisation or identification had been carried out on CSBs and much that was attempted seemed to have been by people with a very rudimentary knowledge of these disciplines. It was therefore considered necessary to complete an expert visual characterization of as many CSBs as possible in an attempt to reveal more about both the artefacts and their origin. Following visual characterisation, a comparison would be made between the newly identified materiality of each CSB and the geology surrounding its findspot to distinguish which examples may have been made from locally available materials and which may have travelled from elsewhere.
3. The landscape context of each CSB was also identified as an important area of research and aimed to study the overground geology and agricultural potential of the area along with contemporary artefacts or monuments around findspots, to explicate any context that may exist between them. In particular an assessment of

Figure 1.3: 'First Conundrum' in Festival Square, Edinburgh created by Remco de Fouw. © Google Images.

why some areas seemed to be hotspots for finds was considered necessary as was the potential use of overland, riverine, or coastal routes for their distribution.

4. Analysis of those CSBs with findspots, both by type and the number of knobs or discs to understand if local or regional connections may have existed.
5. Investigate CSB manufacturing techniques and tools used and examine suspected nineteenth and twentieth century forgeries.
6. Finally interpret and contextualise the above findings to identify the reasons behind the creation of CSBs and understand how and why they were used, in an attempt to further our knowledge of the Late Neolithic people of Scotland.

Structure, themes, and interpretation

In the chapter that follows I will provide a background to the transition between the Mesolithic/Neolithic periods offering a broad view of the changes that Neolithic people made to the natural environment, their farming practices, and the novel elements of material culture they introduced. Chapter Three will comprise a review of the literature surrounding CSBs from the mid nineteenth century to the early twenty-first century illustrating how past antiquarian and archaeological thought regarding these artefacts has changed and, thanks to the internet revolution, will include some of the stranger ideas that surround them. In Chapter Four I will present a brief resumé of the unique geological landforms of Scotland with important new analysis by this author of the first visual geological characterisation of CSBs in the University of Aberdeen and National Museums Scotland collections. Visual characterisation work was carried out by Dr John Faithfull, Curator of Mineralogy and Petrology at the Hunterian Museum, an acknowledged expert in the geology and mineralogy of Scotland. Dr Faithfull had already carried out the mineralogical characterisations of several CSBs in the past and has a considerable knowledge of how stone has been used by past people. He was the obvious person to offer informed professional guidance on the materiality of CSBs. In Chapter Five I will consider how Scotland's landscape may have been responsible for CSB findspots and how it may have offered various opportunities for their dissemination throughout the country by land, river, and sea. Chapter Six will look for potential links between CSB findspots and Neolithic and Early Bronze Age monuments, artefacts and natural locations and features in the landscape. Chapter Seven will look at the subject of classification and typology and how it can be useful to archaeologists researching early collections of artefacts, especially where very little is known about them. I will also illustrate how Marshall expanded the early classification and typology by Coles

Figure 1.4: 'The Eternal Present: Gneiss, Granite and Gabbro' in Oldmeldrum, Aberdeenshire by artist Janet McEwan. C. Stewart-Moffitt 2018.

as more CSBs were found and by providing my own expansion of Marshall show that we may in fact be able to see the hand of individual craftspeople in the form of specific repetitive styles and attributes. In Chapter Eight I will consider how the decoration seen on some CSBs may have been in existence for considerably longer than the Neolithic and how it, or the ideas behind it, may or may not have travelled from one place to another. I will also provide additional modifications to Marshall's classification/typology and offer further thoughts on where the decoration on Aberdeenshire and Orkney CSBs may have originated. Chapter Nine will consider how many of the more symmetrical CSBs may have evolved from plain stone balls rather than simply having been carved from a beach or river cobble and provide evidence of levels of skill and innovation suggesting they were made by a range of individuals with a variety of skill. It will also suggest their potential stylistic evolution and how and why these styles may have evolved over time before finally arriving at their developmental apogee. Finally, I will suggest what they may have been used for during the Late Neolithic and why they ultimately fell out of favour. In Chapter Ten I will conclude by reviewing the research questions posed at the beginning of my research to determine if any of my original objectives have been met and offer some thoughts on the way forward in carved stone ball research.

As will be seen in the chapters that follow a wide range of uses have been ascribed to CSBs, some finding their origin in the period during which their commentators lived, others from microscopic simulacra. It is hoped this latest research will offer some new and alternative ways of looking at them and will promote further discussion around the people of Neolithic Scotland.

Chapter Two

Scotland: Early people and the environment

This chapter will provide a general background to that part of Britain we now know as Scotland. I will describe the overall topography and geography of Scotland along with the climatic and environmental conditions that existed during its early occupation and show that not all areas of Scotland were conducive to settlement in the same way. I will also briefly introduce the transition of the Mesolithic (Middle Stone Age) to the Neolithic (New Stone Age) c. 3800 BC, a period when farmers from Europe were moving to Scotland, bringing with them new methods of farming and animal husbandry and a plethora of new ideas about the world in which they lived (Whittle et al. 2011: 835). Finally, I will describe what we currently know about the lives of Neolithic people from the sparse and fragile evidence remaining of their settlement and subsistence practices and consider how their monument types and material culture evolved as a new social order developed from the Late Neolithic onwards.

After the Ice: The physical topography and geography of Scotland

Any discussion of the Neolithic settlement of Scotland must naturally take into consideration its very varied topographical and geographical landscape which was created by a long sequence of complex geomorphological change. Following the end of the last Ice Age, around 12,000 years ago (c. 10,000 BC), the ice finally retreated and left behind a barren tundra like landscape. As the heavy overburden of ice melted, those parts of Scotland on the periphery of the central ice-dome gradually began to recover first and isostatic rebound caused the land to rise once again. This produced new shorelines leaving earlier ones as a series of inland sea cliffs (Boulton et al. 2002: 424). Sea levels also rose reaching their highest point around 7000 BC, after which they began to drop to the levels seen today. The result of such cataclysmic geological and glacial events left Scotland with an exceptionally diverse landscape with an indented, rocky, and occasionally mountainous coastline with numerous islands in the northwest, to areas of undulating lowland in the east, southeast and southwest. These contrasting terrains are divided by areas of montane, and give rise to diverse combinations of raw materials, soils, agriculture and subsequently settlement patterns.

Over time, as the climate gradually warmed, life took hold, and a variety of trees and shrubs began to colonise the bare open landscape from refugia in the south of Britain and Europe offering food, shelter, and opportunity to both people and animals (Tipping 1994: 9). This newly forested environment quickly became home to small groups of Mesolithic hunter-gatherers who began to occupy the far north of Britain in the area we now know as Scotland (Bradley 2007: 10; Mithen 2010b: 2).

With the aid of controlled burning (Tipping 1994: 17), Mesolithic people gradually created forest glades which enabled them to hunt animals and birds for food and acquire associated material resources such as skins, pelts, sinews, and feathers (Wickham-Jones 2010: 44). These glades eventually became connected by a network of pathways allowing people to move from place to place as they followed their yearly round of foraging for scattered seasonal food resources of fruit and nuts from the forest and marine resources such as fish, shellfish, and marine mammals and enabled social contact between diverse groups (Mithen 2010b: 149; Wickham-Jones 2010: 34).

Research into Mesolithic sites in the Hebrides has uncovered considerable new and exciting evidence of how people travelled from one seasonal site to another throughout the year exploiting deer, seafood, hazelnuts, and other resources (Mithen 2010b: 393). During an excavation at Staosnaig on Colonsay one of several large pits, used by Mesolithic people to roast hazelnuts, was discovered to have been in use over many seasons (Mithen 2010b: 174-175, 199; Wickham-Jones 2010: 34). Despite a lack of detailed evidence of their journeys, some can be detected from the large and obvious shell middens they left behind (Mithen 2010b: 15, 345-350). Re-analysis of human bone found on some middens has recently revealed that Mesolithic people also occasionally left their dead to decay in these regularly visited places (Charlton et al. 2016: 55-61). Evidence of their camps can occasionally be seen in the form of debitage from the manufacture of microliths and the re-sharpening of stone tools (Mithen 2010b: 250-251). More rarely, ephemeral traces emerge of scoops, stake holes and fireplaces from temporary shelters made from poles and animal hides, known as benders (Brophy 2016: 225). The faunal remains of young animals and fish otoliths also give us an indication of the timing of their foraging habits thus broadening our overall understanding of their lifeways (Bishop et al. 2015: 59).

The fact that very few substantial house structures from this period have been found in Scotland is thought to be largely due to the mobile hunter-gatherer lifestyle of Mesolithic people. Constantly moving through the landscape in search of seasonal resources probably did not justify the need for a permanent home. Although, despite this generalization, a more substantial structure dating to c. 8000 BC, was found at East Barns in Lothian in 2002 and excavators believe this may have provided a permanent dwelling for an extended family or small group. It may also have visually expressed their right to occupancy of the surrounding land (Gooder 2007: 57), in the manner of later Neolithic tombs. Despite settlement remains dating to the Mesolithic being generally rare, development led archaeology continues to reveal more examples, such as those found at Echline Fields, South Queensferry and Dalmeny Parish, City of Edinburgh (Brophy 2016: 200; Robertson et al. 2013: 73-136).

Physical topography and geography of Scotland

As we shall see in more detail in chapter five, Scotland has some very diverse and distinctive types of landscape. Produced by the actions of glacial and climatic forces on a wide range of rock types, they would have contributed numerous farming and agricultural challenges and possibilities to early people much as they still do today (Gillen 2003: 27-39). In the Highlands land suitable for arable farming is relatively rare and is mainly restricted to river valleys, while the coastal margins are generally more suited to animal husbandry, offering limited scope for growing crops. The Southern Uplands are also comprised of large areas of marginal land and evidence for agriculture and settlement is less readily found here due to a combination of acidic soils, altitude, climate, and differential preservation. Although, despite an apparent lack of settlement and agricultural activity in this region, there are signs that important overland, coast to coast routes existed here in prehistory.

With maritime borders to the north, east and west and a semi-mountainous land border to the south, Scotland might today appear to have been relatively isolated and inaccessible, however none of these apparent barriers proved an impediment to the movement of prehistoric people. During this time, settlers and traders came to Scotland by sea from Europe, England, and Ireland; overland travel was possible in the south through the lowlands and from east to west along the Great Glen route in the highlands. While the heterogeneous combination of topography, geography and variable resources in the northern and western Highlands may have presented more of an obstacle to movement, we can see from later monumental structures and material culture that people inhabited the land widely, using coastal waters, river valleys and overland paths to move around, although a clear population imbalance can be seen in areas of marginal and mountainous land. A similar population imbalance is still evident today with larger populations in the lowlands, however this has been greatly exaggerated by processes of industrialization and the growth of major lowland cities.

The Mesolithic to Neolithic transition

Around c. 3800 BC a remarkable transformation occurred in Scotland with the introduction of the new and novel practices of crop growing and animal husbandry (Whittle et al. 2011: 835). These had originated in the Middle East, several millennia earlier, in a region known as the Fertile Crescent which spanned the modern-day territories of Iraq, Syria, Lebanon, Israel, Palestine, Jordan, northeast Egypt, the Nile valley and parts of Turkey and Iran. These new methods of food production were associated with other new and unique concepts involving how people thought about and interacted with the natural world, their relationship with animals, new types of ritual activity and beliefs about life, death, and regeneration (Noble 2006b: 9). As farming communities and their unique ideologies started to expand throughout Central and Western Europe, they slowly but progressively replaced or absorbed Mesolithic hunter-gatherer groups until finally reaching the Atlantic coast, before eventually moving into Britain and Ireland. Using twelve radiocarbon dates from southern Scotland as a chronological model, the Gathering Time team, led by Professor Alasdair Whittle of Cardiff University, suggested that the first signs of a Neolithic lifestyle in Scotland appeared in the south of the country within a generation of *3800 cal. BC* (Whittle et al. 2011: 822). Bayesian analysis further suggested that the Early Neolithic Timber Halls at Balbridie and Warren Field in Aberdeenshire and Claish in Stirlingshire were built between *3800-3705 cal. BC* and ended their life between *3705-3630 cal. BC* (Brophy 2016: 211).

A great deal has been written about how the transition from Mesolithic to Neolithic lifeways in Britain and Ireland might have taken place. Julian Thomas originally suggested that the adoption of Neolithic ideas and economic elements in Britain may have been through adaptation and acculturation by Mesolithic people rather than migration or invasion (Thomas 2013: 152). He believed that the sudden transformation over a very wide area suggested they had been trading animals, seeds, and ideas with Neolithic farmers on the Atlantic coast of Europe for some time. He noted that, although there were signs of restricted cereal use from the Late Mesolithic the '*very sudden cultural change seems to have been superimposed on a much more long-term shift from food-gathering to food-production*' (Thomas 1991: 16; Anderson-Whymark and Garrow 2015: 59). While it seems likely that Mesolithic people would have found the production of cereal crops relatively easy to grasp, animal husbandry may have been a very different matter altogether. A recent study of early Neolithic dairying in Scandinavia concluded that they may have found animal husbandry more difficult as hunter-gatherers would have lacked the detailed knowledge and skills involved to make a success of it (Gron et al. 2015: 11).

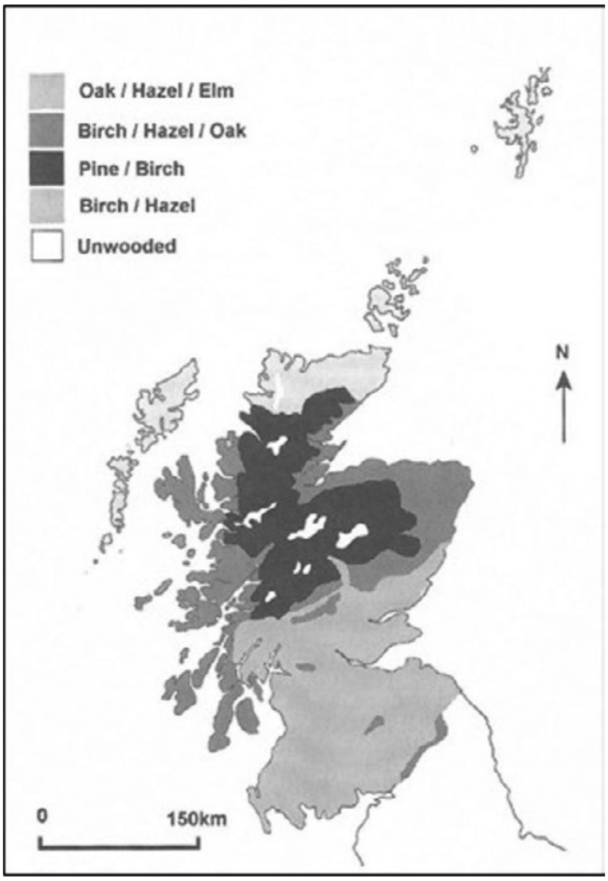
Alison Sheridan had an alternative viewpoint, suggesting that changes in lifestyle from hunter gathering to farming were derived via external influences. Sheridan based her views on radiocarbon dates, pottery evidence and monument types (Whittle et al. 2011: 849) and suggested that European Neolithic farmers had populated Britain and Ireland in a series of colonizing events. She believed there may have been four separate Neolithic expeditionary episodes to Britain and Ireland although she considered the earliest of these, at Ferriters Cove in southwest Ireland, may have failed (Sheridan 2010: 89-105). Her opinions were based upon finds of what she has identified as Castellic pottery, Carinated pottery and distinctive monument styles, all of which she argued originated in northern France (Sheridan 2010: 95-101).

Over the past three decades the debate became somewhat polarized with several extreme and entrenched views, however more recently a perhaps more practical and constructive amalgam of views has been proposed by two other researchers. Cummings and Harris suggested that a more rational explanation of how farming and Neolithic culture came to Britain and Ireland was through the uptake and introduction of a variety of ideas and methods by both Mesolithic and Neolithic people (Cummings and Harris 2011: 364, 372). They argued that a combination of available crop and animal resources, along with improving local climatic and environmental conditions, had been responsible for a series of separate fusion and integration events over a period of several hundred years and suggested that those involved in early farming probably continued to hunt and gather wild foods to supplement and vary their diet. Human bone found on the Cnoc Coig shell midden on the Isle of Oransay on the west coast of Scotland, which was radiocarbon dated to c. 4000 BC suggests that whichever argument is favoured, both farmers and hunter-gatherers probably co-existed throughout Britain and Ireland for several centuries (Sheridan 2010: 101; Charlton 2016: 60). However several recent studies of European DNA have shown little evidence for Neolithic farmers and Mesolithic hunter-gatherers living side by side, with farmers replacing or dispersing hunter-gatherers as they colonized areas previously occupied by them (Malmstrom et al. 2015: 1-10; Cassidy et al. 2016: 368-373); although this is not evident in all areas (Jones et al. 2016: 576-582).

These alternative ideas along with other seemingly more practical propositions of how farming arrived in Britain and Ireland still present a challenge though. The coarse-grained information we currently have is insufficient to fully explain how a switch from a hunter-gatherer to farming lifestyle happened, let alone flesh out the more intricate details of such a transition (Sheridan 2010: 101-102). However, the results of a project published in 2011, may yet enable a closer appreciation of how this occurred and how quickly the Neolithic way of life developed in Britain and Ireland. Many of the dates detailed in this chapter would not have been possible without the 'Gathering Time' project undertaken by researchers at Cardiff University under the aegis of Professor Alasdair Whittle. His team initially set out to date the early causewayed enclosures of southern Britain and Ireland using data from across both countries (Whittle et al. 2011: vii). This project eventually became the largest archaeological application of Bayesian chronological modelling in the world at that time. The concept of Bayesian statistical modelling was originally formulated by the English statistician Thomas Bayes (1701-1761) to describe the probability of an event, based upon prior knowledge or beliefs of conditions that might be related to that event. Gathering Time researchers combined many hundreds of new and existing calibrated radiocarbon dates from a wide cross section of regional monuments and settlement sites with additional archaeological information such as stratigraphy, context and materials allowing them to produce new and chronologically tighter dates. The resultant date estimates proved to be considerably more precise than traditional single radiocarbon date calibrations and have given researchers the ability to refine dates down to generational level. This showed the earliest Neolithic dates to be found in southeast England c.*4100 cal. BC*, spreading to Scotland by c. *3900 cal. BC* (Whittle et al. 2011: 910). It seems then, that the earliest dates for the Neolithic settlement of Britain and Ireland may represent early groups of pioneering settlers who, in identifying areas suitable for settlement, may have integrated with local indigenous groups of hunter-gatherers and prepared the way for later, more concerted migration events (Thomas 2013: 185-187).

Early climate and natural environment of Neolithic Scotland

Scotland's climate and natural environment must have presented many challenges to Neolithic people; in western and central areas the combination of high rainfall and winds would have engendered poor growing conditions for both crops and animals. By contrast the land in the east was relatively warmer, drier, and less windy due to it being in the lee of the central mountain ranges (O'Hare et al. 2005: 104). Pollen evidence shows that by the beginning of the Neolithic much



Map 2.1: Tree coverage of Scotland at the time of the Neolithic. (Noble 2006b: 13).

of Scotland was covered in forest; its density varying from abundant cover in the south to sparser, more open shrubby woodland in the north and west (Tipping 1994: 16; Tipping 1995: 1-54, Tipping 2012). As noted earlier, following the last Ice Age trees gradually began to colonise the landscape; the conditions under which each flourished depending upon latitude, altitude, climate, aspect, and soil conditions. Birch (*betula*) first appeared c. 9500 BC with Hazel (*corylus*) c. 8050 BC; they were followed shortly after by broadleaved trees such as Elm (*ulmus*) c. 7550 BC and Oak (*quercus*) c. 6550 BC with Ash (*fraxinus*) and Alder (*alnus*) by c. 6150 BC. Scots Pine (*pinus sylvestris*) could also be found at higher altitudes as shown on Map 2.1 (Tipping 2008: 33, 37-38).

During the Early Neolithic, a more open forested environment was created as people began to clear the dense early woodland allowing grazing and cultivation to take place in open glades; these also encouraged species of wild animals which continued to be hunted for food. A few centuries after this expansion in farming activity began a sharp decline in Elm pollen can be seen in the palynological record. Originally thought to be due to over-foraging, soil erosion and land clearance by Neolithic farmers, subsequent research on Coleoptera beetles from this period shows that the decline could also have been due to widespread Elm disease (Robinson 2000: 30-31). However further study of the palynological record showed that there had also been an increase in Plantain Ribwort (*plantago lanceolate*) during this period which, along with other wild plant indicators, supported the idea that pastoralism may still have been the culprit, with Elm used as winter forage for cattle (Tipping: 1994: 23).

The lowland areas of Central Scotland, Aberdeenshire, Tayside, Ayrshire and Dumfries and Galloway enjoyed a warmer and more settled climate due to the lower altitude and more fertile soils. Like today, they comprised the most productive agricultural areas in Scotland, and it is therefore unsurprising that it is in these areas we see the densest evidence for prehistoric settlement. However, like much of lowland Scotland, the archaeology here is often plough-truncated due to agricultural activity and can only give us a partial view of prehistoric life. Better preservation occurs in the Northern and Western Isles where marginal low-lying land has seen relatively little in the way of intensive agriculture. Some of the best known and most spectacular Neolithic sites can be found in these parts of Scotland, and several deserve special mention. In Orkney the semi subterranean houses at Skara Brae and the house at Stonehall Farm, with their seemingly 'modern' domestic stone fittings such as 'dressers', box beds and underfloor plumbing are unique examples of Neolithic domestic buildings (Richards et al. 2016a: 117-118; Richards et al. 2016b: 143, 150). The area around the Ness of Brodgar, a few kilometres away, incorporates an immense stone circle, a henge, cairns, standing stones and a range of large stone buildings that the excavation director has suggested may have been 'a possible ritual or ceremonial complex' (Card et al. 2021: 2-5). A few hundred meters southeast of the Ness of Brodgar at Stenness is another henge, stone circle, and the Neolithic settlement of Barnhouse. Just over a kilometer to the east is Maeshow which is arguably the most spectacular tomb in Scotland (Richards 2013). In the west on the Isle of Lewis, the Calanais stone circle is probably the most complete of any in Britain, having been protected by a deep layer of peat for much of its life. Many of the stones in this circle, along with several others nearby, have distinctive hornblende 'eyes' and were clearly chosen for their unique appearance, although today we can only guess at their significance to the people of the time (Richards 2013: 254-279). It is unlikely that any of these sites would have survived had they been in more fertile parts of Scotland where, in the past, farmers have reportedly resorted to gunpowder to remove them from their fields. It was not just the topography that challenged Neolithic people however, added to this were the vagaries of the climate and in many places a dense woodland environment (Noble 2017: 77).

Evidence of Settlement

Unlike Ireland, we see very little evidence of settlement or houses in Britain during this period; why should this be? Early research suggested, that like their European counterparts, Neolithic farmers in Britain lived a generally sedentary lifestyle in permanent houses, tending their crops and animals in one location. This lack of evidence for permanent structures throughout Britain prompted author Julian Thomas to suggest that they may have lived a semi-nomadic lifestyle, building temporary shelters to suit their short-term needs, moving on when their animals needed fresh grazing, when crops were harvested, or the soil became depleted of nutrients (Thomas 1999: 222). This argument is supported by numerous pits containing the detritus of daily life such as broken and discarded utensils, tools, and the remains of meals, all of which offer a valuable insight into Neolithic subsistence practices and suggest that people were burying the residue of their everyday lives before moving on to a new location (Noble 2006b: 66-68; Noble et al. 2016: 171-199). The fact that some of these pits are known to have been used and re-used over a long period of time suggests that these locations are potentially evidence of settlement (Brophy 2016: 201; Noble et al. 2016: 171-199).

The argument for a mobile lifestyle now appears to be turning full circle, with many once again believing that Neolithic people could have led a sedentary lifestyle, arguing that the reason we cannot see their houses is because they were built from ephemeral organic materials that have simply not survived. During an excavation at Chapelfield near Stirling in 2002 a number of circular, sub-circular, and oval Neolithic structures were found and the excavators suggested that if Neolithic houses were built from materials such as stakes, turf, wattle-and-daub and thatch (Aitkinson 2002: 184-185) they would have been unlikely to have survived either the Scottish climate or five thousand years of farming activity and would be rapidly reduced to their fundamental components once abandoned, returning to the soil from which they originated (Bradley 2007: 348).

Some lowland locations in Scotland have produced considerably more substantial buildings. Originally seen as cropmarks in aerial photographs, these large rectangular timber structures often described as 'timber halls', were built from massive tree trunk uprights, squared oak timbers and planked walls and appear to have been roofed (Millican 2016: 145-147; Noble 2006b: 48). Some had hearths or burning pits and were associated with carinated pottery, while others had internal partitioning suggesting domestic use by several families. Excavations at Balbridie produced over 20,000 charred cereal grains scattered throughout the structure and has provided us with a snapshot of the type of crops grown by its inhabitants, although it is unknown if this was the result of a single year's harvest or a supply of food for overwintering (Fairweather and Ralston 1993: 316). Their resemblance to European longhouses, although see Brophy (2007: 94), has led researchers to suggest a wide range of uses, including farmsteads for the extended families of early settlers, communal buildings, feasting halls and ritual or cult houses (Brophy 2007: 92). Those at Balbridie, Figure 2.1, and Warren Field in Aberdeenshire were built on opposite sides of the River Dee; they were similar in size and were constructed *3800-3705 cal. BC* (Whittle et al. 2011: 833). While Warren Field only appears to have been in use until the end of the century, Balbridie may have been in use a little longer. Further south at Claish in Stirlingshire another timber hall was built along the lines of Balbridie; a little later in date, it was in use for little more than fifty years. Another at Lockerbie Academy in Dumfries and Galloway was broadly contemporary with Claish and Balbridie; it had a build date of *3950-3700 cal. BC* and its occupation ended *3720-3630 cal. BC* (Kirby et al. 2011: 12). These buildings occur not just in Scotland but throughout Britain. Other examples exist at White Horse Stone in Kent, constructed *4115-3825 cal. BC* and abandoned *3745-3635 cal. BC* (Whittle et al. 2011: 380); Lismore Fields in Derbyshire, constructed *4070-3625 cal. BC* (Whittle et al. 2011: 843) and Llandegai in Wales, constructed *3960-3770 cal. BC* (Whittle et al. 2011: 537). Several other structures have similar features but cannot be positively identified due to lack of preservation and corroborating finds. Whatever these impressive structures were used for, radiocarbon dating shows that they all had a relatively short life span during the early Neolithic and most went out of use after little more than a century, or around three generations.

Finding houses during the Late Neolithic is often problematic. Excavation at Greenbogs near Monymusk in Aberdeenshire uncovered several round and oval structures; two of which were found to have central four post settings and the excavators suggested that these could have been domestic structures rather than monumental (Noble et al. 2012: 135-171). Similar settings have also been found at Durrington Walls, near Stonehenge; Wyke Down in Dorset; Redgate Hill, Norfolk; Balgatheran in Eire and Beckton Farm in Scotland; the remains of Grooved Ware pots were also found on several of these sites (Brophy 2016: 217-219; Noble et al. 2012: 135-167). As many of the radiocarbon dates from Greenbogs show dates of *2990-2490 cal. BC*, it is thought possible that these Late Neolithic four post structures could have been forerunners of the roundhouses of later prehistory and are perhaps a sign of an early settled landscape. Since the excavation of Greenbogs further examples of 'four-post' structures

Figure 2.1: Artist impression of the Early Neolithic Timber Hall at Balbridie, Aberdeenshire. © ScARF 2020.

have emerged as cropmarks in aerial photographs (Brophy 2016: 217; Noble et al. 2012: 151).

In other parts of Scotland more resilient traditions of building are apparent from the mid to late Neolithic onwards. In Orkney the local Sandstone, which cleaves easily into flat slabs or flags, allowed people to build houses and tombs with drystone walls. Domestic stone structures were abundant in this part of Scotland and although Orkney was once thought to be treeless, excavation has shown that timber houses underlie many of the later stone structures indicating that a timber tradition also once existed here. At Wideford Hill on Mainland the remains of timber buildings have been identified underneath their later stone counterparts (Richards and Jones 2016: 16-40) and it is likely that, had such stone been more readily available for domestic architecture on mainland Scotland, more Neolithic houses might have been found.

Regions outwith Scotland suggest what we may be missing in terms of domestic buildings. During the 'Celtic Tiger' economic boom between the mid 1990s and 2000, large numbers of houses dating to the Neolithic were found in Ireland; these were discovered due to an unprecedented rise in archaeological projects undertaken during a period of rapid economic growth. During this period archaeologists identified dozens of Neolithic houses, many of which dated to the Early Neolithic (Smyth 2014; Cooney 2000: 52-70). Unfortunately, a similar period of economic growth in Scotland and England occurred before the value of archaeology was realized, resulting in the probable loss of many sites.

Evidence of Subsistence

Neolithic farming methods have been the subject of much discussion and raise a number of fundamental questions regarding the range of domesticated resources available to Neolithic people and are central to our understanding of this period. Topics include how and when such resources were introduced, were they available to all and to what extent they impacted on the environment. As noted earlier, the Neolithic diet was very different to that of Mesolithic people being comprised of specialized domesticated plants and animals, although faunal and plant remains do show that people still hunted and consumed occasional wild resources to provide variety in their diet.

The most common technique for reclaiming forested environments for agriculture is known as swidden, or slash and burn, a method still used in many parts of the world today. Despite being a useful way to clear a forest environment and introduce nutrients into the soil, it is known to be a short-term strategy, due to subsequent nutrient depletion and forest regeneration. In Scotland fossil soils, cultivation ridges and Ard marks have been found beneath many monuments implying that permanent intensive cultivation practices were in use by the Late Neolithic (Taylor and Hunter 2000: 179-186; Noble 2006b: 210). Indeed, recent archaeobotanical analyses suggest that fixed garden plots were probably the norm during the Neolithic (Bogaard 2005: 179-184; Noble 2006b: 210). In 2009, following the excavation of an Early Neolithic site at Maybole in Ayrshire, paleoenvironmental evidence suggested that animals were grazed in the forest and seaweed was used for fodder and manure. The excavators thought it was probable that a combination of fields or gardens, with access to the sea and woodland, had existed on this site along with additional woodland grazing further inland (Becket and MacGregor 2009: 119).

The range of domesticated animals kept by Neolithic farmers can be determined from faunal remains found during excavation. Studies have shown that the type of animals farmed varied according to site location, quality of the land and altitude above sea level. Cattle (*bos*) were a particularly important part of Neolithic culture and were the most important domesticated animal available to Neolithic farmers; not only did they produce meat, milk, blood, and skins but also by-products such as sinew. So important were they it is probable they were directly equated with wealth and status (Schulting 2013: 323) and would undoubtedly have been an intrinsic part of the farming cycle, providing manure for the cultivation of crops, traction for breaking the land and possibly load carrying (Serjeantson 2011: 20). As sheep (*ovis*) could exist on poorer land they were often kept at higher altitudes; they supplied meat, milk, and wool and there is some evidence that goats (*caprine*) were also kept (Becket and MacGregor 2009: 119) perhaps as flock guides for sheep (Serjeantson 2011: 31). Considerable faunal evidence from ceremonial sites indicates that pigs (*sus scrofa*) were also important, their meat being consumed at social gatherings, rituals and ceremonies as can often be seen from their skeletal remains. The faunal remains of pigs show they were probably bred specifically for such occasions, as it was mostly prime cuts from younger pigs that were selected for the feast. When salted or smoked they would also have been a useful food resource for overwintering families. It is probable that animals like pigs and goats would have been kept well away from cultivated areas and left to roam in nearby woodland to forage woody vegetation (Becket and MacGregor 2009: 119).

Finding evidence of Neolithic diet and economy is difficult, especially in the acidic soils of Scotland. While modern excavation techniques and subsequent scientific analysis are often able to detect the remains of a wide range of foodstuffs, the full range will always be elusive. Although hazelnut shells, cereals and other seeds are occasionally found during excavation their preservation is usually due either to deliberate charring to aid long term storage, or because they were accidentally dropped into the fire while cooking. It is therefore difficult to decide how important each might have been to the Neolithic diet. Archaeobotanical analysis of charred plant remains suggest that the main species of cereal grown in Scotland was naked barley, with a lesser amount of hulled barley on a few sites. Emmer wheat has also been noted at a few locations, along with marginal evidence that oats were grown in northeast and southern Scotland. Due to the combination of latitude and climate, barley seems to have been the dominant crop on the colder and wetter west coast, while both barley and wheat were grown on the warmer and drier eastern side of the country (Bishop et al. 2009: 87-89).

Although it is not known how much or what proportion of each was consumed on a daily basis Neolithic people appear to have regarded meat and cereals as important foods. Wild seasonal fruits such as Bilberry (*vaccinium myrtillus*), Blackberry (*rubus fruticosus*), Cowberry (*vaccinium vitis-idaea*), Wild Strawberry (*fragaria vesca*), Crab Apple (*malus sylvestris*) and Sloe (*prunus spinosa*) were also gathered across Scotland. These would have added diversity to the diet and would have contributed valuable sources of protein, vitamins and perhaps more especially variety, to what appears to have been an otherwise heavy, protein rich diet. In 2009 a survey of archaeobotanical material excavated from both large and small timber and stone structures, ritual sites, middens, and pits concluded that while domesticated foodstuffs were dominant, hazelnuts still seemed to have been an important food source for many. The exception to this seemed to be on Orkney, where natural decline and anthropogenic activity had wiped out most native tree species (Bishop et al. 2009: 86). While there appears to have been a higher usage of wild plants in southern and north-eastern areas, researchers believe this is more likely to be due to taphonomic influences rather than preference. Nonetheless, the emerging evidence suggests '*exploitation was geographically, socially and chronologically diverse*' (Bishop et al. 2009: 89-90). Leafy vegetables, tubers and roots were also undoubtedly consumed as part of the daily diet, as were the seeds, leaves and flowers of herbs to improve and vary the flavour of food. As these can rarely be identified however, their use must be implied.

Although marine foods were commonly consumed during the Mesolithic, isotopic analysis suggests they fell out of favour at the start of the Neolithic (Richards and Schulting 2006: 453; Cramp et al. 2014: 6). When carbonized deposits on Neolithic pottery, dating between c. 3700 BC and c. 2300 BC, were tested for evidence of biomolecular and isotopic compounds of lipids there was an almost complete absence of marine biomarkers. There was however, strong evidence for degraded animal fats, indicating that diets were probably composed of highly nutritious, protein rich foods such as cereals, meat, and milk, along with secondary milk products of yoghurt and cheese. This suggests that a high protein terrestrial diet of meat and fats was preferred by most individuals and communities during the Neolithic (Cramp et al. 2014: 4). Despite these findings, it is probable that some Neolithic people still fished as can be seen from the skeletal remains of marine resources from the Knap of Howar, on the island of Papa Westray, Orkney (Ritchie 1983: 103-105, 110-114).

Notwithstanding the apparent wealth of available foodstuffs, evidence from this period does show it could not always be relied upon. Nutritional diseases like Cribra Orbitalia, Porotic Hyperostosis (*iron deficiency anaemia*) and dental enamel Hypoplasia have all been seen in Neolithic skeletal material, indicating that famine, food shortages and nutritional deficiency did occur from time to time. Such problems may have occurred due to the failure of crops, a general shortage of food, or foodstuffs with vitamin deficiencies (Roberts and Manchester 2010: 76, 223, 230-232).

Monumentalizing the landscape

From an early date the Neolithic landscape also began to be populated with non-domestic structures such as tombs and cairns Figure 2.2. In western and northern Scotland chambered cairns were built right from the start of the Scottish Neolithic c. 3800 BC (Whittle et al. 2011: 833) and as Audrey Henshall recognised, they were built in several distinctive regional traditions (Henshall 1963; 1972 and 2001). These monuments were usually built on hillsides overlooking the land upon which the people lived and worked; most had at least one internal chamber and were covered by a stone and earth cairn. Early chambered cairns may have been associated with the practice of de-fleshing and disarticulation as evidenced by cut marks on bones and the separation and stacking of long bones and skulls in separate chambers. Evidence of missing bones also suggests that some may have subsequently been distributed and circulated among extended family members in memory of the entombed ancestor (Bruck 2004: 112), although it is entirely possible that some smaller bones may have been lost to birds and animals during excarnation.

In the west of Scotland and Ireland cremation was also adopted (Bradley 2007: 352). Evidence of cremated bone has been found inside a number of tombs in these areas, along with signs of burning in the tomb forecourt (Cummings 2016: 49). While stone for chambered cairn construction was readily available in the north, west and highland areas, in the heavily forested lowlands to the east of the country stone was less readily accessible. Here bank barrows, timber mortuary enclosures and cursus were all constructed from a combination of timber and earth. Timber mortuary enclosures (Millican 2016b: 29-32) and bank barrows were built from extremely large and ancient tree trunks that had been split in half before being covered with earth; these appear to have been the equivalent of the stone chambered tombs of the north and west. These massive trees were often ceremonially burned before they were covered with earth and transformed into burial mounds. It is probable that these once majestic trees were also a symbol of the permanence of the forest in which Neolithic people lived (Noble 2006b: 17) and perhaps the permanence of the ancestors in their lives.

By the Late Neolithic burial practices were beginning to change in line with a newly developing social order and as the distance between the living and the dead became greater. New ideas of a 'social death' were growing in importance with cremation and individual burial becoming more usual allowing the living to memorialize the death of an individual. Thomas has suggested that the end of family groups, the rise of individuals and the arrival of new populations may have been responsible for the changes seen in burial practice during the Late Neolithic (Thomas 1999: 226-227).

Not all monumental structures in this period were associated with the dead however; unlike timber and stone circles, which were permeable and allowed free movement through the structure, others appear to have been built as enclosed meeting places for the living and may have also been used for the performance of rituals. Often resembling wooden fences or palisades with large free-standing or linked timbers, they appear to have had a limited means of entry and may have been designed to prevent people outside from seeing the rituals that were taking place within. Alternately they could have simply been constructed as a focal point for social gatherings (Noble and Brophy 2011a: 76, 82). Later structures were considerably more substantial than earlier ones and could be to up to 200 meters in diameter, perhaps reflecting an increase in the population. Some seem to have been constructed out of individually spaced posts, while others provided a solid wall of trees of varying heights with the largest posts up to seven meters high (Millican 2016b: 47). Another unusual monument type is the Cursus; Millican suggests over thirty exist in Scotland (2016: 23), while Brophy lists thirty-six (2019: 73). Dating to c. 3700 cal BC (Loveday 2016: 108; Whittle 2011: 830), they were originally identified in the south of England where antiquarians thought them to be Roman chariot racetracks: the longest cursus monument in Scotland is c. 2.1km, while the longest in England stretches for

Figure 2.2: The Grey Cairns of Camster, Caithness. ©Northlink Ferries 2020.

Figure 2.3: Calanais Stone Circle, Isle of Lewis. Google images 2020.

10km (Brophy pers. comm). These elongated enclosures were formed from either timber posts, parallel earth banks or pits and although excavation has proved them to be Neolithic in date, their actual use is still debated (Brophy 2019: 228-244).

The new ideas of social order that were emerging during the Late Neolithic also seem to have affected monumental traditions; while earlier monuments were generally rectangular or trapezoidal in form, those that came c.3000-2500 BC were circular (Bradley 2007: 116). This circularity, which can be seen in palisaded enclosures, timber and stone circles and henge monuments was a recurring theme during the Late Neolithic. This has led some authors to suggest they may have been influenced by the domed vault of the sky, the circular motion of celestial bodies (Harding et al. 2006: 44; Darvill 2015: 142), or the recognition that life itself revolved in circles. Perhaps more prosaically, it was because circular structures more readily facilitated equal involvement in the activities they were designed to contain. Bradley has suggested that these new spaces may have been 'theatres' for public events, as against the private events which took place in or near a tomb and that they formed a special place for gatherings and esoteric rituals to take place (Bradley 1998: 101; Harding 2013: 59). Many of these monuments were sited centrally in locations that mirrored their circular form and had unrestricted 360 degree views of the surrounding horizon. Others seem to have had alignments with conspicuous local topographical or astronomical phenomena (Bradley 2007: 136). At the Calanais stone circle on the Isle of Lewis the moon not only seems to be approximately aligned on the southern avenue but also travels along the horizon at its southern major standstill: although debate continues over the accuracy of observations and alternative explanations abound (Ruggles 1999: 136; Bradley 2016a: 115). What is certain however, is that people would have witnessed many striking astronomical events in the dark Neolithic skies, and it is therefore unsurprising that some events may have become incorporated into their monumental landscape.

The earliest timber circle identified, *3350-2920 cal. BC*, was found at Carsie Mains in Perth and Kinross (Millican 2016: 154), while the earliest stone circles are those at Stenness, in Orkney, *3020-2890 cal. BC* and Calanais on the Isle of Lewis, *3380-2690 cal. BC* (Griffiths and Richards 2013: 284-288). Excavation shows that some stone circles were still in use in later prehistory; no doubt their distinctive appearance, permanence in the landscape and association with ancient people added gravity and authority to rituals performed across time and space (Bradley 2016a 112; Bradley 2016b 122). Signs of changing ideologies in the Late Neolithic may also be visible in the materials these circles were built from; many timber circles have been shown to be the precursors of those built from stone; both the Temple Wood stone circle in Argyll and another on Machrie Moor in the Isle of Arran were originally constructed in timber and then later rebuilt in stone (Richards and Wright 2013: 61). From a modern ethnographic perspective, it is interesting to note that in Madagascar timber circles were places for the living, while the stone circles were places of the dead (Parker Pearson and Ramilisonina 1998: 308-326). Could this be how people saw them in Neolithic Britain? It is possible that this could account for the later rebuilding of timber circles in stone and may also be why funerary remains are commonly found at stone circles but not those built of timber (Parker Pearson 2012: 10).

We will see in chapter four that people clearly not only understood and appreciated stone for its structural and tool making properties, but also prized it for its visual properties in terms of colour and texture (Cummings 2009: 100-102). As mentioned earlier, many of the stones used in the construction of the Calanais stone circle Figure 2.3, have particularly distinctive hornblende eyes (Richards 2013: 273). At the Ness of Brodgar the stone used to make prestige objects and decorative architectural elements in some of the buildings also appears to have been deliberately chosen for its distinctive colour (Thomas 2016: 144-153) and at the later recumbent stone circle at Easter Aquhorthies, near Inverurie in Aberdeenshire, the use of both colour and texture is again evident. Here, a reddish Granite recumbent stone with natural Cup Marks is flanked by two grey Granite orthostats; the remainder of the stones forming the circle are Porphyry, except for a single stone of reddish Jasper. As in the Brodgar stone circle in Orkney, none of the stones used here are local and would have been brought from many miles around: a phenomenon noticed at other stone circles throughout Britain.

Henges, along with smaller hengiform structures or mini henges, were built at the end of the Late Neolithic from c. 2400 BC onwards and were constructed with circular earthen banks and ditches. Found mainly in eastern and southern Scotland, they were often sited at the junctions of overland routeways and rivers (Noble 2006b: 148-149) and allowed convenient access to surrounding communities. Many have also been identified from fieldwalking and aerial photography in the vicinity of Biggar Gap where several east-west routeways converge while following major rivers such as the Clyde, Annan, Tweed, and their tributaries high into the hills. Considerable amounts of Neolithic material culture such as flint from Yorkshire and pitchstone from the Isle of Arran have been found in the vicinity, along with Seamer and Greenstone Axes and a Carved Stone Ball (Noble 2006b: 150-151, 213; Johnston 1997: 248). Much of this raw material along with finished artefacts probably passed through the area as people travelled across the country from coast to coast with some exchanged during communal gatherings between locals and traders (Johnston 1997: 228; Ballin 2008: 20-21).

Bradley has suggested that the majority of people who visited henges may have been prevented from entering the central 'screened stage'. This area perhaps having been reserved for those conducting rituals within, although some people may have had visual access from the surrounding banks (Bradley 2012: 114). Excavation shows that, like chambered tombs, some underwent ceremonial closure at the end of their lives and were put beyond use by blocking and mounding, thus preventing access to them. By placing blocking stones in the entrances, completely encircling them with surrounding ditches, or mounding over internal ritual areas, people were prevented from gaining access. This may have been to prohibit access to a burial or ritual location that was currently out of favour and/or was considered dangerous and although the perception of danger may have been spiritual or ideological rather than physical, by preventing access the perpetuation of old ideas, now out of fashion, may have been avoided (Brophy and Noble 2012: 21-34).

The ideology behind the construction of these new and increasingly innovative monuments and ceremonial complexes may have been to enable the past to be commemorated and new memories and social relations to be created (Younger 2016: 134). The design of these evolving monumental spaces show the importance Neolithic people ascribed to both continuity and memory of place (Noble and Brophy 2011b: 787-804; Younger 2016: 121). The significance and long-term value of some monument sites is self-evident, as both Early and Late Neolithic monuments are often combined. Excavation at sites like Forteviot and North Mains in Perth and Kinross and Cairnpapple in West Lothian show that comprehensive re-working was undertaken to amalgamate later types of monument with those built earlier, often with the addition of timber avenues or processional ways connecting them (Noble and Brophy 2011b: 787-804). Strangely these sites do not appear to have been sacrosanct as evidence of settlement and material culture have been found during field walking, and subsequent excavation has shown that people were grazing animals and growing crops in the areas surrounding them.

Material culture

The greater part of Neolithic household, farming and hunting equipment would have been manufactured from organic materials (Hurcombe 2014: 13-15). While the vast majority of these everyday artefacts are rarely visible today, we can still enjoy limited access to the minds and lives of the people who made and used them through the fired clay pottery and stone tools they produced. However, the most common Neolithic artefacts that survive today are the flaked and ground stone tools and implements that would have been in everyday use and which, by their very nature, are relatively resilient to damage by burial and later farming activities. One of the most popular materials used during the Neolithic was flint which, when flaked, produced a typically sharp and enduring edge which could be readily re-sharpened. Flint was not universally available throughout Scotland although a significant source was mined from the Buchan Ridge in the Den of Boddam area of Aberdeenshire (Ballin 2011: 50, 59; Edmonds 2002: 51). Flint was also imported into Scotland from the area around Flamborough Head in Yorkshire during the Late Neolithic (Henson 1985: 2-10; Ballin 2011: 3, 45, 52-59, 64; Edmonds 2002: 51). Where flint was unavailable a wide range of hand tools were made using alternative sources of local stone. Chert and felsite were used at some locations in the east of the country and in the west bloodstone from the Isle of Rhum was used. Pitchstone, a type of volcanic glass, was also readily available on the west coast from its source on the Isle of Arran; studies show it travelled widely throughout Scotland, reaching as far north as Barnhouse in Orkney and over to the east coast via the Biggar Gap (Ballin 2013: 1-14). Small scale quarries at Creag na Caillich, near Killin in Stirlingshire, also produced material suitable for manufacturing stone axes (Edmonds 2002: 157).

Axes, Adzes, and the stone points used on the Neolithic Ard or plough, were the largest and most important of Neolithic stone tools; used to fell trees, shape wood and for ploughing they were essential to daily life in a forested or farming environment (Noble 2017: 59). The butt end of some axes can occasionally be seen to have suffered damage, probably while being used as a hammer and their cutting edges are often chipped. While many seem to be too small to have been of any practical use it is probably due to their continual resharpening (Edmonds 2002: 53). Early Neolithic flaked stone tools like End-Scrapers and Serrated Blades, were generally smaller than their later counterparts and often show signs of reworking suggesting a probable shortage of raw material (Edmonds 2002: 37-42). While tool making and retouching would have been a skill learnt by everyone at an early age, specialized items such as Axes, Leaf Shaped Arrowheads and Crescentic Single Piece Sickles, were more likely to have been made by specialists and as such may have also been imbued with symbolic importance. Some Stone Axes were traded over great distances; Ground and Polished Porcellanite Axes travelled from their source at Tievebulliagh and Rathlin Island in Northern Ireland (Edmonds 2002: 50) and can be found from Scotland to southern England. Volcanic Tuff Axes from the Langdale Valley in Cumbria were also traded widely throughout Britain and Ireland; quarried from inaccessible quarries high on the side of Harrison Stickle and Pike 'O Stickle they were probably imbued with special significance, not only because of their unusual and dangerous origin, but also because of their beauty when polished. A few much rarer axes were made from Jadeite which had its origin in the Piedmont area of the Swiss Alps and their highly polished and usually pristine condition suggests they may have had a social or ceremonial value rather than being simple utilitarian tools. They were made from quite brittle material and were often considerably larger and more decorative than was either practicable or necessary which also suggests a ritual or prestige use (Walker 2018: 18-21; Noble 2017: 66).

Other more exotic stone artefacts like CSBs and Maceheads also began to appear during the Late Neolithic. Unlike CSBs, which are mostly found within Scotland, Maceheads have a wide geographical distribution across the length and breadth of Britain. Many were made from visually distinctive materials in a variety of styles (Roe 1968: 145-172). Perforated Maceheads seem to have been the most vulnerable to damage and are often found broken at the point of perforation which is their weakest point. Although it is unknown whether this breakage occurred by accident or design it has been speculated that their subsequent deliberate destruction may be indicative of ritual use, but without more contextual and locational information this is difficult to prove. Like CSBs they are generally considered to be symbols of power; many Maceheads show little sign of wear or damage other than being broken at the hafting point. It is of course, possible that this damage occurred when they were used more prosaically as a weapon or hammer. As concentrations of perforated Maceheads have been found at both regional population centres and ceremonial sites it would seem more likely that they were associated with powerful individuals and were part of their ceremonial paraphernalia (Clarke et al. 1985: 62; Fenwick 1995: 51-60; Edmonds 2002: 110-111).

Although most Late Neolithic artefacts come to us as stray surface finds with little contextual information a few have been found in funeral contexts. Among these are three decorated chalk 'drums' decorated with stylized faces and geometric motifs which were found in a round barrow at Greenwell near Folkton, in Yorkshire in 1889 alongside the body of a child (Clarke et al. 1985: 248-249). A recent study, using reflectance transformation imaging and photogrammetry, has suggested that after a period of circulation some of the images had been erased and then reworked (Jones 2015: 1088-1093).

Pottery was another important innovation brought to Britain and Ireland by Early Neolithic people. Mesolithic people did not make or use pots, in all probability this was because their weight and fragility would have made them difficult to carry safely as they travelled around their territory. During the Early Neolithic Carinated Bowls were the most common type of domestic pottery but as time progressed this plain style of pottery developed into the more decorative style of Impressed Ware, which itself subsequently evolved into several regionally distinct styles (Noble 2006b: 15). As significant changes in social order began to appear throughout Britain and Ireland c. 3000 BC a new style of pottery was introduced for use in feasting and entertaining. Thought to have originated in Orkney, Grooved Ware, or the concepts behind it, began to spread throughout Britain and Ireland eventually evolving into several individual and distinctive styles: although some researchers believe there is evidence that these alternative styles may simply be chronological (Bradley 2007: 134). Unlike the smaller and plainer Carinated Bowls and later Impressed Ware used domestically by earlier Neolithic households, Grooved Ware was large and ornate and lent itself readily to large scale, high-status social gatherings. It is thought to have been used as part of an elite 'status kit', to impress guests and enable food to be served on a large scale (Thomas 2010: 4). There may have been restrictions on who could, or could not, attend such gatherings and these large and important vessels may have been reserved for elite use only (Bradley 1982: 35-37). The distinctive style of decoration used to decorate Grooved Ware pottery and other prestigious Late Neolithic objects seems to reflect many of the symbols found in passage tombs in the Boyne Valley in Ireland. The use of these symbols may also have mirrored the personal beliefs of their owners and signalled how well travelled and conversant they were with the customs of distant cultures, while at the same time emphasizing their own position in life.

Conclusion

This chapter has introduced the environmental changes taking place in Scotland as the last ice age ended and considered how, as sea-levels dropped and the climate gradually improved, groups of hunter-gatherers moved northwards. It has described the transition from the Mesolithic to Neolithic, as incoming people from Europe began to introduce new agricultural methods, material culture and ideologies to Britain. During this period the landscape was transformed from one of dense forest to a more open environment as animals and crops were introduced.

An apparent lack of evidence for settlement in Scotland was examined and comparisons were made with Ireland where, due to a booming economy and a government sensitive to its past, more dwellings were discovered through archaeological excavation. It was suggested that further evidence might be found in Scotland in the future with an expansion in new infrastructure projects and developer led excavation. A review of Neolithic subsistence and diet suggested that our knowledge is incomplete due to taphonomic issues and the lack of preservation of soft organic foodstuffs. Neolithic monumental structures and the materials used in their construction were also reviewed, along with evidence of how such structures changed during the later Neolithic, as circular structures began to appear, and new worldviews were introduced.

Finally, the surviving material culture of Neolithic Scotland was briefly described, including the introduction and use of early Carinated Bowl pottery, stone tool types and the origin of some of the raw materials they were manufactured from. It was noted that much of the material culture of this period was organic and as such has not survived, but while pottery and stone tools represent only a fraction of the material culture used by Neolithic people, such artefacts can still tell us a great deal about the people who made and used them. Some of the novel changes in Late Neolithic material culture were also presented to illustrate this was a time of significant social change, where powerful elites promoted themselves through group social interaction and the use and exchange of innovative artefacts like Grooved Ware, Maceheads and CSBs.

Chapter Three

Antiquarian, Archaeological and New Age ideas regarding CSBs

This chapter will provide a chronological literature review outlining the changing philosophies of antiquarians and archaeologists towards CSBs, along with the often more imaginative ideas of lay people, over the past two hundred years. It will introduce Frederick Rhenius Coles who was the first person to study CSBs in both the National Museum of Antiquities and private antiquarian collections and who produced the first typology/classification for these artefacts. It will also introduce the work of Dorothy Marshall who wrote the first comprehensive paper on these artefacts which until now was the only complete and authoritative work on the subject.

Eighteenth and Nineteenth Century Antiquarianism

The Enlightenment period of the late seventeenth to early nineteenth century was responsible for a massive change in scientific, political, and philosophical dialogue and introduced new and wide-ranging ideas based upon thought and reason. These newly emerging ideas were to change society from one based on centuries of custom and tradition and transform it into the modern world we know today. Since the early seventeenth century increasing literacy and the availability of printed material offered the public the ability to follow the latest discoveries in 'natural philosophy' shedding new light on nature and the surrounding world. In Scotland the Enlightenment flourished a little later between the eighteenth and nineteenth centuries and encompassed values of improvement, virtue, and practical benefit for both the individual and society as a whole. Natural history and Antiquarian societies sprung up in many towns and cities to celebrate social harmony, moral improvement, and the transformation of local civic society through the formation of natural history societies and clubs (Finnegan 2005: 53-56). In many cases they were the reason why so many Museums and Art Galleries were built in relatively small towns during this period. They promoted the concept of individual moral and intellectual 'self-culture' or 'self-improvement' through the observation, systematic collection and identification and display of 'nature' through direct experience in the field (Finnegan 2005: 55-56). A number of these societies had a dual interest in both the natural world and archaeology as can be seen from names like Dumfries and Galloway Natural History and Antiquarian Society (DGNHAS) and Stirling Natural History and Archaeological Society. Others like the Buchan Field Club, which may also have started out with an interest in the natural world, eventually seem to have concentrated much of their time in the study of antiquarian pursuits such as the history and archaeology of the area (Finnegan 2005: 66-68). Similarly, the Inverness Field Club's 1876 research manifesto coupled geology with archaeology (Finnegan 2005: 69). Edinburgh in particular was home to many scientific and educational societies, journals, newspapers, and geological sites (Finnegan 2004: 29-52; O'Connor 2007: 2, 10) probably largely due to work carried out there by Scottish geologists James Hutton and Charles Lyell. Other societies also appear to have had considerable involvement with the natural sciences, antiquarianism and latterly archaeology and although many were known by less specific and perhaps grander names such as Literary and Philosophical Societies, Philosophical Institutions and Literary and Scientific Institutions, many still involved themselves in similar activities (O'Connor 2007: 193).

Antiquarianism, which Naylor describes as '*the broad study of objects of antiquity, whether in the form of texts, buildings, or potsherds*' dates back to the sixteenth century in England when in 1533 John Leyland was appointed the King's Antiquary. Subsequent interest in past history prompted the founding of the Society of Antiquaries of London in 1586 and the Society of Antiquaries of Scotland in 1780 (Naylor 2003: 310). Antiquarian societies aimed to study a wide range of materials and monuments within their immediate locality or region rather than nationally and for many was a way of promoting the individual distinctiveness of their area (Naylor 2003: 319; 327). During the late eighteenth and nineteenth centuries the terms antiquarian and archaeologist often appear to have been used quite loosely and in some instances were undoubtedly conflated. Unlike their predecessors, Victorian antiquaries argued for rigorous measurement and representational techniques, in all probability due to the upcoming arrival of the new science of archaeology (Naylor 2003: 315).

Having remained buried for several millennia, CSB use whether practical or ritual, was probably beyond the understanding of the majority of farm labourers and others who found them. Many of the antiquarians who collected them may also have had little concept of their potential use or the materials they were made from, resulting in a wide range of theories being expressed.

As can be seen from the reviews that follow there was an early and pragmatic tendency to view them as purely functional or warlike; ideas probably originating in part from the series of conflicts in which Britain was involved across the globe between 1852 and 1902. Many of these conflicts involved native peoples fighting with un-sophisticated, club-like weapons and details of such actions would have undoubtedly been reported widely in the newspapers of the time, perhaps influencing opinion on the potential use of CSBs.

Antiquarian ideas regarding CSBs

1851: Daniel Wilson FSA Scot

The earliest mention of CSBs in print appears to have been in a book written by academic Daniel Wilson FSA Scot, entitled '*The Archaeology and Prehistoric Annals of Scotland*'; Wilson later became Professor Sir Daniel Wilson and, in 1851 was Honorary Secretary of the Society of Antiquaries of Scotland. He commented that '*unperforated stone balls the size of an orange were often referred to among the other contents of the Scottish tumulus, however there were sometimes difficulties in distinguishing them from cannon balls'* which indicates that not all were CSBs. He suggested that the circumstances in which they occurred and the fact that some were decorated with circles and other ornamentation, made them unquestionably ancient and that they had undoubtedly been held in esteem by those who used them; interestingly he likened them to the 'corn-crushers' (sic) found in Danish tombs (Wilson 1851: 138-139).

1861: George Irving

Ten years later, an article entitled 'Lanarkshire Antiquities', by George Vere Irving in the *Journal of the British Archaeological Association of London*, commented on a stone ball found at Biggar Parish in Lanarkshire; it was described as '*a stone ball of spherical form, having six regularly arranged circles in relief, presenting intervening spaces, giving it an aspect of remarkable symmetry*' (Irving 1861: 43). His article went on to mention other CSBs seen by Professor Wilson in Scotland, along with a similar one found in Ireland and commented that none had been found in England. He suggested that, although their use was not apparent, they could have been used socially in a game of chance or as an oracle for divination.

1862: William Hunter FSA Scot

In 1862, antiquarian William Hunter, FSA Scot, defined the Biggar CSB findspot more closely as Biggar Shield when he wrote about it in his book '*Biggar and the House of Fleming*' (Hunter 1867: 7). He stated that they had been found in various parts of Scotland and that there were four or five very fine specimens in the Museum of the Antiquaries of Scotland in Edinburgh. Using an ethnographic parallel he was the first to suggest that they were used for a war-like purpose and likened them to the weapons used by some tribes of Native Americans, who enclosed individual balls in leather pouches with thongs, which attached them one to another. Like Daniel Wilson, he also mentioned they were believed by some to have been used practically as corn-crushers (sic), while others thought the balls must have been used ritually as they appeared to have been held in respect in remote ages because of their frequent association with cists. By inference, this association with ancient burial places also appears to have given CSBs the same superstitious virtues as 'elf-bolts' a vernacular name for stone arrowheads (Hunter 1862: 7).

1872: John Evans FRS, FSA

John Evans FRS, FSA was next to comment on CSBs in print. Evans was an antiquarian, archaeologist, numismatist, geologist, and member of many eminent societies; he was also a trustee of the British Museum and was knighted in 1892. In his book '*The Ancient Stone Implements, Weapons and Ornaments of Great Britain*' (Evans 2015: 376-379), he briefly described CSBs from Dumfriesshire, Biggar, Dudwick, Montblairy, Tullo of Garvoch, Easter Brakie, Ballater, Isle of Skye, and Garvoch Hill. He also mentioned a Hornblende Schist CSB found at Ballymena in County Antrim and other examples in Perth Museum; noting that CSBs seem to have been confined to Scotland and Ireland (Evans 2015: 376). Whilst ascribing the majority to the 'Stone Period' he considered that the Towie Ball must be later in date and the character of patterns inscribed on it led him to believe it belonged to the Bronze Age rather than the Stone Age (Evans 2015: 377). In considering their use Evans discounted them being used practically in a game, for amusement, divination or as 'sink stones' for fishing and likened them ethnographically to the Patagonian style bolas which could be used for hunting, suggesting that the channels between the knobs were used to attach them one to another with rope. Like William Hunter some thirty years earlier, he also compared them to similar, Mace like weapons used by the Shoshonee, Chippaway, and Alogonquin Indians in the Americas, who used a stone ball 'shrink-wrapped' into a piece of wet leather and attached to a leather covered wooden handle (Evans 2015: 378). His overall impression was that they were used for 'chase or warfare' an idea perhaps prompted by newspaper reports of the American Frontier Wars between native American tribes and European settlers, which occurred frequently throughout the nineteenth century. A further suggestion was that they could have been a similar weapon to the 'morning star' which was used during the Medieval period and consisted of a spiked metal ball attached to a staff.

1874: John Alexander Smith MD, FSA Scot

In the 1870s, antiquarian John Alexander Smith, MD, FSA Scot, wrote a paper entitled '*Notes of Small Ornamented Stone Balls Found in Different Parts of Scotland etc: With Remarks on their Supposed Age and Use*' in which he considered CSBs in some depth. It was the first comprehensive paper on the subject, describing several CSBs in detail for the first time and was published in the Proceedings of the Society of Antiquaries of Scotland (Smith 1874: 29-64). Smith included their dimensions, the type of stone they were made from, along with their findspots and finder where known. He also detailed where they had been exhibited in the past, which museum held them and who had donated them (Smith 1874: 30-51). He compared them ethnographically with the stone boilers the Assinniboine people of Western America used for cooking, the heated stones used in New Zealand for baking and their potential to be used in catapults, cannons or as sink stones used for fishing (Smith 1874: 29). Smith was also the first person to attempt to categorise them into stylistic classes; his first class had small, rounded projections, the second had circular discs and the third had neither knobs or discs but were plain and polished (Smith 1874: 30). He also summarized the paper by John Evans (reviewed above), commenting on each of Evans' proposals in the light of his own research at the British Museum and the lack of supporting evidence for bolas within Britain and Ireland (Smith 1874: 54).

Smith noted that they seemed very alike in size, weight and mineralogical character and believed they had been formed by iron tools, a theory supported by a skilled lapidary. He was certain they had not been designed to be rolled around, as the angularity of some would have prevented it, however he did note a 'rubbed' appearance which he suggested could have been due to soft leather thongs perhaps attaching them to a handle (Smith 1874: 55). In considering the decoration that had been applied to some CSBs he noted that it appeared very like that of the Pictish period, and that the apparent lack of antiquity of stone balls and other artefacts found at Skaill, Orkney, and Kilpheadar in Sutherland, persuaded him that CSBs belonged, not to the Stone or Bronze Age, but to a later period (Smith 1874: 56).

In looking for further evidence Smith approached Joseph Anderson, curator of the National Museum of Antiquities of Scotland in Edinburgh, who suggested they were very like Maces used by the Saxons during the Battle of Hastings in 1066, which could readily be seen in a series of plates of the Bayeaux Tapestry held at the museum (Smith 1874: 56-61). These showed images of men carrying weapons with four equally projecting rounded knobs or bosses that were attached to a stick and which looked remarkably like CSBs; he suggested that being of Saxon date, these would have been made of iron rather than stone as were the later spiked military flails. The resemblance seems to have convinced Smith, as he concluded his paper with the statement '*I am now able, with Mr. Joseph Anderson's valuable assistance, to restore to its place among the ancient weapons of our country, the long-forgotten Stone Mace, which must have been brought in great numbers with the Saxons when they flocked in early times to Scotland, where they were probably used at a later date than in England*' (Smith 1874: 61). He seems to have been quite certain they had been made for warfare however, as his final comment likened them to what he called a '*closely analogous weapon*', the Fijian club, which was remarkably similar in many respects, albeit it was made entirely of wood (Smith 1874: 61-62). Whilst writers that had preceded him had written about CSBs in very general terms, describing only single artefacts, Smith provided the first detailed account of them as an assemblage and made the first attempt to characterize them as a wider group of artefacts.

1881: Joseph Anderson LLD, HRSA

CSBs were once again the subject of re-interpretation in 1881 when Joseph Anderson, Keeper of the National Museum of Antiquaries of Scotland, delivered a Rhind lecture to Fellows of the Society of Antiquaries of Scotland, entitled '*Scotland in Pagan Times: The Iron Age,* Lecture III, *The Celtic Art of the Pagan Period*' (Anderson 1881: 167-169). Anderson described them as a '*class of objects of a peculiar type, presenting features of decoration which are essentially Celtic in nature*'. In making this statement it would seem he had given the decorative elements of CSBs additional thought since his conversations with John Alexander Smith, some eleven years earlier. He described the arrangement of '*triple dots*' on the Towie CSB as being similar to that seen on illuminated Celtic manuscripts; made a comparison between the 'irregular scoopings' (sic) on the Dunfermline CSB with similar decoration on a gold ornament from Cairnmuir and compared the decoration on a CSB from the River Tay, near Perth to similar decoration on silver penannular brooches found at the Bay of Skaill in Orkney. He still referred to their potential historical use as a Mace, comparing them to those seen on the Bayeux Tapestry, although it seems Anderson was still undecided on which period they should finally be attributed to. Although he felt they were distinctly Celtic in character, he recognized they did not have the fully developed style of Celtic ornamentation which predominated throughout the early Christian period. He concluded that although '*they possessed a typical form which has no distinctly definable relations with any other class of stone implements*' they were sufficiently distinctive to be placed in the same design classification as that which produced the distinctive patterns of the 'Pagan period'.

Early archaeological research on CSBs

1896: Frederick Rhenius Coles FSA Scot

The first in-depth study of CSBs was eventually undertaken by Frederick Rhenius Coles who was appointed Assistant Keeper at the National Museum of Antiquaries in Edinburgh in 1896; Coles became the first person to make a careful and detailed study of the many CSBs in the Museums' unique collection along with others in private hands. In 1908 he became the first person to describe the collection in detail and to attempt their classification. Subsequent studies carried out by later researchers are, to a great extent, based upon Coles' early work which set the scene. He was an interesting character as the following short biography shows and it was undoubtedly his wide-ranging interests and contacts that eventually steered him into a career in archaeology. It also shows how, despite a series of personal tragedies, he threw himself wholeheartedly into his career at the museum until financial hardship finally forced him to give up a position he clearly cherished. Coles wide range of interests and talents served him well at the museum, being an artist, naturalist, musician, and amateur archaeologist with contacts in the worlds of art and music. While working at the museum, he was the recipient of a number of Gunning Fellowship grants from the Society of Antiquaries in support of his field work which enabled him to survey over a hundred and thirty stone circles and sixty castle sites throughout Scotland, becoming what was arguably Scotland's first professional field archaeologist Figure 3.1.

Frederick was born in Bellary, East India in 1854 into a missionary family. In 1860 the family returned to England but, just two years later, his parents returned to India to continue their work, leaving Frederick and his sister Lydia behind in the care of the Rev. James Sewell and his wife, who were missionaries with the London Missionary Society (Sibree 1923: 174). The 1871 census shows Frederick still living in London while his elder sister Lydia was living in Tongland, Nr. Kirkcudbright, Scotland with her aunt and uncle, Mary and Josiah Rhenius who was the Minister of the local Free Church of Scotland (FindmyPast Website: 2018). Later conversations between Frederick and his contemporaries, combined with his very detailed approach to art, naturalist studies and archaeological research, suggests that while living in London he may have studied art under the South Kensington System. At some point after 1871 Frederick moved to Edinburgh where in both 1873 and 1875, he exhibited paintings at the Royal Scottish Academy (Curtis 2011: 160).

In 1880, while living in Edinburgh, he married Mary Helen Threshie, the daughter of his aunt, Mary Rhenius, from her marriage to Major Cairns Threshie of

Figure 3.1: Fredereck Rhenius Coles (on the right) surveying The Nine Stanes in Aberdeenshire. © Welfare, Great Crowns of Stone 2011.

the 10th Bombay Native Infantry, who had died in India in 1851. By 1881 the census shows that Frederick and Mary, along with her stepsister Minnie Rhenius, had moved from Edinburgh to The Hermitage in Tongland, Kirkcudbrightshire, which had previously been the Free Church manse. In this census he describes his occupation as '*Artist, Landscape and Marine Painter';* an occupation confirmed by paintings he exhibited at the Royal Scottish Academy in 1882, 1887 and 1889. Their first child, Helen Rhenius was born c. 1884 but a second child, born in 1886 did not survive and Mary, now aged 41, died from 'shock after delivery' (FindmyPast Website: 2018). A year later Coles married Margaret (Maggie) Neilson Blacklock, eight years his junior, who was the daughter of his friend Thomas Blacklock, the English master at nearby Kirkcudbright Academy.

As an artist living in Dumfriesshire, Coles would have been part of a thriving artistic community; his letters show that among the people he knew and associated with were nationally celebrated artist John Faed and local artists William MacGeorge, Edward Atkinson Hornel, Malcolm Harper and Thomas Blacklock and in 1886 Coles was a member of the committee that founded the *Kirkcudbright Fine Arts Association.* He was also a member of the *Dumfriesshire and Galloway Natural History and Antiquarian Society* (DGNHAS) and regularly conducted field visits and presented papers to its members and, in 1887, was one of its two Vice-Presidents (Curtis 2011: 163). A small hand bound book of drawings of Molluscs from this period still exists in the collection of the *Yale Centre for British Art in Connecticut* in the USA. It appears to have been Coles' personal field guide to marine shells and is comprised of 21 mounted drawings in graphite originally copied from '*A History of British Mollusca'* by Forbes and Hanley (Yale University). His *Herbarium* from this period also still exists and is curated by The Stewartry Museum in Kircudbright (The Stewartry Museum). Coles also had a passion for music and in the early 1890s, while living in Edinburgh, formed a musical association (Curtis 2011: 163). He passed his love of music on to his children and his eldest child Cecil later became a distinguished musician and composer. Cecil was a close friend of Gustav Holst spending several years with him in Austria prior to the beginning of the First World War (Weedon 2013: 1). The war was unfortunately responsible for Cecil's untimely death on active service in France in 1918 (Lewisham War Memorials). Another child, John is also listed as a Student of Music in Edinburgh in the 1901 census (FindmyPast Website: 2018).

The 1891 census offers us an insight into how Coles' changing interests were steering him along a new career path. While it shows that the family were still living at The Hermitage in Tongland, he now describes himself as a *Landscape Painter/Archaeologist.* His interest in archaeology had led him to become a corresponding member of the Society of Antiquaries of Scotland and he wrote papers on Mottes and Duns and the Cup and Ring Marks of Kirkcudbrightshire, which he had investigated with his artist friend and associate Edward Hornel (Curtis 2011: 162-165). It seems that his archaeological work attracted the notice of officers at the Society's Museum, as in 1896 he was offered the post of Assistant Keeper at the National Museum of Antiquaries in Edinburgh. He became the second DGNHAS member to have been offered this post and in 1898 was made an Honorary Member of the Society (DGNHAS Proceedings). However, while the position of Assistant Keeper was obviously prestigious, it seems to have paid a pittance. In 1890 the Council of the Society of Antiquaries of Scotland had agreed upon a salary of £100 per annum for the job of Assistant Keeper (approximately £12,000 today). By comparison Assistant Keepers at the British Museum were being paid an annual salary of between £500 and £600 per annum (between £61,000 and £73,000 today); even allowing for the differential costs involved in living in London, Coles' salary, like others at the museum, was very poor.

In 1899 Coles second wife, Margaret died, leaving him with four children between the ages of eight and fifteen all of whom were still living at The Hermitage in Tongland, while Coles was living in Edinburgh. By 1901 he had moved the family from Tongland to Edinburgh and the census for that year shows him living in Edinburgh with the three youngest children and a housekeeper; it also confirms that his occupation was Assistant Keeper at the National Museum (FindmyPast Website: 2018). It would appear that living and working in Edinburgh while the family lived in Tongland, some 130km distant, may have put a strain on his finances. In December 1904, the Council of the Society of Antiquaries of Scotland appointed a committee to investigate the matter of Coles' financial position, as he had reportedly been borrowing money from Fellows of the Society. Coles agreed that this had been the position for the past eight or nine years; travelling to and from Edinburgh, along with local lodgings and the house in Tongland had exacerbated his poor financial situation. He told the committee that he had no private means and only received a salary of £140 a year plus three guineas (£3.3.0) a year for Index work and approximately £2 per month from a small fund in India and had for some years been very short of funds. He added that there used to be a little money coming in from the Society of Antiquaries for drawing work but that had now fallen off almost completely. Also, in recent years he had been unable to do much work for private individuals as his eyes had been troubling him; a situation this author had already suspected prior to reading the Society minutes, as Coles had made a number of simple, but obvious, errors when transcribing the contents of the accession register to his CSB typology which suggested poor or failing vision. The committee asked him to draw up a complete list of his outgoings and present them at their next meeting in January 1905. Following the meeting the committee explained the situation to the Keeper of the National Museum of Antiquities, Dr Anderson, suggesting that he gave Coles temporary leave of absence and take steps to satisfy himself that nothing was missing from the museum, which Dr Anderson agreed to do (A-SAS Minutes: 29.12.1904).

On the third of January 1905 the committee re-convened and Coles presented them with a complete list of both his income and outgoing expenses which revealed he had an annual deficit of almost £70. The committee's subsequent report later that month suggested that this appeared to be a '*highly undesirable*' situation for a person holding a position of trust (A-SAS Report: January 1905; A-SAS Minutes: 03.01.1905).

At a further meeting on the eleventh of January, Coles submitted a memorandum to show that a sum of at least £150 would be required to clear his liabilities, even allowing for a possible reduction in outgoings of £23 per annum, bearing in mind the expenditure he was committed to for the education of his children at George Watson's College and the George Square Ladies College in Edinburgh. He also expressed a wish to submit to the Committee a statement regarding his work in the museum and his remuneration and they agreed to forward it to the Council with their report. A letter from Dr Anderson was also presented to the Committee which confirmed that nothing at the museum was found to be out of place (A-SAS Minutes: 11.01.1905). It appears that the Council took notice of the committee's report and Coles associated statement as, at a meeting of the Purchase Committee on the twenty-eighth of January, they allocated an overall increase of £200 per annum for staff salaries. From the size of the increases apportioned they would appear to have recognized they were considerably under paying museum staff and recommended a 25% increase in salary to the Keeper Dr Anderson from £400 per annum to £500 per annum and a 50% increase to Coles from £140 per annum to £210 per annum (A-SAS Minutes: 21.02.1905). However, the further education of his children may have put yet more strain on his finances over the following years. In 1911, an astonishing incident occurred that appears to have been totally out of character considering his robust missionary upbringing and his lifetime interests in the fields of art, naturalist studies, music, and his later passion for and dedication to archaeology. The Society minutes of the eighteenth of April 1911 note that Coles' appointment to the Gunning Fellowship had been deferred (A-SAS Minutes: 18.04.1911) as five articles, believed to be museum property, had been brought to the police by two pawnbrokers in Edinburgh. The museum subsequently confirmed the articles were missing from their collection and left the police to deal with the matter; there is no record of what action, if any, was taken by the police. In the Society Minutes of the sixteenth of May 1911, we see that Coles was summarily dismissed (Curtis 2011: 24; A-SAS Minutes: 16.05.1911).

Coles had shown great dedication to the acquisition of knowledge both in the field and within the museum itself and it is clear from his detailed descriptions and drawings that he had an intimate knowledge of whichever subject he was illustrating and recording. In the case of CSBs, he carefully recorded the nuances in the morphology and decoration of not only the Museums' CSBs but also many of those in private collections, further interrogating their keepers for information regarding findspots. What is very clear though, is that his seemingly desperate actions not only caused him personal loss but were also a considerable loss to the museum itself.

1908-c1911: Coles' CSB classification

It is unclear exactly when or why Coles first began to record, illustrate and research CSBs although a manuscript he wrote in 1908 was entitled '*The Unique Things in Scottish Archaeology*' which listed: a. Clipped Discoids of Stone from Culbin Sands; b. Rude Stone Implements found in Shetland, Orkney, and St Kilda; c. Oval Knife-like Implements of porphyrite found in Shetland; d. The Horned Cairns of Caithness; e. Massive Bronze Armlets; f. Carved Stone Balls; g. Brochs; h. Massive Silver Chains and i. The Symbols of the Sculptured Stones. It seems possible that his interest in CSBs was part of a larger project to showcase Scotland's unique past. As the bulk of his work on CSBs is dated January 1908 it would seem probable that he began work on them some time during 1907; the last correspondence he had with a collector was dated April 1910. His initial attempt at classification, Figure 3.2, was mostly restricted to those in the National Museum of Antiquaries collection, although he was aware of others that were in the hands of private collectors.

In his initial 'synopsis', Table 3.1, he listed seven main groups, although the seventh, labelled 'Abnormals' (sic), was subsequently crossed through. Other contemporary notes made by Coles suggest that group seven (abnormals) may relate to those now grouped under 'miscellaneous' in his revised typology, being very much one-offs or potential forgeries.

Following his initial synopsis (sic), Table 3.1, Coles went on to classify the entire National Museum of

Table 3.1: Coles' 1908 Carved Stone Ball Synopsis. Courtesy of National Museums Scotland. Transcribed by C. Stewart-Moffitt 2020.

Group	Description
Group 1	Balls with numerous Knobs (probably weapons).
Group 2	Balls with large Discs or Knobs devoid of ornament.
Group 3	Balls with Discs ornamented.
Group 4	Balls with Discs plain but ornamented interspaces.
Group 5	Balls with both Discs and interspaces ornamented.
Group 6	Spherical balls smooth contoured having incised ornamentation.
~~Group 7~~	Abnormals (sic).

Antiquaries collection, Table 3.2, which included individual museum accession numbers (not included here), the total number of balls, findspots where known, number of CSBs and in some cases additional descriptions regarding potential use or ornamentation. The second iteration of his classification was more complex than the first and was broken down into Groups 1 and 2 with Group 2 being subdivided into Classes (a) to (t); Class (c) was further subdivided into three 'varieties' (1) (2) and (3).

His third and final attempt at CSB Classification Figure 3.3, may have been undertaken sometime prior to his dismissal from the museum in 1911 and was entitled '*A Classification of the Carved Stone Balls peculiar to Scotland, which are preserved in the National Museum and of other specimens in Local Museums and Private Collections'.*

Although this handwritten manuscript was undated, Coles stated intention was:

I. Classification in Catalogue Order of the Balls in the National Museum of Antiquaries, Edinburgh. Groups 1 to 6 plus a Group of Abnormals (sic). Page 1-54.
II. Classification of Balls elsewhere than in the National Museum, Edinburgh. Page 55.
III. Topographical Distribution of the Balls.
IV. Dimensions and weights of the Balls.
V. Analysis of the evidence regarding the Discoveries of the Balls.

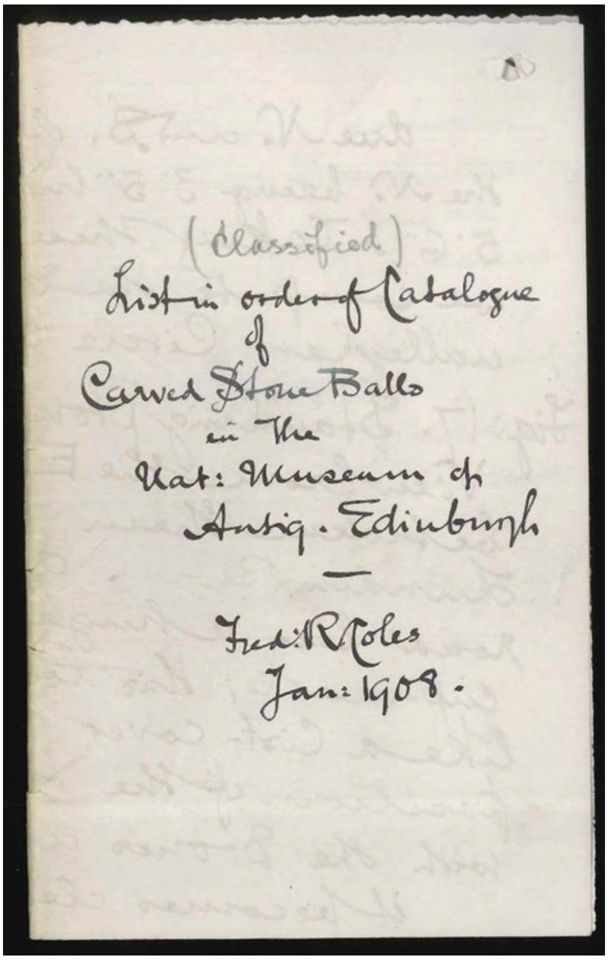

(Classified)
List in order of Catalogue
of
Carved Stone Balls
in the
Nat: Museum of
Antiq. Edinburgh
—
Fred: R Coles
Jan: 1908.

Figure 3.2: Coles' original classification of CSBs in the National Museum of Antiquities, Edinburgh (sic) January 1908. Courtesy of National Museums Scotland.

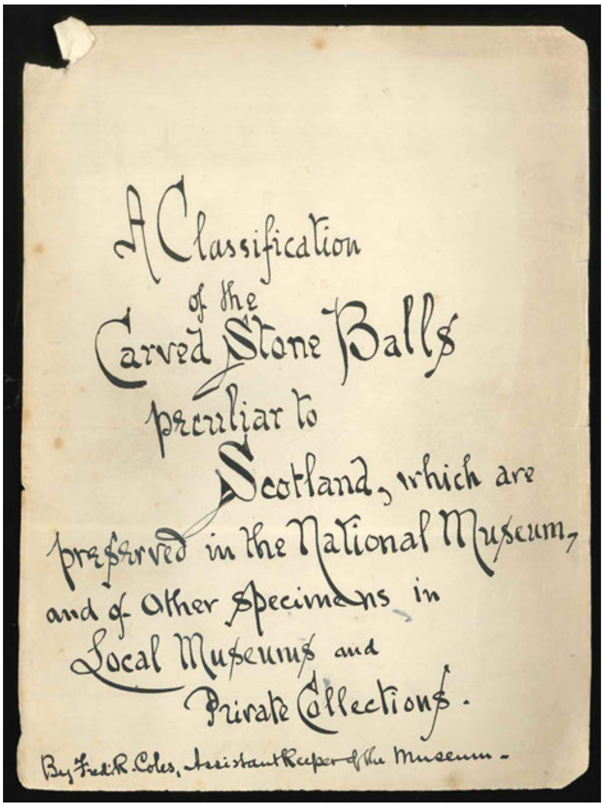

A Classification
of the
Carved Stone Balls
peculiar to
Scotland, which are
preserved in the National Museum,
and of other Specimens in
Local Museums and
Private Collections.
By Fred R. Coles, Assistant Keeper of the Museum -

Figure 3.3: Coles' third and final classification which included CSBs in private collections at January c.1908-1911. Courtesy of National Museums Scotland.

Table 3.2: Coles' 1908 Carved Stone Ball Classification. Courtesy of National Museums Scotland. Transcribed by C. Stewart-Moffitt 2020.

Group	No: of Knobs	Description
Group 1	13	Knobbed balls: knobs numerous and mostly sharpish. These may all have well been weapons or implements of war - 'knuckle-dusters' - a class by themselves.
Group 2	13	Class (a): balls with Discs or large Knobs which are quite void of ornament.
	3	Class (b): with 5 such Discs or Knobs.
	47	Class (c): six plain Discs. (Further subdivided as below into varieties). variety (1): 12 with Discs circular, equal and slight. variety (2): 21 with Discs circular, not very regular but well defined. variety (3): 14 with Discs very prominent and becoming Knobs or Bosses.
	5	Class (d): 7 plain Discs.
	3	Class (e): 8 plain Discs.
	1	Class (f): 12 plain Discs.
	1	Class (g): 13 plain Discs.
	2	Class (h): 14 plain Discs.
	2*	Class (k): 15 plain Discs.
	1*	Class (l): 16 plain Discs.
	1*	Class (m): 18 plain Discs.
	1	Class (n): 20 plain Discs.
	2*	Class (o): 22 plain Discs.
	1*	Class (p): 24 plain Discs or Knobs.
	1*	Class (q): 25 plain Discs.
	1*	Class (r): 30 plain Discs or Knobs.
	1*	Class (s): 50 plain Knobs.
	1*	Class (t): 80 plain Knobs
		Note: The nine specimens marked * are also placed in Group 1 as 'balls with numerous knobs and probably weapons' i.e. Their carvedness (sic) is for utility and not for ornament. (Subtotal: 100 -9 = 91).

VI. Analysis of the Ornamentation found on the Balls and Comparison with other Prehistoric styles of Ornamentation.
VII. Conclusions: References to various suggestions as to purpose or use of the Balls.

He defined the following descriptive terms used in his Classification as follows:

Facets: when the contour of the ball is merely notched between the extremes of the circular or other patterns.
Discs: when these patterns are well defined and clearly projecting.
Boss: when the projection becomes still more prominent and is more rounded.
Knob: when the projections are the same in height as in breadth or, when the height exceeds breadth.

Coles finally listed the six main groups that he thought the balls were reasonably divisible into, Table 3.3.

Part two of Coles' manuscript included notes of the '*Carved Balls Elsewhere than in the National Museum*' which he listed by collector or collection. However, the manuscript then ends abruptly and parts III, IV, V, VI and VII that would have described their topographical distribution, dimensions, or weights, provide analysis or evidence of their discovery or ornamentation, or indeed provide any conclusions as to their purpose or use was not completed. To all intents and purposes his final work on CSBs remained unfinished and unfortunately,

Table 3.3: Coles' c.1911 Carved Stone Ball Classification. Courtesy of National Museums Scotland. Transcribed by C. Stewart-Moffitt 2020.

Group	Description
1	Balls with Numerous Knobs
2	Balls with few Discs, Bosses or knobs, Unornamented. This is the largest group and contains many classes which I have arranged in what seems the simplest manner, that is according to the number of projections on each ball. As a sphere cannot be systematically divided into fewer than four circular portions the balls having that number of discs obviously come first.
2 (Second Class)	Five Discs
2 (Third Class)	All Balls having six plain discs (most numerous). a. Balls in which the discs are circular, equal in diameter but slightly defined. b. Balls in which the discs are circular, not very regular in breadth, but strongly defined. c. Which comprises the balls with fully developed bosses and knobs. d. The fourth class includes the balls having seven plain discs. e. Balls carved into eight plain discs form the fifth class of the Group. f. In the sixth class we have three specimens of balls carved into twelve discs or bosses. g. Of the seventh class there is only one ball known to me, that is, a ball carved apparently with the usual amount of care and yet having only thirteen discs. h. Balls with fourteen discs.
3	Balls having ornamented discs, bosses or knobs.
4	Balls having plain circular discs with ornamented inter spaces.
5	Balls with ornamentation on both discs and inter spaces.
6	Balls, completely spherical, having carved or incised ornamentation.

we will never know what his final thoughts regarding CSBs might have been.

Early Archaeological Interpretations

1914: Ludovic McLellan Mann FSA Scot

By 1914 CSBs attracted speculation from Glasgow based antiquarian and amateur archaeologist Ludovic McLellan Mann, when he wrote '*The Carved Stone Balls of Scotland: A New Theory as to their Use*' (Mann 1914: 408-420). In reviewing the ideas that had been proposed by earlier writers Mann noted that at the time of writing around two hundred specimens existed. From their decorative style and findspots in souterrains and near Brochs he suggested they were associated with the late Celtic period and noted that Joseph Anderson had hesitated to place them in the Bronze Age (Mann 1914: 408). He was generally suspicious of any that were claimed to date from prehistoric structures and discounted suggestions that they were used socially or practically for gaming, amusement, divination, hunting or as missiles or weapons in warfare: he considered that all such arguments had weak points.

Mann seems to have had an overriding interest in their potential cultural historic use and following his interest in weights and measures had, some years earlier, formed a new hypothesis based upon his examination of traditional weighing beams known as Bismars. These devices had been used in Scotland in antiquity and were a type of balance made from two beams of unequal length. They had a fixed pan or hook at one end where the item being weighed was attached, and a fixed weight which hung from the beam by either a hook or string on the other arm. He considered that CSBs, with their relatively consistent weight, would have provided people with a method of weighing goods which were being exchanged and that the '*sunken interspaces and channelled gutters*' of a CSB were designed to facilitate its attachment to the Bismar via a '*delicate network of strings*'. He also suggested that any decoration would further enhance the overall attraction of the apparatus (Mann 1914: 414-415). To help prove his argument he asked the National Museum of Antiquities for permission to weigh the CSBs in their collection but was advised this had already been carried out by Mr. Wilfred Airy from the Institute of Civil Engineers who also thought they may have been used for trade purposes. He was subsequently given access to the paper by Airy, which went into considerable detail regarding the Avoirdupois pound and the use of CSBs as trade weights; Airy suggested that the system pre-dated the Roman period, which Mann considered fitted well with his own hypothesis (Airey 1913: 258-285; Mann 1914: 417).

Mann summed up his detailed hypothesis with no less than thirteen points. He suggested that the reason CSBs were found singly was because a Bismar only required a single weight, that they were usually only found at domesticated sites rather than graves and that they were only in vogue in Scotland, not England. He also suggested that their appearance coincided with the first development of trade and their units of weight pointed to them being early trade weights, intimating that the reasons for sculpting were threefold: 1. to assist the method of suspension; 2. to please the eye and 3. to prevent a reduction in weight by fraudulent traders. Interestingly, he commented that the Scottish Bismar had acquired a greater beauty than in any other area which indicated the high degree of aesthetic attainment of the people of Scotland compared with the rest of Britain: a very nationalistic but unscientific sentiment! In conclusion, he thought they may also have been used as units of length, as the length of the channels and lines cut into them bore a relationship to one another; he gave no explanation of how this might have worked in practice and it seems possible that he was in the early stages of forming an idea for future research, or a follow up paper on CSBs. Strangely, neither Airy nor Mann appear to have considered the weight variations between CSBs as important. This seems to have been a rather lackadaisical, almost careless approach to their research and the conclusions they drew from it, considering that Airy was a civil engineer and Mann was an accountant and actuary (Ritchie 2002: 46), three professions requiring a great deal of accuracy. Even early trade weights would surely have been more accurate than the random weights produced by CSBs, and such variations render Mann's statement, regarding '*decoration preventing a reduction in weight by fraudulent traders*', superfluous.

Following the publication of Mann's paper in 1914 the appetite for the discussion of CSBs seems to have waned somewhat. Despite a thorough search of the *Proceedings of the Society of Antiquaries of Scotland*, the *Proceedings of the Dumfriesshire and Galloway Natural History and Antiquarian Society* (DGNHAS), the *Banffshire Field Club* and a number of other contemporary society publications plus internet search engines such as Google and Google Scholar, no further papers seem to have been published until a report by Vere Gordon Childe and J. Wilson Patterson on excavations at Skara Brae in Orkney. The apparent lack of activity during this time is perhaps unsurprising as the world changed rapidly in the early twentieth century following the Great War (1914-1918). This cataclysmic event changed the social structure of Britain decimating the aristocracy, many of whom had regularly contributed papers to the Proceedings of the Society of Antiquaries of Scotland. The presidency of the Society also changed in 1918 from that of aristocratic antiquarians to professional archaeologists. This new professionalism brought with it a change of emphasis in both the type and quality of papers published, which now included more definitive archaeological knowledge based upon firmer evidence.

1929: Skara Brae Excavation Report by Professor V G Childe and J W Patterson

In their 1929 report on excavations carried out at Skara Brae archaeologists V. Gordon Childe and J. Wilson Patterson noted that two balls of stone covered in protuberances, one of which was perforated, had been found at Skara Brae. Owing to an absence of datable material, neither their age or use could be settled, but in mentioning the papers of Smith, Anderson, and Mann, they once again suggested an ethnographic parallel and considered that they were very like the carved stone Maceheads found in New Guinea (Childe and Patterson 1929: 267).

1930: Graham Callander FSA Scot

In a presentation to the Society of Antiquaries of Scotland the following year, Graham Callander FSA Scot pointed out that apart from those found at Skara Brae, no other CSBs in Scotland had been found in association with anything that could determine their age. He suggested they were not connected with the Stone or Bronze Age but that their designs were like those known from the Iron Age and therefore attributable to that period (Callander 1930: 107). He discussed the distinctive pyramidical knobs that are peculiar to CSBs found in Orkney and noted that typologically their pyramidical knobs had been found on other unique carved stone objects at Skara Brae (Callander 1930: 105, also see Childe and Patterson 1929: 225-280 and Childe 1929: 158-191).

1931: A further report on Skara Brae V G Childe

In a further report on Skara Brae in 1931 Gordon Childe noted the similarity between the decoration on stone objects at Skara Brae in Orkney and that on the Neolithic tombs at Newgrange and Loughcrew in Ireland. Determining that CSBs were Neolithic and not Iron Age or Pictish in origin on a lack of statistical evidence he dismissed the suggestion by Mann that they were weights and argued that they were more likely to be weapons. He had also arrived at the conclusion that undecorated CSBs were mainly utilitarian, whereas those that had been decorated were probably a later development for ceremonial use and were perhaps utilized as an emblem of rank (Edmonds 1992: 184-185). Although in 1931, Childe had initially characterized Skara Brae as Neolithic, he had at the same time compared the distribution of CSBs with that of Pictish Art. This idea however, was finally discounted in his 1946 and 1962 papers (Childe 1946: 1-144; Childe 1962: 9-25; Edmonds 1992: 182).

1936: Bulmer's Updated CSB Card Record

In 1936 a Mr. Bulmer from Stockfield in Northumberland took an interest in CSBs and as a practical exercise brought Coles' classification and the National Museum records up to date on a card index system, producing maps of their known findspots (Marshall 1977: 40). Unlike Coles' c. 1911 classification Bulmer made no attempt at interpreting CSBs but instead simply compiled a comprehensive and up to date inventory of all the CSBs that were known in September 1936. Listing them by county he recorded each one by its findspot where it was known, the date it was found or information regarding its publication, the type of material it was thought to be made from, the type of decoration, its overall dimensions in inches, its weight in ounces and its museum acquisition number. He also added additional references against some of the entries, referring to Coles' manuscript, the Queen Street (museum) catalogue, 'Scotland in Pagan Times' and the 1881 Rhind Lecture by Joseph Anderson, Keeper of the National Museum of Antiquities in Edinburgh, which was subsequently published in 1883. His updated inventory contained details of 277 balls which included 15 that were plain and 10 that were polished; 183 of these were from 152 known sites with two unidentified, 50 that were allocated to county only and 44 with unknown findspots. He also listed 18 cast balls with no known originals and 15 where the originals were known. While Bulmer did not add anything to the overall interpretation of CSBs it was nonetheless an extremely useful exercise in updating and recording the corpus as it existed in 1936 and has been useful to this study, producing clarification on several issues.

1941: W Douglas Simpson

Another brief mention of CSBs came in the Society of Antiquaries of Scotland 1941 Rhind Lecture entitled '*The Province of Mar*' given by W. Douglas Simpson, a Scottish academic and Librarian at Aberdeen University. Simpson was not a trained archaeologist but had directed excavations at a number of castles in Scotland and was a prolific writer on Medieval architecture; he had also served as chairman of The Ancient Monuments for Scotland and was a member of the Royal Commission on the Ancient and Historical Monuments of Scotland. He noted that CSBs were confined almost entirely to Scotland, in an area north of the Forth and were concentrated in the areas of Mar and Gairoch where they had been found in very great numbers. Simpson seems to have been one of the first people to observe that they were rarely found in any definite association with structures or other artefacts. He particularly mentioned the CSB that was discovered at Dunadd fort in Argyll, which was a major power centre of the Scots, and which is known to have been occupied from prehistoric times down to the eighth or ninth century AD. He further commented that the Towie CSB and several others from the prehistoric village at Skara Brae, in Orkney were decorated with what was clearly Celtic ornamentation. However, he offered no explanation for their use and simply described them as 'mysterious' (Simpson 1941: 79-80).

1954: Stuart Piggott

Apart from Simpsons lecture in 1941, little was written about CSBs or even archaeology in general, during the second world war and they appear not to have been mentioned again until 1954 when a very brief mention of them was made in Stuart Piggott's book *'The Neolithic Cultures of the British Isles: A study of the stone-using agricultural communities of Britain in the Second Millennium BC'* (Piggott 1954: 332). Apart from finds and donations of CSBs being reported in the Proceedings of the Society of Antiquaries of Scotland, no papers seem to have been written about CSBs per se, until the study by Dorothy Marshall in the 1970s.

Changes in archaeological approach

During the 1960s a sea change in archaeological thought began to take place with the advent of 'new' or 'processual' archaeology led by the American archaeologist Lewis Binford. Previous attempts to explain how our ancestors lived, through artefacts and monuments alone, were now being transformed using a much wider range of evidence. Adherents of what became known as New Archaeology believed that the increasing mass of archaeological data gathered from excavations, radiocarbon dates and dendrochronology offered far greater potential to scientifically explore the functional, social, and economic characteristics of past societies than had been previously realized. They reasoned that instead of describing and comparing past cultures in relatively vague terms, loosely based upon cultural and artefactual typologies, all archaeological evidence should be fully investigated, scientifically evaluated, and explained holistically, based on logical and objective arguments which could be made open and unambiguous to all. They also argued that delving deeply into the more mundane and utilitarian aspects of people's lives would enable a more thorough understanding of how individual cultures functioned on a day to day, season by season basis (Adams 2008: 1024; Sorenson 2015: 86).

As more and more scientific methods were adopted, and theories changed, the continuing need for typologies was extensively debated among the archaeological community. Consideration was given to whether the artefact types seen by typologists would have been recognized by the people who made them. Were the artefacts they were attempting to classify meant to be different to one another, or were they simply interpreting them as such? Gifford suggested that while craftspeople generally felt the need to produce consistent artefacts, most would change and innovate from time to time and the differences we see between one artefact, and another may be due to experimentation with new designs or the expression of their personality (Gifford 1960: 345; Rouse 1960: 313). Others suggested that the combination of attributes present on any artefact may not be those favoured by the personal and idiosyncratic values of the maker but may have been that of its user looking for something unique. Alternatively, they may have represented the ideas of a community who developed a new type of artefact to suit their changing society according to functional, economic, or cultural motives (Gifford 1960: 342, 343; Rouse 1960: 313). This new approach changed the emphasis of archaeological research considerably, by studying the evidence from an excavation as a whole instead of in part, it aimed to provide a more comprehensive and in-depth view of a culture.

1977: Dorothy Marshall's study and classification

In the 1970s Scottish archaeologist Dorothy Nairn Marshall (1900-1992) revisited the question of CSB classification using Coles' original list of 1908, his later classification of c. 1911, Bulmer's card index of 1936 and additional CSBs that had been found between then and 1976. Her paper 'Carved Stone Balls', was published in the 1976-77 volume of the *Proceedings of the Society of Antiquaries* (Marshall 1976-7: 40-73).

She was now able to include in her classification many that had previously been in private collections, but which had now been acquired by museums through private donation or purchased at auction following the death of antiquarian collectors. She finally recorded a total of 387 balls, including cast/replicas, which was an increase of 296 from Coles' listing of 1908. The introduction of these additional artefacts not only allowed Marshall to expand Coles' original classification but also offered her the opportunity to discuss their materiality, distribution, and potential use (Marshall 1977: 40-72). During her research, she made many personal visits to museums and her extensive network of contacts supplied her with slide photographs and sketches of a comprehensive selection of decorated CSBs, thus allowing many to be seen for the first time outwith a museum setting. It is interesting to note that Marshall completed her research without access to personal computers (not available until c. 1977) and the advent of portable digital photography, (not available until c. 1989) and more recently digital mapping, all of which made this study so much easier. As correspondence with curators at the University of Aberdeen Museum shows she used her trusty Automobile Association Road Map of the UK to locate CSB findspots and, while undoubtedly useful to an extent, some findspots seem to have been less easy to locate, meaning that on a number of occasions she had to fall back on local knowledge. The amount of information in her paper clearly illustrates that a considerable amount of time had been spent tracking down findspots which, in the 1970s, would have been a difficult task without satellite navigation and the relatively easy access to museum collections that we enjoy today via the internet and email.

Like Coles, the main defining attributes of a CSB identified by Marshall were:

1. a hand sized carved stone ball.
2. a varying number of discs or knobs carved into its surface.
3. occasional incised ornamentation.

It also appears that Marshall may have used the relative height of the knobs to define the difference between her Type 4a and Type 4b CSBs, although as there are no records of how she arrived at this, it could have simply been a visual estimate. Marshall does not seem to have used Coles' original system as the basis for her own extended classification; instead, listing CSBs by the number of knobs or distinctive diagnostic features. Her classification (Table 3.4) basically ranged from Type 1 to Type 8 (with several distinctive sub-types) plus three additional types; Type 9 (decorated), Type 10 (oval) and Type 11 (over 90 mm in diameter) (Marshall 1977: 44).

She included supplementary information which listed the findspot of each CSB by type, and included additional comment on styling, decoration, the materials (where known), the total number of CSBs in each type and a series of maps showing their individual locations, which once again clearly revealed their northeast Scottish provenance. The maps also showed that despite the concentration of CSBs in northeast Scotland they were spread widely, but thinly, across the country. She also noted a handful of outliers in northern England, Ireland, and a single example as far away as Aure in the municipality of Møre og Romsdal in Norway, all of which she considered had probably been transported there by collectors in more recent times (Marshall 1977: 55).

In reviewing the ideas of previous writers, she discounted them being oracles, the view of Childe that they originated in Orkney, Smith's opinion that they were weapons, Mann's view that they were weights, and Evans theory that they were used in a game, being

Table 3.4: Marshall's 1976/7 Carved Stone Ball Classification/ Typology. ©Proceedings of the Society of Antiquaries of Scotland, 108, 40-72. Transcribed by C. Stewart-Moffitt 2020.

Type	Knobs/Decoration	Description
1	**3**	**Rounded and clear-cut knobs.**
2	**4**	**Rounded and clear-cut knobs.**
2a	**4**	**Rounded and clear-cut knobs but also having worked interspaces.**
4a	**6**	**Low cut knobs.**
4b	**6**	**Prominent knobs.**
4c	**6**	**Knobs with worked interspaces.**
5	**7**	**Knobs.**
6	**8**	**Knobs.**
6a	**9+**	**Nine + additional, various sized knobs or discs.**
7	**10-55**	**Knobs.**
8	**70-160**	**Knobs.**
9a	**Decorated**	**Decorated with spirals.**
9b	**Decorated**	**Decorated with concentric circles.**
9c	**Decorated**	**Decorated with hatchings and incised Lines.**
9d	**Decorated**	**Various decorated balls.**
10	**Oval**	**Oval balls with Knobs or Discs.**
11	**Large**	**Over 90 mm diameter.**

thrown competitively from village to village (Marshall 1977: 63). She concluded that as so few had been found in graves, they must have been prestigious family or clan possessions rather than belonging to individuals and suggested that they may have been used at clan conferences, their momentary possession giving the holder the right to speak.

At the time Marshall was writing her first paper it was generally accepted that these objects were almost certainly attributable to the third to second millennia BC and researchers like MacKie thought that the context of those from Orkney indicated they were prestige objects (Marshall 1977: 64). Marshall noted that although Maceheads had a more widespread distribution than CSBs she considered both artefact types were chronologically contemporaneous and suggested both were probably in use from the Late Neolithic to the Early Bronze Age (Marshall 1977: 62).

In his 1992 paper entitled '*Their Use is Wholly Unknown*', which originated from the caption of an image of CSBs in *'A Picture Book of Ancient British Art'* written in 1951 (Piggott and Daniel 1951: Plate 18), Mark Edmonds commented that her excellent study of CSBs '*remained the most substantive statement of our current knowledge on the distribution and physical characteristics of these distinctive artefacts*' (Edmonds 1992: 181). Although he pointed out that while Marshall's categories effectively described each type of CSB and the differences between them, they did not appear to show any relationship between distribution or context; adding that *'it still remains difficult to assess the significance of the variability between different balls'*. (Edmonds 1992: 189-190).

She subsequently added a further 23 CSBs to her corpus in a supplementary paper entitled 'Shorter Notes' which was published in the *Proceedings of the Society of Antiquaries of Scotland* in 1983, bringing the total number recorded to 410 (Marshall 1983: 628-630). These additional artefacts had been brought to her attention by museum curators and private individuals as a result of her 1976-77 paper. Since Marshall's original paper was published it has been the sole source of stylistic and locational information on CSBs for archaeologists, museum curators and others. On her death in 1992, her card index was bequeathed to National Museums Scotland in Edinburgh, where it is currently curated by the early prehistory section.

1985: The 'Symbols of Power at the Time of Stonehenge' Exhibition

Their function was once again redefined when they were exhibited in the '*Symbols of Power at the Time of Stonehenge*' exhibition held in 1985 at National Museums Scotland in Edinburgh. In the book which accompanied it, CSBs were described as '*decorative abstract items...not intended for practical use but seem to embody the power of those who held them*' (Clark et al. 1985: 59). As the exhibition organizers pointed out, distinctive symbols have been used throughout history and are still used today to indicate rank and membership (Clark et al. 1985: 6). They considered that the types of material used, along with the craftsmanship and design involved, set these exclusive objects apart from everyday utilitarian tools, promoting them to the position of important symbols suitable for group exchange, displays of conspicuous consumption and ritual destruction. As such both CSBs and Maceheads were argued to have been used in the establishment and legitimization of control and authority over individuals and groups which, along with megalithic structures, inspired regional integration as populations grew larger (Clarke et al. 1985: 10-12; 57-62). This led the authors to believe that the reason few CSBs had been found in graves was because they were likely to have been communal property, not owned by any one person but were instead controlled by powerful individuals, who decided how and when they were used (Clark et al. 1985: 62). It was probable that other, seemingly prestigious decorative objects from Skara Brae, served the same purpose and were used in the same way (Clark et al. 1985: 59-61).

1992: Mark Edmonds

The focus on social context continued in the 1990s with a paper by Mark Edmonds entitled '*Their Use is Wholly Unknown*'; the title referencing Stuart Piggott's comments on CSBs in 1954 (Edmonds 1992: 179-193). Edmonds noted that the later Neolithic was characterized by a proliferation of a wide range of highly distinctive portable artefacts, often originating from noticeably regional sources, he suggested these objects may have been used to facilitate local political control and resulted from the spread of a range of new and innovative ideas in the Late Neolithic (Edmonds 1992: 188-189). He referred to the idea originally mooted by Marshall that CSBs may have been 'family or clan possessions', an idea also alluded to by Clark (1985: 62), suggesting that '*increased emphasis on lines of affiliation and decent*' may have led to them becoming hereditary devices 'sustaining ideas across several generations' (Edmonds 1992: 192; Weiner 1985: 210; Lillios 1999: 26). He further suggested that differences between the balls might be due to emulation between regional groups, changes in power structures, influence over people or resources, or differential local or regional practices. He also noted that the decoration on some examples, with its resemblance to passage grave art and Grooved Ware designs could, at the very least, indicate a movement of ideas, if not movement of objects themselves (Edmonds 1992: 191). Edmonds believed that, despite their lack of contextual information, CSBs might yet add to our understanding of the social lives of the people who lived in Late Neolithic Scotland, even though there was, as yet, no apparent correlation between the distribution of the various types delineated by Marshall. He noted the lack of dating evidence and secure contexts and reflected on the many questions still requiring answers, such as the significance of the numbers of knobs, whether their use changed over time (Edmonds 1992: 192) and if their decoration was made using stone or metal tools (Edmonds 1992: 189). Although Edmonds posed these questions more than twenty years ago, most remain unanswered.

1999: Sensory Analysis of CSBs

In the late 1990s, a new and very different study was undertaken when Gavin McGregor considered the sensory analysis of CSBs; this aimed to see them through the eyes of the people who attended the ceremonies or rituals they might have been part of. MacGregor's work was influenced by post-processual moves towards considering the experiential aspects of past material culture. He examined them both by touch and visually, while static and while in motion, both close in and from a distance, in each case noting their visual balance and haptic qualities (MacGregor 1999: 264). He noted that there were differences between the texture of the balls studied, which seemed to be due to the quality of their finish, weathering, and repeated handling and that it was easier to determine the number of knobs when there were fewer, rather than larger numbers of knobs present. He argued that a visual examination gave an impression of uniformity, especially where inscribed lines in the interspaces extended from one knob to another, while those with decoration either on the knobs or in the interspaces, produced a sense of fragmentation, breaking the visual continuity into a series of separate patterns and objects. Similarly, he found that visual examination of the surface of a CSB while tossing it from hand to hand did not change its appearance, although it changed dramatically if spun quickly when the decoration and knobs blurred together, making it appear as a complete and unbroken sphere (MacGregor 1999: 267). He concluded therefore that CSBs were unstable objects and that there may have been no single understanding of them. MacGregor suggested that CSBs may have had several roles or identities during their lives, from personal objects for private reflection, to communal totems. He considered that as their recovery was from a variety of contexts, which also appeared to vary regionally, they may have meant different things to different peoples and that possibly their differential deposition may indicate their meaning changed as they moved from one area or period to another. In concluding he pointed out that they had now adopted different roles to suit modern socio-political needs. Since their re-discovery in the nineteenth and twentieth centuries they were now being used to construct a 'Scottish Identity' through museum displays and electronic media, stating that: *'today, even unintentionally, CSBs are involved in the creation of contemporary identities'* (MacGregor 1999: 268).

2006: The Aerodynamic Qualities of CSBs

Another new perspective was introduced when the aerodynamic qualities of CSBs were investigated in a paper written in 2006. The author being a physicist and engineer (Todd 2006: 73) had a very different background to previous writers. Todd was particularly interested in their weight and any aerodynamic drag and spin effects they might have. His interest was aimed at understanding if such attributes might have been deliberately built-in to aid the speed and distance they could be thrown (Todd 2006: 65). He spent considerable time and effort making a replica from Serpentine and produced experimental CSBs from silicon rubber, suitably weighted with sand, with which to conduct his experiments. From experimentation with these replicas, he was able to calculate their throwing range according to ball size and mass and hypothesised that CSBs were well optimized for throwing by hand, commenting that those with a rougher surface would provide a better grip and could be thrown further than the smooth ones (Todd 2006: 71). Todd believed they were less likely to have been used for socio-political purposes, as they were not highly polished like Jadeite Axe Heads and would therefore be less highly prized. In considering the decorated examples, he felt they may have been used in some sort of competition and the decoration was to allow their owners to be able to identify them (Todd 2006: 71). He concluded by saying that the CSBs he examined were very close to the ideal weight for throwing by hand which suggested a weapon of some kind. He believed that if they were simply manufactured for the sake of art or ritual use there would have been a greater variability in size and would have been finished to the same degree of symmetry and sophistication as other Late Neolithic objects (Todd 2006: 72). Ultimately, he concluded they had been made for killing birds and small game or deterring predatory birds and animals from killing domesticated flocks (Todd 2006: 73). He did note however that they could only have been used on ground where they could be easily recovered.

Using his knowledge of science and engineering along with mathematical skills Todd investigated the possibilities that 'engineered CSBs' could be thrown further and more accurately and would therefore be more efficient than randomly acquired stones. However, despite presenting a skilfully researched mechanical based theory, Todd did not take into consideration their social potential and instead concentrated on their mechanical qualities alone. He glossed over the potential for their loss in long grass, bogs or watercourses, damage to them from hitting stones or rocks and the considerable time that might have to be spent in their recovery. While there would undoubtedly have been a need to deter predators, there would be no guarantee that throwing a single CSB would have been sufficient deterrent. It is probable it would have had to be followed up with a volley of random stones from the ground. Surely a more practical approach to predators would have been the slingshot, used by shepherds since prehistory and which is still in use by shepherds in some parts of the world today.

2009: CSBs as Toys?

In 2009, researcher Sharon Brookshaw focused on the potential social role of CSBs in childhood and in a paper entitled '*The Material Culture of Childhood*' considered the possible use of CSBs by children (Brookshaw 2009: 370). After reviewing many of the above papers, Brookshaw focused on the 1999 paper by Gavin MacGregor, suggesting that instead of CSBs being used by adults in a game, as he had proposed, they may in fact have been made to amuse children. Nevertheless, the remainder of the paper suggests she may in fact have been using CSBs as an example to museum curators to recommend they re-examine their collections of artefacts for those that could have been used by both children and adults, questioning potential past misinterpretations. It is almost certain that the undamaged nature of most CSBs would preclude them from being used in any sort of game where they may have become damaged, and it is also probable that they were too large and heavy for the smaller hands of most children.

2010: CSBs as a means of moving Megaliths

A 2010 study returned to the practical use of CSBs. In this study, Andrew Young of Exeter University, suggested they may have been used for moving large megalithic structural components such as those used in the recumbent stone circles of northeast Scotland and structures like Stonehenge (Young 2011: 2016). Young had seemingly observed links between CSBs, recumbent stone circles and Grooved Ware pottery and hypothesised that CSBs, which he considered were made to exacting sizes, may have been used to move the components of these structures into place. He believed that people may have brought the idea south at the same time as Grooved Ware pottery and used CSBs in the construction of Stonehenge.

Filmed by American documentary makers NOVA (Exeter University/Nova 2010), experimentation showed that a group of people could successfully move a large block of stone using wooden balls running in grooved wooden tracks. However, the experiment seems to have been less successful than expected, as they had used green rather than seasoned oak, which quickly led to damage to both balls and tracks. Although the concept of using spherical balls as 'ball bearings' worked in this experiment, it did not discuss how successful CSBs, with knobbly surfaces, might have been and one strongly suspects they may have run a lot less smoothly. Had CSBs been used in this manner there would almost certainly be more showing signs of damage and yet it is clear that the majority in museum collections remain relatively undamaged. It is possible that monument builders may have used ***smooth*** stone balls instead of ***carved*** stone balls, although this rather negates the original argument and close examination of smooth stone balls in museums once again show no signs of damage.

If stone balls of any kind had been used to transport or move monumental stone throughout England, or Scotland, we would surely have found signs of them, or their broken remains, in and around the monuments so constructed. In addition, the considerable amount of time, effort and expertise needed to produce both track and balls would seem to be excessive when simpler methods exist. Recent experimentation has shown that there are several much simpler methods of moving heavy stones. Depending on location, throwing seaweed, wet straw, or animal manure on the ground underneath and in front of a stone being moved enables even the largest of them to be dragged with a minimum of effort (BBC Documentary 2016: Secrets of Orkney: Britain's Ancient Past. Episode 1).

2014: Platonic Solids; a Mathematical Viewpoint

The final review is that of *'Art and Symmetry of Scottish Stone Balls'*, a paper written by David A. Reimann from the Department of Mathematics and Computer Science of Albion College, Michigan, USA (Reimann 2014: 441-444). Like a number of other mathematicians around the world (Atiyah and Sutcliffe: 2002; Mann: 2011; Lloyd: 2012; Du Sautoy: 2017) Reimann has a mathematical attachment to and interest in the concept of CSBs and has visited several Scottish Museums in pursuit of them. In his paper Reimann discussed their possible connection with platonic solids, a theory proposed by Keith Critchlow in his 1979 book '*Time Stands Still; New Light on Megalithic Science*' which is often uncritically replicated in New Age articles found on the internet. Critchlow claimed that the Neolithic people of Scotland had discovered platonic solids a thousand years before Plato himself (Critchlow: 2007). In Chapter 7 of Critchlow's book, Reimann notes Critchlow suggests that as CSBs *'exhibit symmetry found in platonic solids, they must be equivalent to them'*, but Reimann argued that although they show *some* relationship to the symmetry of platonic solids, they do not represent a complete set as the icosahedron is missing; he concluded therefore that Critchlow's argument was weak.

New Age Theories

It would be remiss of me to end this review without mentioning some of the less scientific thoughts on CSBs, or petrospheres as they are often known, that are usually found in web-based media intended for a popular mass audience. These range from pseudoscientific metrology to the likeness of CSBs to simulacra. Several novel 'mathematical' theories have evolved based upon the average diameter of a CSB, which according to some websites, has been arrived at by measuring several hundred CSBs: this alone is difficult to believe knowing the reluctance of many museum curators to allow CSBs to be handled, let alone measured. They are also difficult to measure accurately due to their irregular surfaces so any measurements made will vary from person to person thus producing a variety of 'megalithic' possibilities. I am personally sceptical of such claims, although as maths has never been my strong point, I will leave it to the reader to reach their own conclusion. Simulacra such as pollen grains and atoms are also regularly compared to CSBs due to their similar morphology, however as we have only been able to see such microscopic entities since the invention of microscopes the idea that our ancestors could have seen them is impossible. Others have suggested the presence of unknown third parties imparting esoteric knowledge to our species at some point in the past, although no evidence has ever been found of an alien culture. I believe these simply show that no real attempt has been made to engage with either the artefact or past people and is lacking insight into our species. One failing many of these 'fringe' ideas appear to have in common is that they do not consider the rich history of archaeological research and knowledge that continues to be amassed and in the absence of such knowledge look far and wide for simpler or more obscure comparisons (References freely available on Google and other search engines).

Conclusion

The literature review presented above has examined both antiquarian and modern archaeological thought regarding the possible uses to which CSBs may have been put and in many instances has suggested the potential reasons why those theories may have been offered by their authors. Further specific critical analysis has been provided on the more modern theories with discussion regarding why this author rejects their conclusions. This chapter also introduced Frederick Rhenius Coles who was the first to attempt their classification and analysis, and Dorothy Marshall who updated and expanded Coles' original classification and outlined her thoughts on their possible use.

Chapter Four

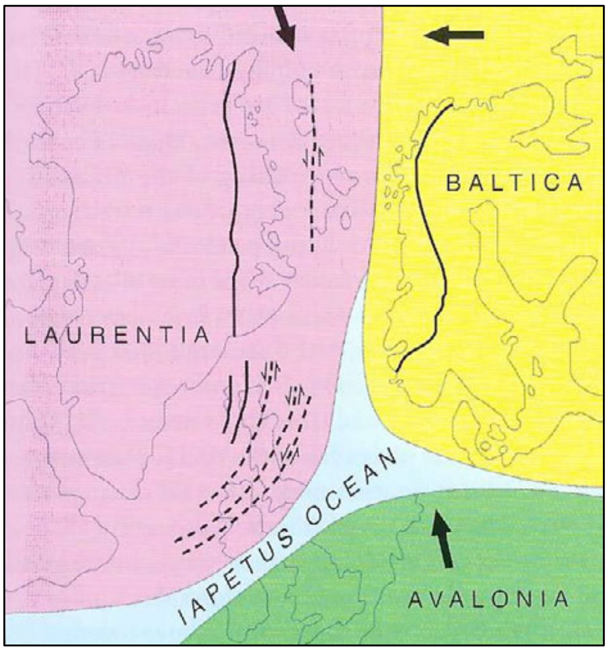
The Geology of Scotland and Materiality of Carved Stone Balls

This chapter will look briefly at the geological origins of Scotland and show how, when the former continents of Laurentia, Baltica, and Avalon collided, they formed what we now call Britain. It will show how this collision was responsible for the formation of the mountains of Scotland and how subsequent periods of vulcanism and glacial erosion fashioned the landscape into that we see today. Neolithic people's intimate knowledge of stone will be considered along with the value they appear to have attached to it in terms of its colour and texture for both monuments and material culture. Using accession data from collections at Aberdeen University Museum and National Museums Scotland, past antiquarian, and curatorial characterization of the materiality of CSBs will be discussed, along with the types of stone thought to have been used in CSB manufacture until the time this current study was undertaken.

Details of new visual geological characterization work, undertaken by Dr John Faithfull, on those museum collections will be presented, along with subsequent fieldwork carried out by this author to locate the potential sources of the more unusual materials identified. The visual characterization of the majority of CSBs in these two collections, combined with fieldwork, will provide new information on the types of stone used in CSB manufacture and will show how one material in particular was sourced in central Aberdeenshire and traded/exchanged throughout Scotland. Finally, I will show how the materiality of some CSBs offer a tantalizing glimpse of how past craftspeople may have travelled widely throughout the country making CSBs from locally available materials.

A brief overview of the geology of Scotland

Despite Scotland being a relatively small country, it has a diverse and unparalleled range of rock types straddling a wide range of geological time. They range from the earliest hard crystalline gneissose rocks of the Lewisian period which surface in the northwest of the country and date from around 3000 Mya to the much later and softer sedimentary Ordovician and Silurian rocks in the south dating to between 488-416 Mya (Gillen 2003: 20). These were laid down as the land we now know as Scotland moved from the Equator to the South Pole and then north to its current location. During this time the land was subjected to extreme geological activity and was split by volcanic dykes, punctured by Granite plutons and deformed by Gabbro intrusions. It was also continuously eroded by a range of climatological and glacial events, all of which served to modify its geological structure through cycles of heat, pressure, and mineralization (McKirdy et al. 2007: 1-7).



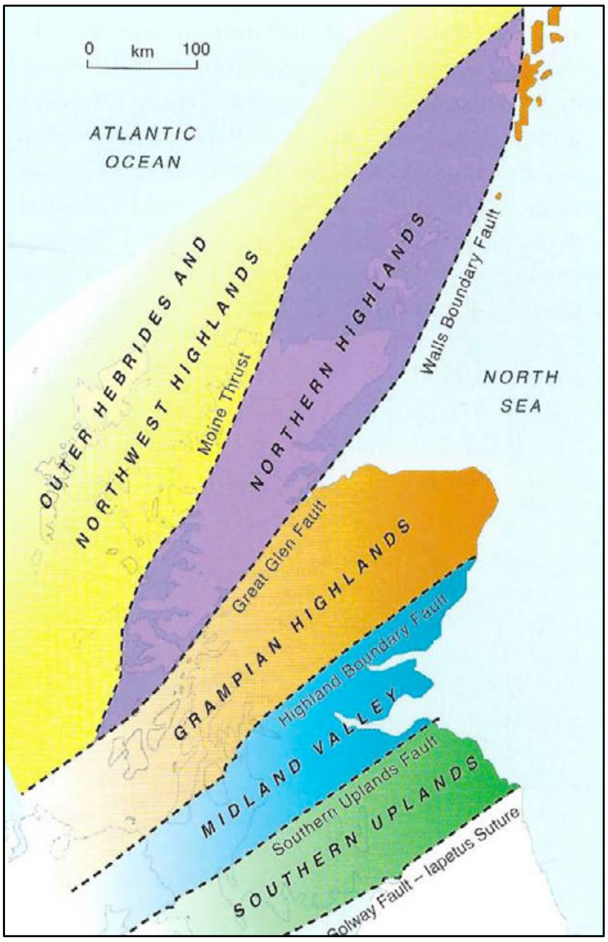
Map 4.1: Continental collision. © Gillen. 2003: 69.

The largest individual geological event to take place was the collision of the ancient continental land masses of Laurentia, Avalonia and Baltica, Map 4.1.

As these three continents collided around 420 Mya, the Iapetus Ocean which separated them was gradually closed (Gillen 2003: 26-30, 106). While the sediments from its ocean floor were forced upwards to form the softer sedimentary rocks of southern Scotland, the immense impact of the collision crumpled and folded the northern continent of Laurentia forming the Caledonian Highlands Mountain chain, which runs northeast from Argyll to Shetland. As the enormous energy generated by this collision dissipated, considerable faulting and thrusting occurred throughout Scotland and a thickening of the earth's crust caused Granite intrusions, or plutons in some areas; particularly in the Grampian Highlands (Gillen 2003: 88-89).

Faults and Terranes

The collision of Laurentia, Avalonia and Baltica also caused several major southwest to northeast fault



Map 4.2: Geological Terranes that form the Geological landscape of Scotland © Gillen. 2003: 26.

lines to develop; between which diverse geological and varied mineral resources led to the formation of five distinctive regional topographies known as 'terranes', Map 4.2.

Southern Uplands Terrane: This lies between the Solway Fault on the geographical boundary between England and Scotland and the Southern Upland Fault further north and is mainly composed of folded sediments from the floor of the Iapetus Ocean along with a few Granite intrusions (Gillen 2003: 68). The land is mainly sedimentary with some volcanic elements and is comprised of a variety of poor quality upland and fertile lowlands. The Solway fault represents the Iapetus Suture, the point at which Laurentia and Avalonia collided.

Midland Valley Terrane: This lies between the Southern Uplands Fault and the Highland Boundary Fault and comprises a very different and much flatter landscape. Known as the Midland Valley Terrane, its geology is composed of both sedimentary and volcanic elements that were at the heart of Scotland's past economic wealth of coal, ironstone, and limestone (Trewin and Rollin 2002: 11-13).

Grampian Highland Terrane: Situated between the Highland Boundary Fault and the Great Glen/Walls Boundary Fault which runs up the northeast coast of Scotland as far as Shetland. The land is formed from a large expanse of metamorphic rocks with major Granite intrusions and is comprised of both poor quality and mountainous land in the west and central areas with good quality farmland in the east.

Northern Highland Terrane: Between the Great Glen/Walls Boundary Fault and the Moine Thrust Zone the Northern Highland terrane is composed of a mixture of volcanic rocks in the south and west and sedimentary rocks in the north and is dominated by metamorphic rocks along with a few Granite intrusions. Subjected to continual folding and refolding this is an area of high rugged mountains and moorland with small pockets of land suitable for agriculture.

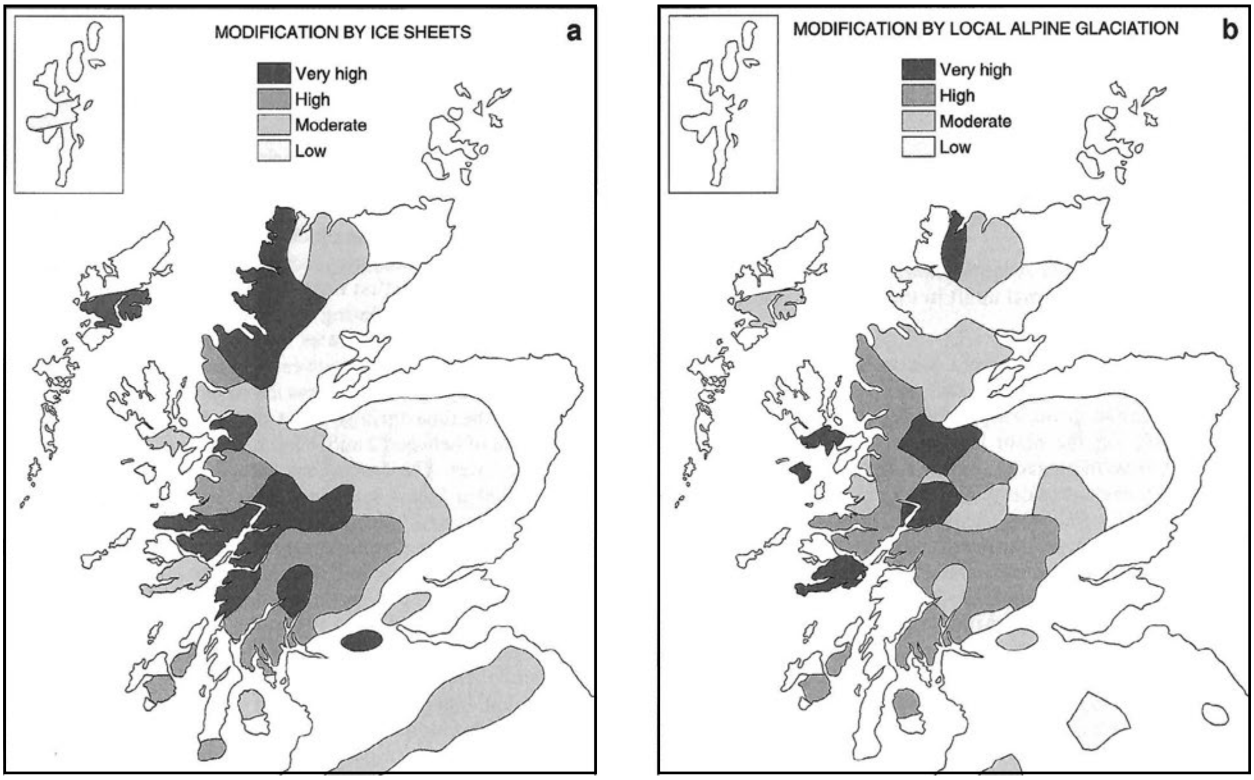
Hebridean Terrane: This final area is northwest of the Moine Thrust Zone and is host to some of the oldest rocks in Scotland, the Lewisian Gneiss (Gillen 2003: 42; Trewin and Rollin 2002: 1-16) and is marginal at best.

As can be seen from these brief descriptions, the land formed between these fault lines was caused by diverse combinations of past geological and vulcanological activity later modified by glaciation. These unique and very different topographical landscapes would have offered Neolithic people a wide variety of mineral resources, ecological environments, and potential biotopes to exploit, although in many areas a combination of latitude, climate and acidic soils would have restricted the range of animals and crops and the potential to live in them.

Glacial erosion in northeast Scotland

Over the past 2.6 million years Scotland has also been subjected to several ice ages which further altered the landscape. Interestingly their effect was different from one side of the country to the other, with the extent of erosion in the east being considerably less than that in the west, because of differences in the thickness and temperature of the ice. The combination of warmer temperatures, higher snowfall and thicker ice led to glacial ice in the west reaching the pressure melting point at its base, producing a thin film of water allowing the ice to move over the land surface, scouring the rock beneath. By comparison the east was colder and drier and received less snowfall; here the ice stuck to the rock, thus causing less serious erosion, Map 4.3 (Gillen 2003: 169-170, Boulton et al. 2002: 410-430).

In the east of the country new landforms were created through glacial melting; in some areas the landscape was eroded and scoured by meltwater, with glacial detritus subsequently dumped in new locations.

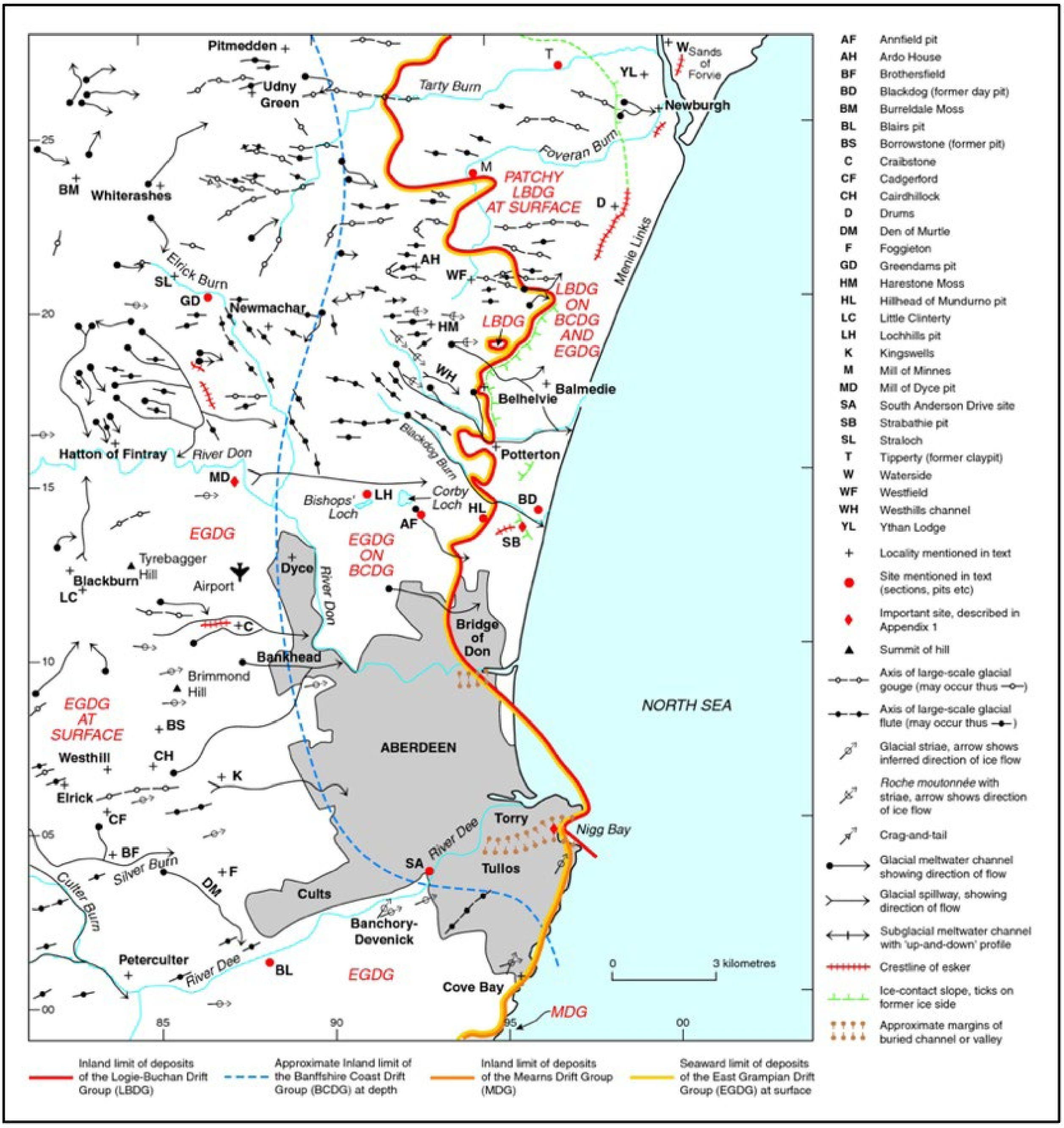


Map 4.3: Intensity of glacial erosion in Scotland. The highest intensity of erosion from both types of glacial activity is found along the north-western seaboard and the lowest erosion is found in the east. After Boulton et al. 2002.

Glacial erosion and dumping can be seen to the north of Inverness, along the Morayshire coast and down the east coast of Aberdeenshire as far as Arbroath, East Lothian, and the Borders. Today we see the vestiges of this in the dry glacial meltwater channels, known locally as 'dens', that exist in Aberdeenshire, Angus and Fife and vast deposits of pebbles and cobbles which form eskers, kames and outwash sheets in Morayshire and Aberdeenshire (Gillen 2013: 176-179; Merritt et al. 2003: 1-6; Trewin and Rollin 2002: 16). Much of this material was deposited along the north and east coasts, dropped by meltwater from glaciers retreating westwards, although research shows that some material travelled westwards from locations offshore in the western North Sea Basin (Merritt et al. 2003: 1-4).

One result of the glacial movement of stone is that non-local cobbles are often found a considerable distance from their origin and are regularly washed out of the banks of rivers as they change their course. Plotting the movement of non-local glacial material, such as cobbles and erratics, allows geologists to assess the extent of glacial advance, Map 4.4 (Merritt et al. 2003: 1-6) and could explain why CSBs, made from non-local material, are found some distance from the source. To assess the possibility of such material being used in the manufacture of CSBs, geological maps detailing the movement of glacial debris were consulted. However, despite the potential for this happening it was impossible to identify suitable candidates in the time available and without considerable knowledge of past glaciation. Suffice to say it would be surprising if at least some CSBs and other artefacts had not been made expediently from glacial material.

Neolithic farmers would have undoubtedly encountered a much rockier land surface than we see today. It would have been strewn with stones and cobbles left by glacial action and considerable effort would have been expended in de-stoning the land before it was fit to grow crops. Much of the stone would have still been there in the seventeenth and eighteenth centuries when farmers began reclaiming the land; particularly in Aberdeenshire where extensive de-stoning and drainage works were an essential part of farming practice (Carter 1997: 42; Tarlow 2007: 44). The extent of the task undertaken by these improvement works can be seen today in the miles of stone dykes surrounding the newly enclosed land. In a few locations the quantity of stone was so great that 'consumption dykes' were built on a massive scale to use up the vast quantities of surplus stone cleared. Clearance cairns were an alternative method of concentrating excess stone; these large piles of stone can still be seen dotted around the countryside on field boundaries throughout northeast Scotland. Many of these have been created or added to since, especially during the second world war (Winters pers.comm.) when previously uncultivated land, often known in the past by the misnomer 'waste' (Tarlow 2007: 45), was grubbed and brought into production.



Map 4.4: Glacial and glaciofluvial features and the distribution of glaciogenic deposits on Sheet 77 Aberdeen. After Merritt. et al. 2003: 4.

Knowledge of stone in the Neolithic

It is undeniable that the reason behind Neolithic people's choice of stone, for whatever purpose, was engrained in the individual psyche from millennia of use, particularly for the fabrication of tools. This was a basic knowledge that would have been handed down from generation to generation and should be no surprise to us, as stone has been an essential and major part of everyday life for millennia. While Neolithic people would have known nothing of the geological background of the types of stone used in their daily lives, they clearly had significant knowledge of the unique qualities of each type of stone, along with an innate ability to assess which material suited each individual task. As the land gradually became suffused with incomers from the continent, new and alternative types of stone resources would have been discovered, as they explored what was a virtually pristine landscape. Although some of these resources would already have been known to indigenous Mesolithic people, Neolithic incomers would have undoubtedly discovered valuable new and alternative sources of stone.

As noted in chapter two, flint from Buchan, Antrim and Yorkshire, pitchstone from the Isle of Arran (Ballin

2011: 3, 8-13, 47, 50, 66) and Hornfels from Killin in Perthshire, were used to make stone tools. These materials were highly valued for their hardness and ability to produce a cutting edge and have been found across Scotland (Bradley and Edmonds 2005: 65). Other types of stone were prized both for their hardness and visual properties; Epidotised Greenstone from Great Langdale in the English Lake District was used to make Group VI Stone Axes which have been found across England, Scotland, and Ireland (Bradley and Edmonds 2005: 45; Mandal and Cooney 1996: 52). Judging by its widespread popularity, this particular stone seems to have been held in high esteem during the Neolithic; not only because of the remote and potentially dangerous location from which the material was quarried, but also for its unique appearance when polished. Porcellenite Axes from Tievebulliagh and Rathlin Island in Ireland were also valued for their distinctive visual appearance (Walker 2018: 26), as were the Jadeite Axes quarried high in the Italian Alps at Viso and Mont Beigua (Walker 2018: 123). The latter would have been especially prized, as not only had they been carried vast distances across Europe, they were also stunningly beautiful when polished (Walker 2018: 19). However not all Stone Axes manufactured during the Neolithic were destined for practical use; some were unusable due to their size and weight, the distinctive nature of the material used, the finish applied, or their inability to withstand impact without damage, all of which has led to the suggestion that they were prestige or ritual items (Bradley 2005: 102).

Figure 4.1: CSB 092, dual textured CSB. Findspot New Byth Aberdeenshire. Courtesy of Aberdeen Maritime Museum. C. Stewart-Moffitt 2017.

Figure 4.2: Polished Axe made from Andalusite Schist. Findspot Elgin. Morayshire. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Hurcombe notes that studies of stone utilisation clearly show people not only understood the inherent value of stone from a technological point of view they but also appreciated it for its distinctive colours, texture, and variety of its patterning (2007: 149). Stone was not only valued for tool making it was also valued architecturally and ritually; some tombs and monuments were built using a combination of different types of stone and idiosyncratic methods of construction to produce multi-coloured, multi-textured effects; these have been written about extensively by a number of researchers (Darville 2002: 73-91; Cooney 2002: 93-107; MacGregor 2002: 141-158; Scarre 2002: 242). Cummings has commented on several occasions that Neolithic people appear to have had a fundamental interest in colour and texture, noting that contrasting textures can be found on many Neolithic objects, including monuments (2002: 256). Coloured stone and differential construction were used at Carreg Coetan in Wales (Cummings 2002: 253; Cummings 2012: 41) and Blasthill near Macharloch in Kintyre, Scotland (Cummings 2011: 37-44). These methods were almost certainly carried out by people who cared for their dead and were in all probability a way of showing their respect, in much the same way as we do today. The later recumbent stone circle at Easter Aquhorthies in Aberdeenshire was constructed with a particularly distinctive red jasper orthostat and the Calanais and nearby Turschan stone circles on the Isle of Lewis were built from naturally textured black, pink, red, grey, and cream Lewisian Gneiss. Many of the stones in the Calanais stone circles also have distinctive hornblende 'eyes' (Richards 2013: 272-273). The importance of colour to Neolithic people was also commented on by Gordon Childe during excavations at Skara Brae, where he found paint pots containing red and white pigment mixed with animal fat (Childe 1931: 134). Ochre and haematite pigments were also recently found at the Ness of Brodgar in Orkney along with painted stonework (Thomas 2016: 22, 46).

It is clear from these studies that Neolithic people found some types of stone more visually appealing than others. The interest in texture can also be found in a number of Neolithic artefacts; CSB 092 in the Aberdeen Maritime Museum collection has a 'dual texture' configuration; half of the ball is made from a coarse-grained material whereas the other half is made from a similarly coloured fine-grained material, Figure 4.1, and a Stone Axe in Elgin Museum is made from andalusite schist, Figure 4.2. It seems very likely that these particular types of stone may have been chosen deliberately for their unusual appearance and the distinctive haptic experience they may have afforded.

While the types of stone used to make CSBs may have come from a relatively narrow range of materials with many craftspeople being restricted to local availability, other stone may have been chosen for more subjective reasons, such as its striking colour, curious inclusions, varied texture and/or its hardness or softness (Hensey 2015: 72). It is probable that qualities such as these, along with the location of the raw material, (like the Greenstone Axes from the English Lakes), were also important. How much of this can be attributed to personal choice, design or ritual is difficult to define some 5000 years later, but the use of colour, texture and patterning seems to have been a fundamental concept even in the Neolithic.

In an age where smooth, coloured, and reflective surfaces such as glass and plastic are commonplace, we are relatively blasé about the effect they have on our lives. In the Neolithic such reflective or colourful surfaces would have been few and far between, with still water on a summer day probably being the nearest to a truly reflective coloured surface. Although Neolithic people would have seen the same wide range of natural colours in the landscape as we do today, their clothes, pottery and other artefacts would have been relatively muted earth colours, dull when compared to today's artificial dyes derived from crude oil. It seems certain that their interest in colour and texture did not end with tomb construction but also extended to the smooth, ground and polished surfaces so often found on portable artefacts like Axes, Maceheads and CSBs. These artefacts would not only have reflected light, but polishing would also have brought out the underlying beauty of the stone, especially where colour or patterning were intrinsic. This was almost certainly one of the reasons polished objects were so desirable, such an artefact would have undoubtedly been an object of wonder to all who saw it.

The Science of Geology

The science of geology has its foundations in the Scottish Enlightenment period between 1730 and 1790 when Scotland became the cultural leader of Europe. James Hutton (1726-1797), the founder of modern geology, studied medicine and chemistry at Edinburgh and Paris and took his MD in Leyden in 1749. However, rather than practicing medicine, he undertook 'Improvement Works' at his family's farms; he was not only interested in farming but was also a '*businessman, chemist, geologist, philosopher and gentleman scholar*' (Trewin and Rollin 2002: 27). He later became immersed in the study of geology and after twenty years travelling the country studying the geological origins of the earth, he published his '*Theory of the Earth*' in 1795; in which he described the natural history of the world from a geological viewpoint, challenging biblical teachings. Subsequently Charles Lyell (1797-1875) developed Hutton's ideas further, publishing '*Principles of Geology*' in 1838 (Gillen 2003: 114).

Despite the ground-breaking work of Hutton and Lyell in the eighteenth and nineteenth centuries, the attribution of geological or mineralogical characteristics to CSBs in the nineteenth century was generally quite unsophisticated. Looking at the records of the Society of Antiquaries of Scotland for this period it's clear that many of the CSBs found were reported to the Society by members of antiquarian societies. Antiquarians were a fusion of the upper classes, scholars, professionals, members of the clergy, gentlemen farmers and businessmen. Many were individuals who would have enjoyed an above average education and had a profound interest in the past. Most antiquarians would have been aware of the science of geology, and a few may even have had a rudimentary knowledge of it, although the theologians among them may not have entirely agreed with its seemingly blasphemous philosophies. Nevertheless, it appears that the complex nature of geology and the chemistry of rocks precluded many antiquarians from making an accurate characterization of the materiality of CSBs as it would any layman today. As a result, the range of material characterization at this time was quite narrow, as can be seen from the early museum acquisition records of Aberdeen University Museum, Table 4.1 and Chart 4.1, and National Museums Scotland, Table 4.2 and Chart 4.2.

Table 4.1: Aberdeen University Museum Accession Register: Recorded CSB Materials. Transcribed by C. Stewart-Moffitt 2020.

Material	Number of CSBs
Granite	30
Sandstone	13
Greenstone	3
Serpentine	3
Quartzite	3
Basalt	1
Porphry	1
Unknown	32

The main recurring materials in both Aberdeen University Museum, and National Museums Scotland, accession registers, Charts 4.1 and 4.2, are Granite and Sandstone, with the universal descriptor '*greenstone*' being applied to many of those CSBs that were seemingly less definable. Overall, 37.21% of the Aberdeen University Museum CSB collection and 39.10% of the National Museums Scotland CSB collection had no geological characterization whatsoever. Examples of a lack of specific geological knowledge in the late nineteenth century can clearly be seen in the National Museum of Antiquities of Scotland and its successor the National Museum of Scotland (now National Museums Scotland) accession register. The register shows that, from the date of the first CSB accession in 1860, no attempt at geological identification and classification of CSBs was made until the early 1870s, when a few new accessions were characterized using basic rock types. Occasional characterization continued until c. 1917 after which the majority were simply described by location and the number of knobs, with little attempt at geological identification. This seemingly haphazard approach may be indicative of changes in curatorial staff. By c. 1939 this changed again; all new accessions were now described more thoroughly using the physical attributes of colour, grain size and in a few cases their rock class (ie: igneous, metamorphic, or sedimentary), it is probable that the previous dearth of geological characterization was due to insufficient specialist

Table 4.2: National Museums Scotland Accession Register: Recorded CSB Materials. Transcribed by C. Stewart-Moffitt 2020.

Material	***Number of CSBs***
Sandstone	**28**
Greenstone	**26**
Granite	**19**
Claystone	**3**
Quartzite	**3**
Whinstone	**3**
Feldspathic	**2**
Conglomerate	**2**
Basalt	**2**
Diorite	**2**
Hornblend	**2**
Serpentine	**1**
Greywacke	**1**
Limestone	**1**
Unknown	**61**

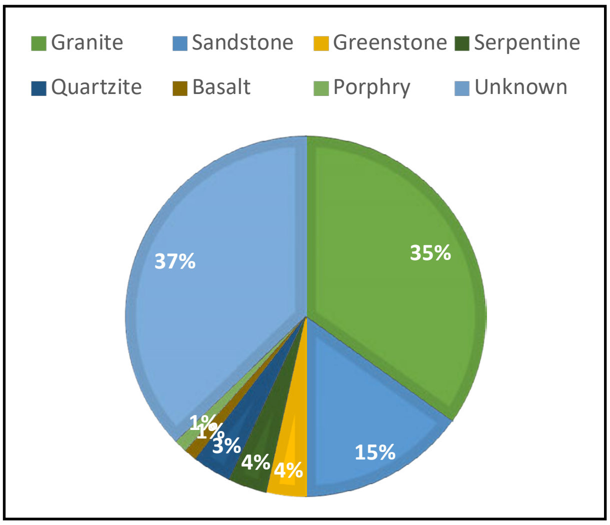


Chart 4.1: Percentage of Materials recorded in original Aberdeen University Museum Collection. C. Stewart-Moffitt 2020.

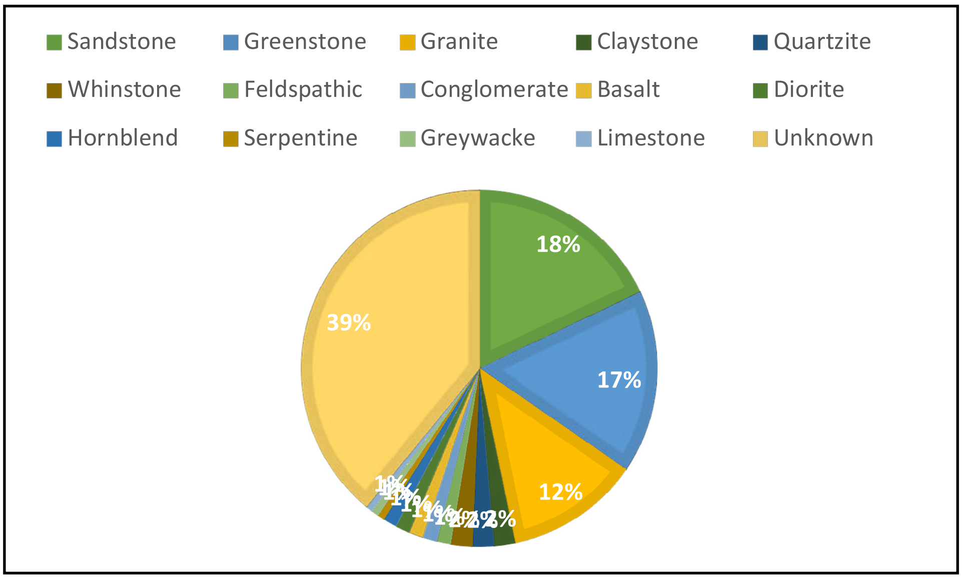


Chart 4.2: Percentage of recorded materials in original National Museums Scotland Accession Register. C. Stewart-Moffitt 2020.

knowledge, exacerbated by the constantly expanding complexity of the science of geology.

Unfortunately, even today there is still a general lack of geological characterization in almost all CSB collections; while some collections have been successful in acquiring accurate characterizations, others have barely managed to slot them into the main geological classes of igneous, metamorphic, or sedimentary, because of which many CSBs still await characterization. A combination of small and widespread CSB collections throughout Scotland and England and a lack of funding unfortunately means that the experts needed by museums are either rarely available or too costly and so the nature of the raw materials and their potential origins still elude us.

A fresh look at CSB geology/petrology

An integral aim of this research was to visually characterize the materiality of as many CSBs as possible in an attempt to locate the origin of the material used. In addition, it was hoped that a comparison could be made between CSB materiality and that of the area surrounding their find spot to discern the likelihood of them having travelled from elsewhere. Although it is generally accepted that CSBs are a phenomenon of northeast Scotland, in particular Aberdeenshire where the greatest concentration occurs, they have also been found along the east coast from Orkney to Hull and on the west coast from the Western Isles to Cumbria. The first step therefore was to undertake an up-to-date review of their materiality using CSBs in the two largest collections at Aberdeen University Museum and National Museums Scotland. An initial assessment of both collections was undertaken to evaluate the potential for the use of portable XRay Fluorescence equipment (pXRF), which it was considered might also have been useful in identifying similar raw material locations in the field. However, feasibility studies carried out elsewhere have shown that, despite pXRF having been used to successfully identify obsidian artefacts, along with some other types of stone (Ogburn et al. 2013: 1823) in Malta, Calabria, Croatia, Corsica, and Sardinia (Tykot 2016: 44-46) the equipment required constant re-calibration on multiple diverse samples (Ogburn et al. 2013: 1824-1834). Also, as the majority of CSBs have never been cleaned since their discovery and still retain vestiges of soil, organic compounds from burial in bogs and years of dirt and grime from handling in the past, the indications were that pXRF was unlikely to be useful. As the X-rays used in pXRF only penetrate to a very shallow depth the result of tests on a contaminated surface would almost certainly produce a false reading and probably only indicate the surface coating. As XRF and pXRF are developed further, or alternative non-destructive methods come on-stream in the future, such material characterization may become easier; even so fresh or unsoiled surfaces would still be required for testing and the cost involved in cleaning, along with a reluctance on the part of museum curators to allow such cleaning, may preclude this.

Even using pRXF it would be impossible to be certain of the materiality of a CSB without thin sectioning to determine its specific mineral composition. Thin sectioning is a process which involves cutting a thin (0.03mm) slice from the artefact for examination under a polarizing microscope; whilst this would undoubtedly tell us the mineralogy and type of stone used, it would devastate the integrity and aesthetics of the artefact. This form of depredation is today generally ethically unacceptable in the modern curation of artefacts, even when micro-coring/thin sectioning is utilized. Additionally, trying to find the source of material in the field would involve testing multiple samples of raw materials from across Scotland, and even then, it might still be impossible to find the same source. Having therefore discounted pXRF and petrology as viable methods of characterizing CSBs, the only other viable method of identification available was that of visual geological characterization.

Aberdeen University Collection

Work began on the Aberdeen University Museum collection in July 2018. Out of a total of 86 CSBs in the collection, 14 were unavailable on the two days we were at the museum as they were either on loan or in temporary exhibitions. The nature of the geology and mineralogy of the other 72 CSBs available was reviewed and recorded and can be seen in Table 4.3.

Methodology

Each CSB was viewed under a Muller 20x/40x Stereo Microscope using 20x for general magnification and 40x in a few instances where closer inspection was required; a multiple magnification hand lens was also used where necessary. Dual LED daylight lamps were used for illumination. With permission from the curator a small drop of water was used in some instances on chipped or broken surfaces to provide additional clarity.

Constraints

Many of the CSBs examined were found to have soiled and contaminated surfaces. This may have been caused by a combination of human contact during the Neolithic, c. 5000 years of burial in the ground and dust and grease from their subsequent handling and storage since re-discovery. Some still had an original coating of soil or subsoil adhering to their surface which made characterization either difficult or impossible and could not be resolved without conservation support. Others had a patinated surface or had been subject to chemical, water, or

Table 4.3: Main CSB rock types identified in Aberdeen University Museum 2018. C. Stewart-Moffitt

Revised Rock Types	***New***	***Accession Register***
Hornfels	**20**	**0**
Granite/Microgranite	**15**	**30**
Sandstone	**8**	**13**
Diorite	**6**	**0**
Gabbro/Microgabbro	**4**	**0**
Hornblende/Amphibolite	**4**	**0**
Quartzite	**3**	**3**

acidic weathering, making characterization difficult. A few were coated with a black 'sooty' encrustation which again made characterization either difficult or impossible; this encrustation was considered to probably be a manganese deposit from burial in a watery or boggy environment (Faithfull 2018: pers. comm.). In some instances, it was possible to take advantage of small 'recently chipped' and/or broken surfaces, allowing access to the original material and enabling clearer identification.

Aberdeen University Museum Results

The main rock types found in the Aberdeen collection are shown in Table 4.3 and Chart 4.3, along with the original characterization from the accession register. It clearly shows that the number of Granite CSBs in the collection are far fewer than originally thought, while none had previously been characterized as Hornfels.

National Museums Scotland Collection

The National Museums Scotland collection in Edinburgh was visited in late August 2018. Of a total of 193 CSBs in the collection, 58 were either casts or unavailable on the two days we were at the museum as they were on loan or on permanent display. The nature of the geology and mineralogy of the remaining 135 CSBs available was reviewed and recorded and can be seen in Table 4.4 and Chart 4.4.

Methodology

Each CSB was examined using the same methods as those in the Aberdeen University Museum collection, except for the ability to use a small amount of water to provide additional clarity, as conservators were unavailable to grant or deny permission.

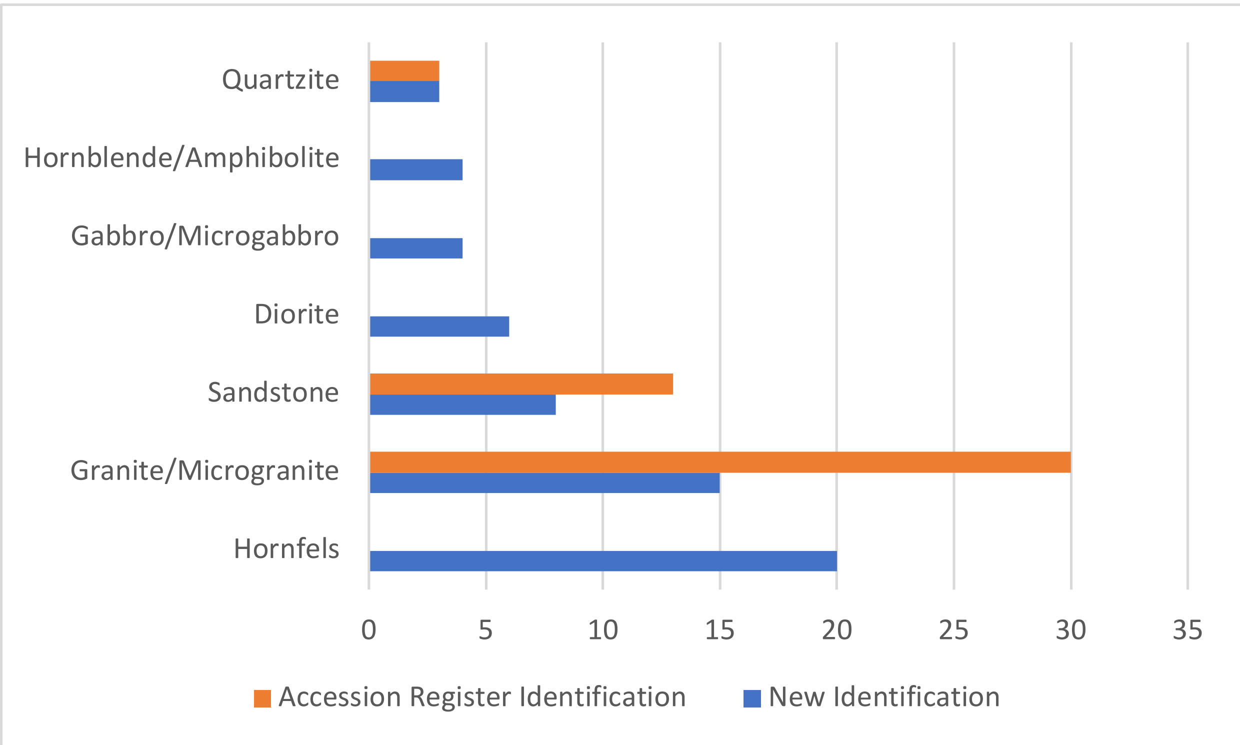


Chart 4.3: CSB Raw Material (revised visual characterisation) Aberdeen University Museum Dr J. Faithfull/C. Stewart-Moffitt 2018.

Table 4.4: Main CSB rock types identified in National Museums Scotland 2018. C. Stewart-Moffitt 2018.

Revised Rock Types	New	Accession Register
Granite/Microgranite	28	19
Sandstone	26	28
Hornfels	20	0
Hornblende/Amphibolite	13	2
Gabbro/Microgabbro	11	0
Diorite	10	2
Quartzite	5	3

Constraints

Once again, many CSBs were found to have soiled and contaminated surfaces for the same reasons as those in the Aberdeen University Museum collection. Again, in some instances it was possible to take advantage of small 'recently chipped' and/or broken surfaces, allowing access to the original material and enabling clearer identification.

National Museums Scotland Results

The main rock types found in the National Museums Scotland collection are shown in Table 4.4 and Chart 4.4, along with the original characterization from the accession register. It clearly indicates a greater diversity, more especially showing that a considerable number of CSBs were made from Hornfels, Hornblende/Amphibolite and Gabbro/Microgabbro.

Discussion

The results of the above research are detailed in Table 4.5 which includes the following:

1. 161 CSBs with both an approximate findspot and an up-to-date visual geological characterization; any without findspots or where the original characterizations were made by an antiquarian or unqualified source have not been included.
2. Each CSB has a revised typological classification (Column.1), database number (Column.2) and approximate find spot (Column.3) and includes the underlying geology (Column.4) along with dykes and intrusions (Column.5) of the surrounding area using the British Geological Survey online viewer. (http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

In addition: Column three, headed 'Approximate Findspot' is colour coded according to Map 4.5 and divided arbitrarily into northern (blue), southern (yellow), western (green) and eastern (white) indicating the area in which each CSB was found. As can be seen from Table 4.5 many CSBs were not made of locally available stone. In making comparisons between CSB materiality and local geology it seems clear that the majority of CSBs were probably made in northeast Scotland from local materials, travelling to their final destination via both overland and coastal routes. A relatively small number of CSBs outwith the northeast show local stone usage, however several

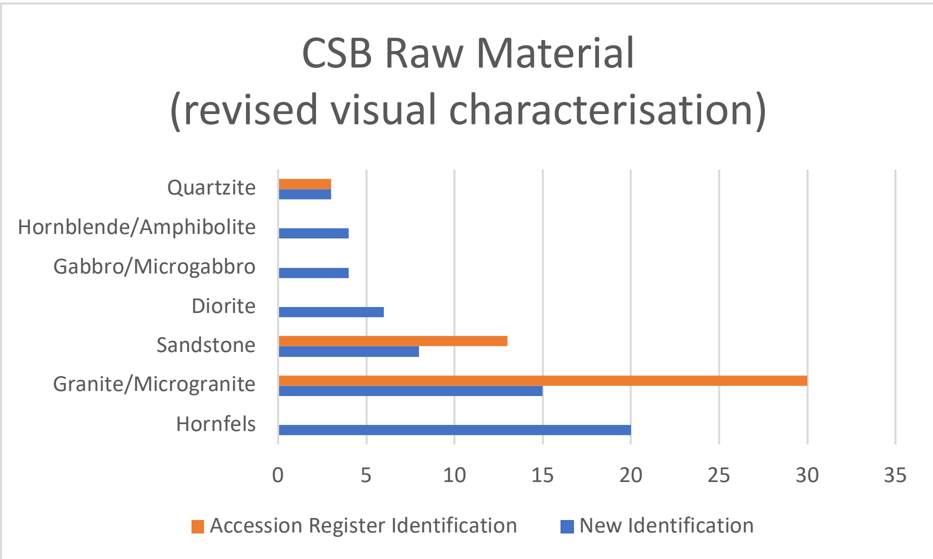
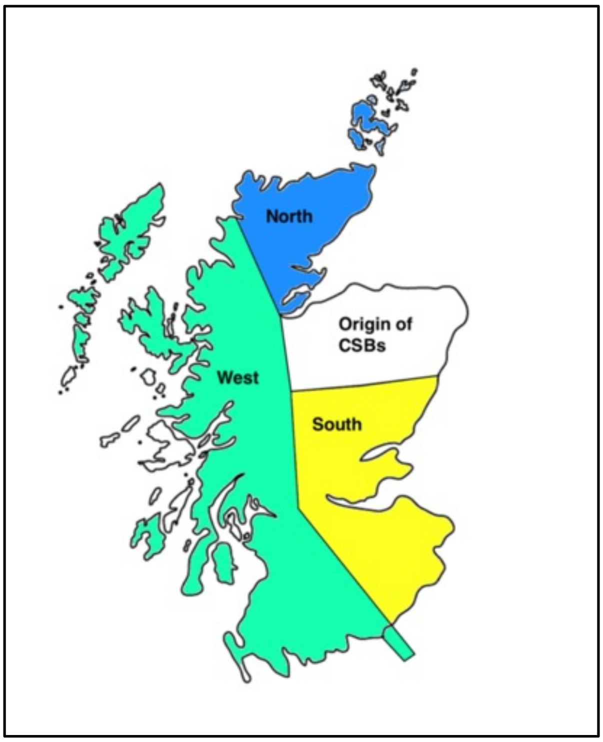


Chart 4.4: CSB Raw Material (revised visual characterisation) National Museums Scotland. Dr J. Faithfull/C. Stewart-Moffitt 2018.



Map 4.5: Area colour codes for Tables.

found on the west coast and outer islands were unquestionably made from materials found only in those areas and which are not available in the northeast of the country. While in theory some locations show that similar types of stone do exist, most are at depth and would therefore not be readily available for use. A number of these distinctive materials stand out by virtue of their distinctive chemical make-up, colour, texture, or inclusions and will be discussed later in this chapter.

Regional breakdown (South)

If we look at the geology of the Midland Valley to the south of Aberdeenshire and the Cairngorms, locations highlighted yellow in Tables 4.5 and 4.6, we can see it is mainly sedimentary in origin (Trewin and Rollin 2002: 9-10). The few igneous intrusions that exist here are felsitic, and overall, many rocks are comprised of Siltstones, Mudstones, Sandstones, Conglomerates, and rocks of volcanic origin. Granite, Hornfels and other igneous and metamorphic CSBs therefore stand out as being non-local and suggest they are more likely to be associated with the Aberdeenshire area. Quartzite CSBs seem to be, at least visually, attributable to the Cullen Quartzite formation on the southern shore of the Moray Firth between Cullen and Portknockie. While approximately 60% of CSBs found in this area appear to be made from material originating in Aberdeenshire, the remaining 40% could have been made from either Aberdeenshire or local material.

Regional breakdown (West)

In the west, locations highlighted green in Tables 4.5 and 4.7, a similar pattern emerges; while stone such as Hornfels and Peridotite may have originated in Aberdeenshire, we can see that some of the local materials used to manufacture CSBs in the Western Isles have a Lewisian provenance (Faithfull 2018: pers. comm.). Another particularly interesting local raw material is Oolitic Ironstone; this distinctive material is peculiar to the west of Scotland and occurs on both the Isle of Rassay and its near neighbour the Isle of Skye. Meladiorite-Appinite is local to the area around Taynuilt, in Argyll and was used to manufacture another west coast CSB, while three others appear to have been made from material that originated in the Greenstone Beds of the east-west Highlands. Whereas 41% of CSBs in this area appear to have been made in Aberdeenshire 59% appear to have been made from local sources.

Regional breakdown (North)

In the northeast of Scotland, locations highlighted blue in Tables 4.5 and 4.8, materials such as Hornfels, Quartzite and Andalusite Schist almost certainly originated in Aberdeenshire and along the southern coast of the Moray Firth. The CSB found on Tom-na-Hurich near Inverness was manufactured from Actinolite, a material not available in the east of the country and would have almost certainly had its origin in the west, probably near the Isle of Skye (Faithfull 2018: pers. comm.). It is possible that 53% of CSBs north of Inverness may have been made from locally available raw materials, however many of these materials were also found in Aberdeenshire.

The visual characterization of over 33% of CSBs, 155 years after the first collections began, is an important initial step in understanding more about these remarkable artefacts. Whether the remaining 67% will be visually or materially characterized in the future remains to be seen; although with ever reducing museum budgets and the allocation of funds to more important projects, it seems unlikely that it will be in the very near future.

The use of unusual, distinctive, and non-local materials

Peridotite

A previous attempt to geologically characterize the materiality of a CSB along with the origin of the material was made by a cultural studies student, undertaking a masters degree at Aberdeen University. As part of her course, she wrote a paper on CSB 234 from Kinlochewe (Forrest 2007: 1-15). This CSB was found in a cist at Bruchaig in 1898 and was in the hands of various local people until 1986 when it was thoughtlessly discarded

Table 4.5: Comparison of local geology against CSB geology throughout Scotland. C. Stewart-Moffitt 2020.

Type	CSB	Approximate Findspot	Underlying Geology	Dykes and Intrusions	CSBs with Visually Characterised Geology
1	075	Kettins	Sandstone		Possibly Chert
1	410	Stonehaven	Sandstone & Psammite		Biotite Granite
1	343	Buchromb	Quartzite, Psammite & Semipelite + Graphitic Schist		Garnet Metabasite
2a	436	Lochboisdale	Lewisian Gneiss		Garnet Metabasite
2a	173	Turriff	Micaceous Psammite, Semipelite and Pelite + Conglomerate		Amphibolite
2a	418	Premnay	Psammite & Semipelite	Insch Pluton: Norite & GabbronoriteBennachie Pluton: Microgranite & Leucogranite	Hornfels
2a	112	Glass, Near Huntly	Semipelite, Psammite, Limestone, Quartzite, Metamicrogabbro & Feldspar-phyric		Diorite
2b	408	Bridge of Earn	Sandstone		2-Mica Granite
2b	409	Stoer	Sandstone, Scourian Gneisses & Scourie & Badcall Dykes	Scourie Dykes: Meta-microGabbro & Amphibolite Badcall Dykes: Meta-clinopyroxen-Norites	Gabbro-Norite
2b	431	Benbecula	Lewisian/Scourian Gneiss	Ortho-Amphibolite	Probably Lewisian Hornblendite
2c	233	Armathwaite	Mudstone	Armathwaite Dyke: Basaltic-andesite	Microgranite/Acid Porphrite
2c	117	Logie Buchan	Micaceous Psammite, Semipelite & Pelite	North Britain: Calc-alkaline Dyke Suite	Hornfels
2c	491	New Keig	Semipelite	Bennachie Pluton: Leucogranite & Microgranite	Quartzite

2c	072	River Tay	Not accurately known		Felsite
2c	290	Water of Leith	Sandstone & Felsite		Felsite
2c	382	Gargunnock	Mudstone & Sandstone	Cornstone, Basalt & Microgabbro	Amphibolite
2d	412	Methlick	Micaceous Psammite, Semipelite and Pelite + Muscovite/Biotite Granite in vicinity	Quartz-Microbabbro & Granite Dykes	Sandstone
2d	395	Udny	Psammite & Semipelite	Microgabbro & Basalt Dyke	Sandstone
2d	413	Huntly	Huntly-knock Pluton: Orthopyroxen-Gabbro, Clinopyroxene-Norite, Olivine-gabbro		Meladiorite
2f	392	Ben Tharsuinn	Augen Gneiss, Granite & Gneissose.		Sandstone
2f	214	Roag	(Sky Lava Group) Basalt & Microgabbro		Reina Lava (Skye Lava Group)
2g	351	Olrig	Siltstone, Sandstone & Mudstone		Hornfels
2g	Auc 10	Dyce	Granite		Fine-grained Gabbro or Basalt
2g	307	Dyce	Granite	Aberdeen Pluton: Foliated Granite	Quartzite
2g, 9 (9b)	388	Elgin	Sandstone & Calcrete?		Hornfels
3	312	Newhills	Psammite & Semipelite + Interbedded Sandstone & Conglomerate	Aberdeen Granite Pluton	Biotite Granite
4a	LM CSB 021	Meikle Geddes	Sandstone		Quartzite
4a	394	Braicklay	Micaceous Psammite, Semipelite & Pelite	Quartz-Microgabbro Dyke & Muscovite-biotite Intrusion	2-Mica Granite
4a	119	Elrick	Semipelite, pelite & Psammite	Quartz & Microgabbro Dyke	Amphibolite
4a	141	Nr. Brechin	Sandstone & Mudstone		Metabasite

4a	172	Cushieston	Norite & Gabbronite		Biotite Granite
4a	390	Dunadd Fort	Metabasaltic Rock		'Greenstone' from the green stone beds of the South West Highlands
4a	144	Leslie	Olivine-Gabbro	Insch Pluton: Serpentinite	Dolerite
4a	060	Cruden	Granite	Peterhead Pluton: Granite	Biotite Arkose Sandstone
4a	142	Leochel-Cushnie	Migmatitic Psammite & Migmatitic Semipelite		Hornfels
4a	115	Fyvie	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Diorite
4a	303	Biggar Shield	Basaltic and Andesitic Lava	Rhyolite	2-Mica Granite
4a	442	Oldmeldrum	Psammite & Semipelite	Insch Pluton: Norite & Gabbronite	Sandstone
4a, 9 (9g)	370	Urlar	Psammite & Semipelite	Unnamed Igneous Intrusion: Amphibolite	Amphibolite
4b	LM CSB 020	Urquhart	Sandstone & Pebbly Sedimentary Bedrock		Possibly Syenite or fine-grained Hornblende and Feldspar
4b	183	Inverkeithny	Micaceous Psammite, Semipelite & Pelite		Amphibolite
4b	130	Croy Wood	Sandstone		Microdiorite
4b	380	Brae of Biffie	Semipelite, Pelite & Psammite		Dolerite
4b	349	Oyne	Insch Pluton: Norite & Gabbronorite		Sandstone
4b	405	Bridge of Dalreoch	Sandstone		Hornfels
4b	478	Hill of Barra	Psammite, Semipelite, Troctolite & Serpentinite	Insch Pluton: Serpentinite & Tremolite Schist	Granite
4b	LM CSB 014	Craigdam	Psammite & Semipelite	Muscovite-Biotite Granite	Granite

4c	147	Kemnay	Granite Foliated-muscovite-biotite & Microdiorite	Tillifourie Pluton: Folioated Tonalite & Foliated Granodiorite	Gabbro
4c	433	Kirriemuir	Sandstone		Psammite
4d	047	Belhelvie	Psammite & Semipelite	Belhelvie Basic Intrusion: Gabbro, Norite, Peridotite	Gabbro
4d	479	Linn of Muick	Semipelite, psammite and Pelite with Amphibolite and Hornblende nearby	Balnacraig Metabasite Member: Metalava & Metatuff	Amphibolite Hornblende
4d	339	Tarves	Psammite & Semipelite	NE Grampian Granitic Suite: Foliated-biotite Meta-melagranite	2 Mica Granite
4d	221	Inverurie	Psammite & Semipelite		Granite
4d	327	Mill of Cromdale	Psammite		Amphibolite
4d	368	Alness	Sandstone		Dolerite
4d	328	Stellock	Wacke, Microgabbro	Microgabbro Dyke	Tuff
4e	424	Greenlonachs	Sandstone		Diorite
4e	396	Contullich	Sandstone		Metabasite
4e	288	Biggar	Basalt & Andesite		Amphibolite
4e	299	Lindores	Andesite		Quartzite
4e, 9 (9b, 9g)	476	Keith Hall	Psammite & Semipelite		Fine-grained Siltstone or Serpentine
4e, 9 (9c)	287	Inverawe	Quartz-monzodiorite, Andesite & Basalt	Microdiorite & Appinitic Dioritic Dykes	Meladiorite Appinite
4f	015	Laxdale	Conglomerate		Hornblend Gneiss
4f	003	Moss of Cree	Wacke		Quartzite

4f	127	Kinkell	Psammite & Semipelite	Porphyritic Felsite Dykes	Granite
4f	499	Cabrach	Gritty Psammite, Pelite, Graphitic Pelite & Sandstone	Andesite Dyke	Micro Granite
4f	337	Kirriemuir	Sandstone & Mudstone		Sandstone
4f	393	Methlick	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro and Muscovite-Biotite Granite Dykes	Biotite Granite
4f 9 (9c) + 11	498	Skara Brae	Siltstone, Mudstone & Sandstone	Camptonite & LamprophyreDykes	Dolerite
4g	136	Methlick	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Quartzite
4g	335	Methven Wood	Sandstone		Sandstone
4g	373	Methlick	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Sandstone
4g	469	Watten	Siltstone, Mudstone & Sandstone		Quartzite
4g	471	Kilphedar, Sutherland	Granite & Microgranite		Sandstone
4g	029	Novar	Sandstone		Andalusite Schist
4g	461	Sherrifmuir	Olivine-Basalt, Conglomerate & Sandstone		Sandstone
4g	078	Rannoch Moor	Granodiorite		Oolitic Ironstone
4h	383	Lonmay	Semipelire, Pelite & Psammite		Psammite
4h	151	Kemnay	Foliated Muscovite-Biotite Granite		Biotite Granite
4h	134	Keith	Limestone, Quartzite, Calcareous Psammite & Calcareous Semipelite	Keith Intrusions: Metagranite	Gabbro

4h, 9 (9b)	333	Auchterless	Micaceous Psammite, Semipelite, Pelite & Conglomerate		2-Mica Granite
4j	460	Forres	Sandstone		Yellow Sandstone
4j	319	Banff	Micaceous Psammite, Semipelite and Pelite		Hornfels
4j	425	Rusky Burn	Sandstone		Psammite
4j	074	Frankley Den	Sandstone, Basalt & Andesite		Felsite
4j	234	Bruchaig	Sandstone, Psammite & Orthogneiss		Peridotite
4j	250	Springfield Asylum	Sandstone		Yellow Sandstone
4j	281	Migvie	Migmatic Psammite, Migmatic Semipelite	Morven-Cabrach Intrusion: Norite. Logie-Coldstone Intrusion: Tonalite	Gabbro/Diorite
4j	LM CSB 030	Aboyne	Limestone		Dolerite
4j	210	Golspie Tower Farm	Sandstone, Mudstone, Chert & Limestone		Porphyrite
4j	324	Turriff	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Microgranite
4j	028	Old Deer	Semipelite, Pelite, Psammite, Metamelagranite, Foliated Biotite Granite & Gabbroic rock		Amphibolite
4j, 9 (9d)	248	Pitmilly Law	Anstruther Sedimentary Rock Cycles		Yellow Sandstone
4m, 11	059	Hillhead	Siltstone, Mudstone & Sandstone		Microgabbro
4n	178	Ardtannies	Psammite & Semipelite		Hornfels
4n	121	Hill of Foudland	Hornfelsed Pelite & Hornfelsed Semipelite		Hornfels

4n, 9 (9d)	286	Loch Lochy	Psammite	Microdiorite, Felsite & Lamprophyre Dykes	Hornfels
4n, 9 (9b, 9c, 9g)	168	Gaucyhillock	Psammite & Semipelite		Hornfels
4n, 9 (9c)	376	Keills	Limestone, Metalimestone & Slate	Porphyritic Microgabbro Dykes	Hornfels
4n, 9 (9b)	160	New Deer	Micaceous Psammite, Semipelite, Pelite, Muscovite-Biotite Granite	Maud Pluton: Gabbroic Rock. Quartz-microgabbro Dyke	Hornfels
4n, 9 (9c, 9d)	500	Sherriffmuir	Sandstone & Mudstone		Sandstone
4n, 9 (9d)	166	Fyvie	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Hornfels
4n, 9 (9d)	165	Fyvie	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Hornfels
4n, 9 (9d)	404	Nocharie	Andesite & Volcanic Conglomerate	Quartz-microgabbro Schist Dyke	Hornfels
4n, 9 (9d, 9e)	438	Dalraich	Quartzite & Psammite		Hornfels
4n, 9 (9c, 9e, 9g)	306	Newburgh	Mudstone, Siltstone & Basaltic Andesite		Hornfels
4?	LM CSB 033	Keith	Psammite, Semipelite, & Metalimestone	Keith Metagranite Intrusions:	Diorite
4o	235	Dunaverty Bay	Conglomerate		'Greenstone' (from the green stone beds north of Glasgow)
4o	018	Lenzie	Limestone		'Greenstone' (from the green stone beds north of Glasgow)
4 Misc	224	Lindas, Norway	Outwith Scotland		Sandstone or Meta-Sandstone

4 Misc	245	Dollar	Mudstone, Siltstone, Andesite & Conglomerate	Andesite Dyke	Andesite or Diorite
4 Misc	244	Houghton-le-side	Outwith Scotland		Old Red Sandstone
4 Misc	439	Glenfarquhar	Conglomerate & Sandstone	Metabasaltic & Andesitic Dykes	Amphibolite
4 Misc	483	New Keig	Semipelite	Bennachie Pluton: Leucogranite & Aplitic Microgranite	Serpentinite
4 Misc	Auctioned CSB 11	Portlethen	Micaceous Psammite	Hill of Blairs Pluton: Muscovite-Biotite Granite	Granite
4 Misc, 9 (9c)	489	Hill of Uisneach, Ireland	Outwith Scotland		Sandstone
5	474	Tarbat Church	Sandstone		Amphibolite
5	111	Kintore	Granite	Kenmay Pluton: Granite, Foliated muscovite-biotite	Quartzite
5	419	Clova	Sandstone & Psammite	Insch Pluton: Syenetic Rock & Serpentinite	Hornfels
6	414	Ardkeeling	Sandstone & Clongomerate		Diorite
6	053	Cruden	Granite	Peterhead Pluton: Granite	Quartzite
7	284	Inverkeithny	Micaceous Psammite, Semipelite & Pelite		Metabasite
7	052	Ellon	Psammite & Semipelite	Quartz-microgabbro Dyke	2-Mica Granite
7	338	Turriff	Micaceous Psammite, Semipelite, Pelite & Conglomerate		2-Mica Granite
7	011	Marnoch	Psammite, Pelite & Metagabbroic and Ultramafic Rock	Quartzite	Sandstone
7	149	Kildrummy	Sandstone, Mudstone, Siltstone & Psammite, Semipelite, Pelite		Hornfels
7	282	Urlar	Psammite & Semipelite	Amphibolite	Semipelite

7	391	Balnasume	Semipelite		Quartzite
8a	146	Kildrummy	Sandstone, Psammite & Semipelite		Biotite Granite
8a	135	Lambhill Farm	Micaceous Psammite & Semipelite		Hornfels
8a	116	Monymusk	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Tillyfurie Pluton: Foliated Tonalite & Foliated Granodiorite	Hornfels
8a	487	South Yarrows	Siltstone, Mudstone and Sandstone		Sandstone
8a	038	Blackford House	Micaceous Psammite, Semipelite & Pelite		Biotite Granite
8b	005	Dyce	Foliated Granite	Aberdeen Pluton: Foliated Granite	Granite
8b	108	Cults	Psammite & Semipelite	Aberdeen Pluton: Foliated Granite	2-Mica Granite
8b	189	Dyce	Foliated Granite	Aberdeen Pluton: Foliated Granite	Granite
8c	435	Rhynie	Mudstone	Porphyritic Microdiorite & Quartz-Microgabbro Dykes. Insch Pluton: Norite, Quartz-Biotite & Serpentinite	Psammite
8c	LM CSB 025	Craigearn	Foliated Tonalite & Foliated Granodiorite		Quartzite
8c, (10)	174	Tarland	Granodiorite	Tomnaverie Intrusion: Granodiorite	Biotite Granite
8c, (11)	051	Sanday	Siltstone, Sandstone & Mudstone		Sandstone
8e	197	Monymusk	Foliated Tonalite & Foliated Granodiorite	Tillyfourie Pluton: Foliated Tonalite & Foliated Granodiorite	Hornfels
8e	334	Fyvie	Micaceous Psammite, Semipelite and Pelite with Conglomerate nearby		Hornfels
8e	114	Bog of Foudland	Hornfelsed Pelite & Hornfelsed Semipelite		Hornfels

8e	LM CSB 002	Jeantown (Lochcarron)	Psammite & Mylonites		Probably Limestone
8f	340	Peterhead	Granite	Peterhead Pluton: Granite	Hornfels
8f	272	Herd Hillock	Pebbly & Gravelly Sandstone		Metabasite (Dolerite)
8f	422	Elgin	Pebbly & Gravelly Sandstone		Hornfels
8f	420	Ardoyne	Norite & Gabbronite		Meladiorite
8f	398	Tom-na-hurich	Sandstone		Actinolite
8f	411	Hillock of Echt	Pelite, graphitic	Meta-ultramafitite & Metabasalt Dykes	Amphibolite
8f	300	Garvock Hill	Sandstone & Conglomerate		Amphibolite
8f	037	Kirkton	Wacke		Gabbro or Amphibolite
8f	LM CSB 027	Meikle Wartle	Norite & Gabbronite		Serpentine
9 (9d)	280	Near Fordoun, Kincardineshire	Mudstone & Conglomerate		Hornfels
9 (9b)	186	South Auchmachar	Semipelite, Pelite, Psammite, Calcsilicate, Melagranite & Biotite		Sandstone
9 (9c, 11)	046	Hillhead	Siltstone, Mudstone & Eday Sandstone		Shale
9 (9d)	071	New Scone/Murrayhall	Scone Sandstone		Basalt
9 (9f)	301	Near Fordoun, Kincardineshire	Mudstone & Conglomerate		Mudstone
9 (9f, 11)	045	Hillhead	Siltstone, Mudstone & Eday Sandstone		Shale/Mudstone
9 (9Misc)	283	Craig Bheag, Ballater	Semipelite, Psammite, Pelite & Amphibolite and Hornblende Schist		Hornfels
10	167	Skelmuir, Old Deer	Semipelite, Pelite, Psammite, Metamelagranite, Foliated Biotite Granite & Gabbroic rock		Biotite Granite

Table 4.6: Comparison of local geology against CSB geology (South). C. Stewart-Moffitt 2020.

Type	CSB	Approximate Findspot	Underlying Geology	Dykes and Intrusions	CSBs with Visually Characterised Geology
1	075	Kettins	Sandstone		Possibly Chert
2b	408	Bridge of Earn	Sandstone		2-Mica Granite
2c	072	River Tay	Not accurately known		Felsite
2c	290	Water of Leith	Sandstone & Felsite		Felsite
2c	382	Gargunnock	Mudstone & Sandstone	Cornstone, Basalt & Microgabbro	Amphibolite
4a	141	Nr. Brechin	Sandstone & Mudstone		Metabasite
4a	144	Leslie	Olivine-Gabbro	Insch Pluton: Serpentinite	Dolerite
4a	060	Cruden	Granite	Peterhead Pluton: Granite	Biotite Arkose Sandstone
4a	142	Leochel-Cushnie	Migmatitic Psammite & Migmatitic Semipelite		Hornfels
4a	115	Fyvie	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Diorite
4a	303	Biggar Shield	Basaltic and Andesitic Lava	Rhyolite	2-Mica Granite
4a, 9 (9g)	370	Urlar	Psammite & Semipelite	Unnamed Igneous Intrusion: Amphibolite	Amphibolite
4b	405	Bridge of Dalreoch	Sandstone		Hornfels
4c	433	Kirriemuir	Sandstone		Psammite
4e	288	Biggar	Basalt & Andesite		Amphibolite
4e	299	Lindores	Andesite		Quartzite
4f	337	Kirriemuir	Sandstone & Mudstone		Sandstone
4g	335	Methven Wood	Sandstone		Sandstone

4g	461	Sherrifmuir	Olivine-Basalt, Conglomerate & Sandstone		Sandstone
4j	425	Rusky Burn	Sandstone		Psammite
4j	074	Frankley Den	Sandstone, Basalt & Andesite		Felsite
4j	250	Springfield Asylum	Sandstone		Yellow Sandstone
4j, 9 (9d)	248	Pitmilly Law	Anstruther Sedimentary Rock Cycles		Yellow Sandstone
4n, 9 (9c, 9d)	500	Sherriffmuir	Sandstone & Mudstone		Sandstone
4n, 9 (9d)	404	Nocharie	Andesite & Volcanic Conglomerate	Quartz-Microgabbro Schist Dyke	Hornfels
4n, 9 (9c, 9e, 9g)	306	Newburgh	Mudstone, Siltstone & Basaltic Andesite		Hornfels
4 Misc	245	Dollar	Mudstone, Siltstone, Andesite & Conglomerate	Andesite Dyke	Andesite or Diorite
4 Misc	439	Glenfarquhar	Conglomerate & Sandstone	Metabasaltic & Andesitic Dykes	Amphibolite
7	282	Urlar	Psammite & Semipelite	Amphibolite	Semipelite
7	391	Balnasume	Semipelite		Quartzite
8f	300	Garvock Hill	Sandstone & Conglomerate		Amphibolite
8f	037	Kirkton	Wacke		Gabbro or Amphibolite
9 (9d)	280	Near Fordoun, Kincardineshire	Mudstone & Conglomerate		Hornfels
9 (9d)	071	New Scone/Murrayhall	Scone Sandstone		Basalt
9 (9f)	301	Near Fordoun, Kincardineshire	Mudstone & Conglomerate		Mudstone

Table 4.7: Comparison of local geology against CSB geology (West). C. Stewart-Moffitt 2020.

Type	CSB	Approximate Findspot	Underlying Geology	Dykes and Intrusions	CSBs with Visually Characterised Geology
2a	436	Lochboisdale	Lewisian Gneiss		Garnet Metabasite
2b	409	Stoer	Sandstone, Scourian Gneisses & Scourie & Badcall Dykes	Scourie Dykes: Meta-microGabbro & Amphibolite Badcall Dykes: Meta-clinopyroxen-Norites	Gabbro-Norite
2b	431	Benbecula	Lewisian/Scourian Gneiss	Ortho-Amphibolite	Probably Lewisian Hornblendite
2c	233	Armathwaite	Mudstone	Armathwaite Dyke: Basaltic-andesite	Microgranite/Acid Porphrite
2f	214	Roag	(Sky Lava Group) Basalt & Microgabbro		Reina Lava (Skye Lava Group)
4a	390	Dunadd Fort	Metabasaltic Rock		'Greenstone' from the green stone beds of the South West Highlands
4d	328	Stellock	Wacke, Microgabbro	Microgabbro Dyke	Tuff
4e, 9 (9c)	287	Inverawe	Quartz-monzodiorite, Andesite & Basalt	Microdiorite & Appinitic Dioritic Dykes	Meladiorite Appinite
4f	015	Laxdale	Conglomerate		Hornblend Gneiss
4f	003	Moss of Cree	Wacke		Quartzite
4g	078	Rannoch Moor	Granodiorite		Oolitic Ironstone
4j	234	Bruchaig	Sandstone, Psammite & Orthogneiss		Peridotite
4n, 9 (9d)	286	Loch Lochy	Psammite	Microdiorite, Felsite & Lamprophyre Dykes	Hornfels
4n, 9 (9c)	376	Keills	Limestone, Metalimestone & Slate	Porphyritic Microgabbro Dykes	Hornfels
4o	235	Dunaverty Bay	Conglomerate		'Greenstone' (from the green stone beds north of Glasgow)
4o	018	Lenzie	Limestone		'Greenstone' (from the green stone beds north of Glasgow)
8e	LM CSB 002	Jeantown (Lochcarron)	Psammite & Mylonites		Probably Limestone

Table 4.8: Comparison of local geology against CSB geology (North). C. Stewart-Moffitt 2020.

Type	CSB	Approximate Findspot	Underlying Geology	Dykes and Intrusions	CSBs with Visually Characterised Geology
2f	392	Ben Tharsuinn	Augen Gneiss, Granite & Gneissose.		Sandstone
2g	351	Olrig	Siltstone, Sandstone & Mudstone		Hornfels
4d	368	Alness	Sandstone		Dolerite
4e	424	Greenlonachs	Sandstone		Diorite
4e	396	Contullich	Sandstone		Metabasite
4f 9 (9c) + 11	498	Skara Brae	Siltstone, Mudstone & Sandstone	Camptonite & LamprophyreDykes	Dolerite
4g	469	Watten	Siltstone, Mudstone & Sandstone		Quartzite
4g	471	Kilphedar, Sutherland	Granite & Microgranite		Sandstone
4g	029	Novar	Sandstone		Andalusite Schist
4j	210	Golspie Tower Farm	Sandstone, Mudstone, Chert & Limestone		Porphyrite
4m, 11	059	Hillhead	Siltstone, Mudstone & Sandstone		Microgabbro
5	474	Tarbat Church	Sandstone		Amphibolite
8a	487	South Yarrows	Siltstone, Mudstone and Sandstone		Sandstone
8c, (11)	051	Sanday	Siltstone, Sandstone & Mudstone		Sandstone
8f	398	Tom-na-hurich	Sandstone		Actinolite
9 (9c, 11)	046	Hillhead	Siltstone, Mudstone & Eday Sandstone		Shale
9 (9f, 11)	045	Hillhead	Siltstone, Mudstone & Eday Sandstone		Shale/Mudstone

Table 4.9: Hornfels colouration and findspots. C. Stewart-Moffitt 2020.

CSB Number	CSB Type	Colour	Location
114	8e	Violet Grey	Bog of Foudland, Insch,
116	8a	"	Monymusk
117	2c	"	Tipperty
142	4a	"	Leochel-Cushnie, Aberdeenshire
148	4n	"	Banffshire
149	7	"	Kildrummy
160	4n + 9(9b)	"	New Deer
165	4n + 9 (9d)	"	Fyvie
166	4n + 9 (9d)	"	Fyvie
168	4n + 9 (9b, 9c, 9g)	"	New Machar
178	4n	"	Ardtannies Farm, Inverurie
438	4n + 9 (9d, 9e)	"	Dalraich, Cromdale
135	8a	Buff Grey	Lambhill Farm, Fyvie
280	9 (9d)	"	Fordoun
283	9 (Misc)	"	Ballater
286	4n + 9 (9d)	"	Loch Lochy, Invernesshire
306	4n 9 (9c, 9e, 9g)	"	Newburgh, Fife
376	4n + 9 (9c)	"	Keills, Islay
404	4n + 9 (9d)	"	Nocharie, Fife
418	2a	"	Premnay
419	5	"	Clova
319	4j	Grey	Banff
334	8e	"	Fyvie
340	8f	"	Peterhead
351	2g	"	Olrig, Caithness
405	4b	Undetermined	Wester Cairnie, Perthshire
406	4e	"	Perthshire
422	8f	"	New Mills, Elgin

into the garden during a house clearance. Fortunately, it was later recovered and subsequently placed in the care of Gairloch Museum, where it can be seen today. In her description of CSB 234 the author, whose first degree is in Geology and Geoscience, suggested that it was probably peridotite and indicated several potential sources for the origin of the raw material. The nearest location to its findspot was 10 miles north of Kinlochewe, in 'difficult terrain' in the Fisherfield Forest; another was 20 miles east on Meall na Faochaig in Strathconon, along with other locations between Kildrummy and Portsoy in Aberdeenshire. Outcrops of peridotite on the Hill of Creagdearg and Red Craig in Aberdeenshire were also highlighted by this research, however in 2019 subsequent fieldwork in these locations by this author failed to locate similar material.

Hornfels

The most interesting discovery made during this review of CSB materiality, which had previously gone unnoticed, was the frequent use of Hornfels (Faithfull 2018: pers. comm.). Three subtle colour variations were identified in the material used, ranging from violet grey to buff grey and plain grey, Table 4.9. and Chart 4.5. These colour variations were caused by metamorphic differentiation which had triggered a variance in the size and quantity of the violet Cordierite inclusions within the Hornfels matrix. This study has identified over 42 CSBs made from Hornfels, although only 29 have approximate find spots, however this number highlights its importance in CSB manufacture. The locations of those made from Hornfels can be seen in Map 4.6, along with the source on Hill of Foudland which is marked with a red X. The yellow stars indicate undecorated CSBs while those with a blue spot indicate decorated CSBs. Interestingly, the nearest CSB findspot to this source of raw material is at the foot of the hill at Bog of Foudland; it's intriguing to consider that some Hornfels CSBs may have been made in or around this very location.

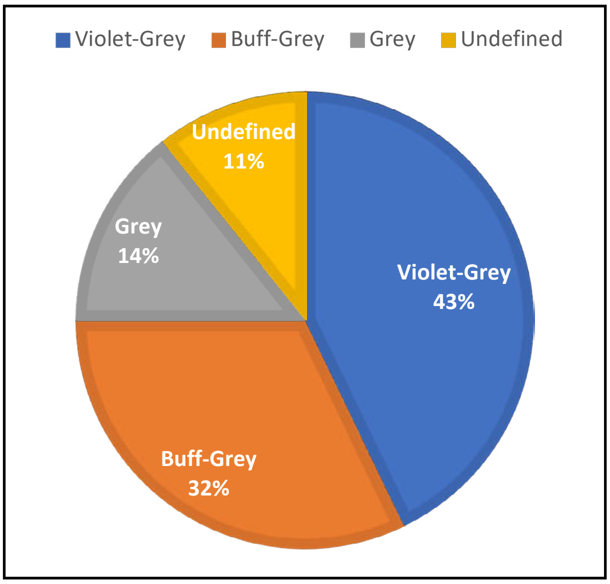


Chart 4.5: Percentage of Hornfels CSBs by colour variation. C. Stewart-Moffitt 2020.

Based on current evidence it seems that violet-grey CSBs may have been for local consumption while buff-grey decorated CSBs, may have been for trade or exchange further afield, Table 4.10. There are exceptions to this however, CSB 160 from New Deer is violet-grey, decorated, and local and CSB 438 from Dalraich is violet-grey, decorated, and distant.

NB: The decoration referred to as Type 9 Decorated CSBs in the table above is defined individually as follows:

Type 9c *Incised Lines but excluding Cross Hatching.*
Type 9d *Vertical, Horizontal and Diagonal Cross Hatching.*
Type 9e *Nested Triangles and/or V's.*
Type 9g *Peck Marks.*

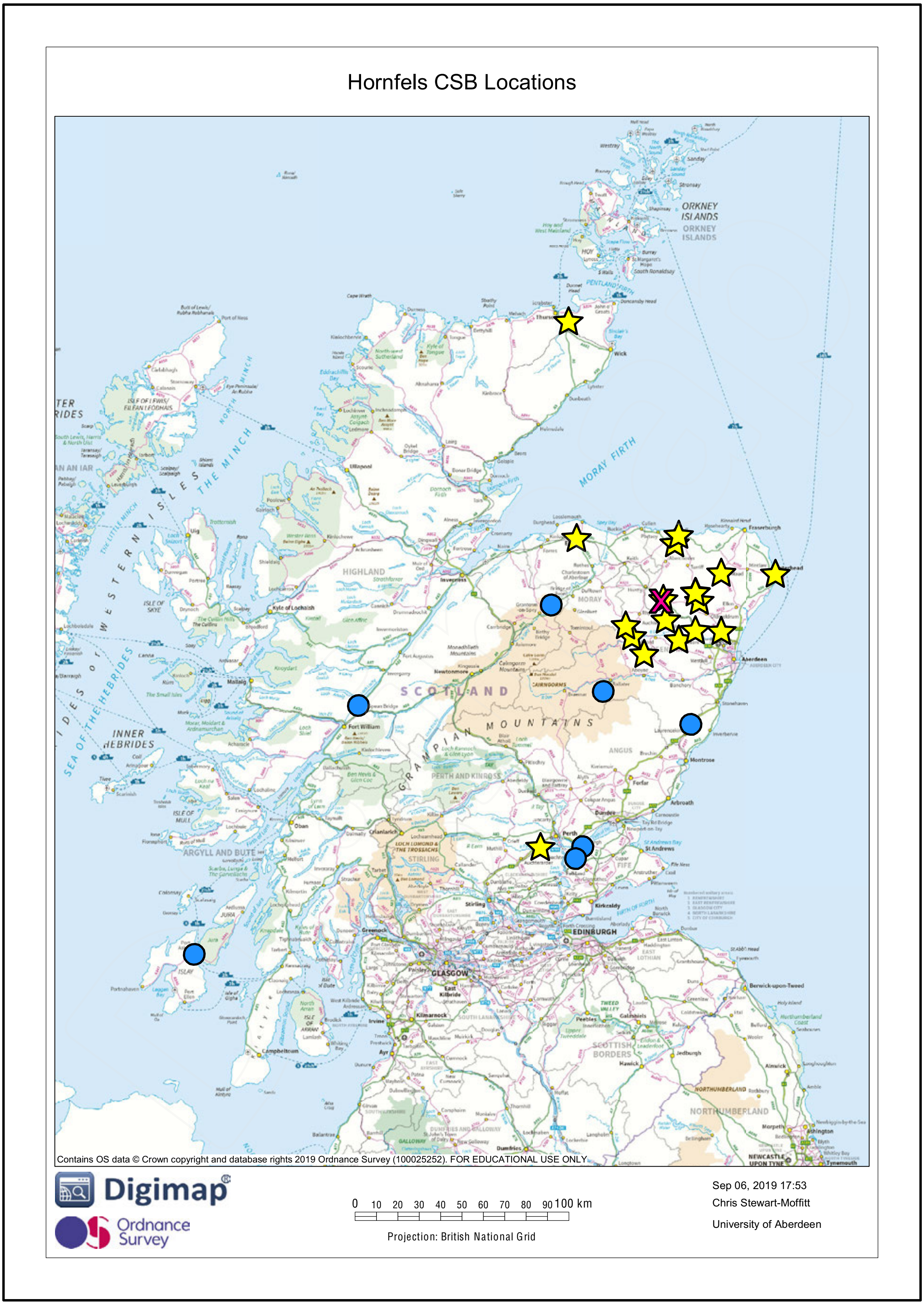
Further information on these can be found in chapter eight: CSB Decoration and Revised Classification/Typology.

Andalusite Schist

CSB 029 from Alness in Ross-shire, Figure 4.3, now in the Neolithic Gallery in the British Museum, is texturally very different from other CSBs; at first glance its rough

Table 4.10: Type 4n for local consumption compared with export? C. Stewart-Moffitt 2020.

CSB Number	Local/Distant	Type	Colour	Location
160	Local	4n + 9 (9b)	Violet Grey	New Deer
165	Local	4n	"	Fyvie
166	Local	4n	"	Fyvie
168	Local	4n	"	New Machar
178	Local	4n	"	Ardtannies Farm, Inverurie
438	Distant	4n + 9 (9d, 9e)	"	Dalraich, Cromdale
286	Distant	4n + 9 (9d)	Buff Grey	Loch Lochy, Invernesshire
306	Distant	4n + 9 (9c, 9e, 9g)	"	Newburgh, Fife
376	Distant	4n + 9 (9c)	"	Keills, Islay
404	Distant	4n + 9 (9d)	"	Nocharie, Fife



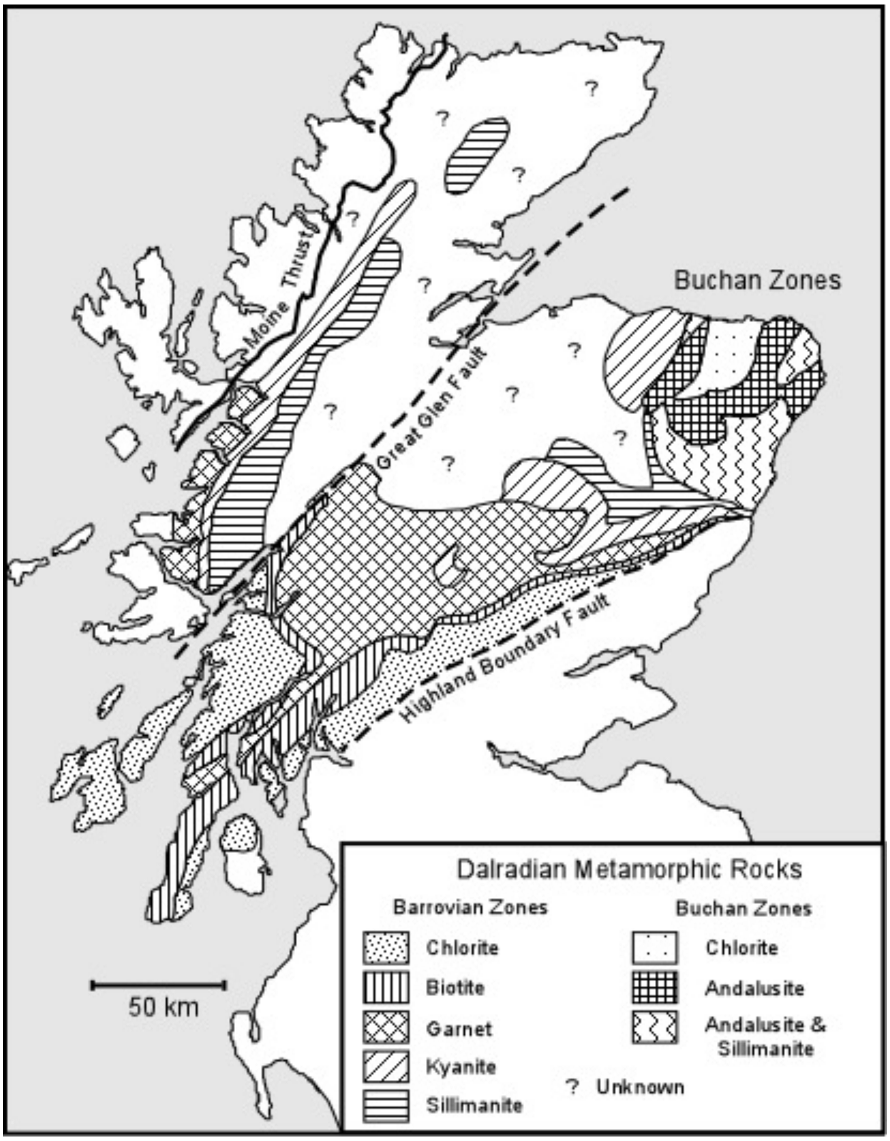
Map 4.6: Hornfels CSBs (All Types) with approximate find spots. Yellow Star: Undecorated. Blue Dot: Decorated. Red X: Probable location of raw material identified as part of this research. C. Stewart-Moffitt 2020.

Figure 4.3: CSB 029, from Alness, Ross & Cromarty © Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

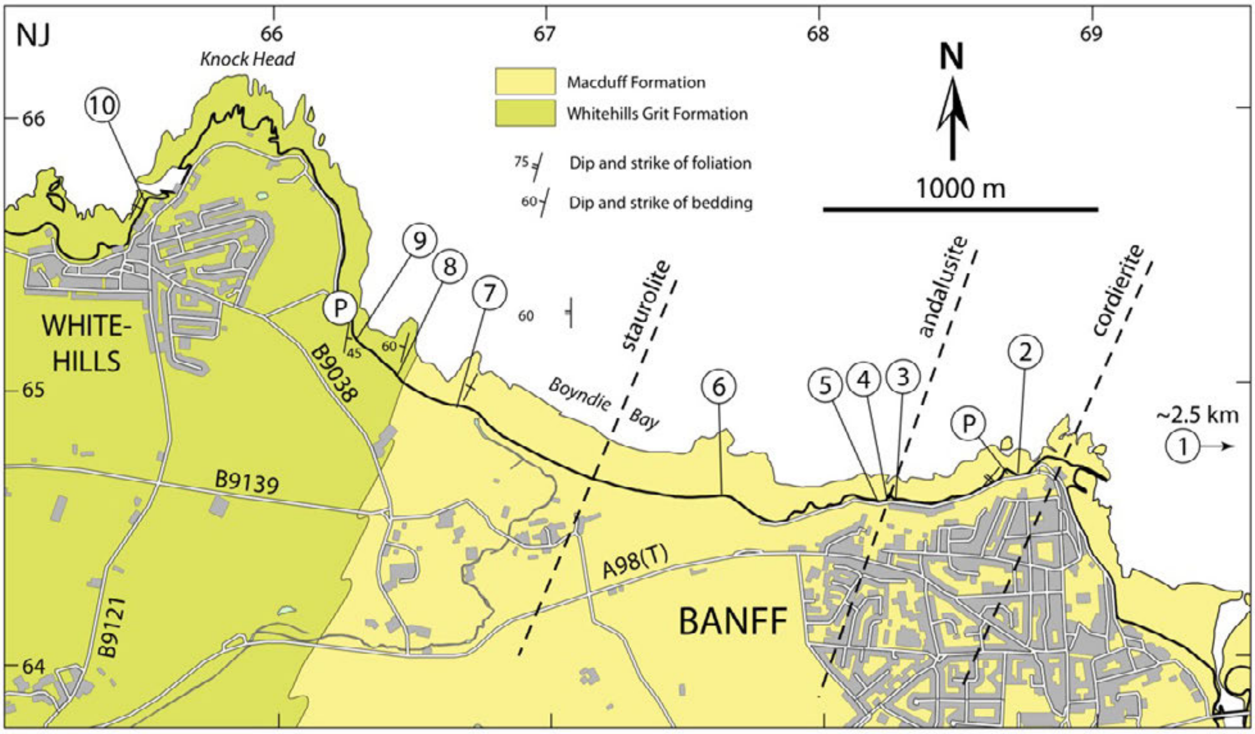
Figure 4.4: Andalusite Schist beach cobble from Boyndie Bay, Banff. C. Stewart-Moffitt 2019.

surface could be dismissed as due to poor finishing or weathering. However, it has been manufactured from andalusite schist, Figure 4.4, which is a product of regional Barrovian metamorphism, Map 4.7, typical of the northeast Dalradian and which outcrops around Boyndie Bay (NJ 679 646) near Banff, Map 4.8, (Faithfull 2018: pers. comm.; Viete et al. 2010: 121).

Similar material from the same metamorphic event can also be found on point bars in the River Don near Milltown of Kildrummy (NJ 4748 1636), and at other locations along a line running through Braemar, Huntly, Banff and southeast of Kirkton of Auchterless in the Ythan Valley (Viete 2010: 121). Apart from that found at Banff, the material in these locations is less massive in form and occurs in thinner lenses, with the more massive form outcropping on the shore at Banff (NJ 6673 6496) (Chinner and Heseltine 1979: 118-122). It seems probable that the stone used for CSB 029 was selected for its unusual



Map 4.7: Buchan Metamorphic Zones. After Nelson. Tulane University 18.04.2012.



Map 4.8: Large scale map of the Andalusite zone near Banff. After Hudson and Johnson 06.12.2013.

texture; its softer matrix being selectively ground down to highlight the harder andalusite crystals individually, making it a particularly distinctive and unusual object.

This stone was also used to make an Axe which was found in Elgin town centre Figure 4.2 and which is now on display in Elgin Museum. In this instance both the matrix and andalusite crystals were ground down across the entire surface, the andalusite crystals showing up as darker patches against the lighter grey matrix. The large chips on its cutting edge suggest this visually distinctive Axe may have been too fragile to be used for practical purposes and may have been used either ritually or as a status symbol.

Acintolite

Although the multi-knobbed CSB from Tom-na-Hurich, in Inverness appears unexceptional to the untrained eye, it has now been visually characterised as being made from pure Acintolite (Faithfull 2018: pers. comm.). Such rock is rare or absent in the northeast and Central Highlands but can be found in the northwest of Scotland in Sutherland, the Outer Hebrides, and the Loch Duich (NG 903 222) and Glenelg (NG 811 191) areas (Faithfull 2018: pers. comm.). Few CSBs have been found on the west coast, let alone those with multiple knobs, making those found within a 50km radius of the source of this material particularly noteworthy; LM CSB 002 from Lochcarron (NG 895 401) and CSB 454 from Satran (NG 404 311) on the Isle of Sky are also multi-knobbed. I would suggest therefore that, as these were found in the same general area as the source of Acintolite used to make CSB 398, it is possible that all three may have been made by the same craftsperson.

Quartzite

Eleven Quartzite CSBs have been identified as a result of this research; an interesting material, it would have undoubtedly been difficult to work as it is extremely hard being seven on the Mohs scale. Although three have been made from a dark brown Quartzite the majority are smooth, homogeneous and have a slightly translucent yellowish grey colouration with occasional rust coloured staining. Another, found in the Moss of Cree (NX 448 595) near Penninghame in Wigtownshire seems to have been made from a bright white, probably Hydrothermal Quartz the origin of which is different from the others in this category (Faithfull 2018: pers. comm.). Their exceptionally smooth surface and colour, coupled with difficulty of manufacture probably made them attractive to both CSB makers and their keepers alike.

Several potential sources of this material were identified with two finally selected as the most likely candidates due to their accessibility to people during the Late Neolithic, these were Windy Hills (NJ 791 394), near Fyvie, in Aberdeenshire (Gordon and Sutherland 1993: 1-5) and the Quartzite cliffs and nearby shoreline near Cullen and Portknockie in Morayshire (Faithfull 2018: pers. comm.). The Windy Hills source of Buchan gravel material proved to be a very white Ortho-Quartzite, an

Figure 4.5: CSB 078, Oolitic Ironstone. Courtesy of Perth Museum and Art Gallery, Perth and Kinross Council. C. Stewart Moffitt 2014.

un-metamorphosed sedimentary version of Quartzite and so was unlike the material that the majority had been made from (Faithfull 2018: pers. comm.). A visit to the cliffs and shores between Sandend Bay (NJ 5563 6632) and Bow Fiddle Rock at (NJ 4944 6885) near Portknockie was more fruitful, with waterworn beach cobbles of a similar yellowish grey Quartzite with occasional rust colouration. These latter locations were easily accessible from both land and sea and provided, not only visually similar material, but also many conveniently sized cobbles which would be ideally suited to CSB manufacture. It has not been possible to locate the origin of the hydrothermal material, sources of which are commonplace.

Oolitic Ironstone

CSB 078, Figure 4.5, currently in Perth Museum, proved to be something of an enigma; purchased from an antique dealer in Reading, it had no safe or verifiable provenance and was said to have been found on Rannoch Moor c. 1981. Although it clearly seemed to be a well made but slightly stylised CSB, the material it was manufactured from had been characterized previously as Oolitic Limestone, a stone not readily found on the surface in Scotland and as such it was initially considered by this author to be a potential forgery.

Following considerable research and field work into the Oolites of Scotland, it has now been shown to be made from Oolitic Ironstone from either the Isle of Skye or the Isle of Raasay on the west coast of Scotland. The area containing these Oolitic Ironstone deposits, which were laid down in a shallow marine environment during the Jurassic (Hillier 2003: 4; Gillen 2003: 134, 190), were originally known as the Broadford Beds (Hallam 1959: 169) and on Raasay, were mined by William Baird of Coatbridge from 1911-1923, producing thousands of tons of ironstone for the war effort during the First World War.

Figure 4.6: Magnified image of CSB 078 showing cavities that were previously filled with Chamosite. Courtesy of Perth Museum and Art Gallery, Perth and Kinross Council. C. Stewart-Moffitt 2019.

At first glance, the apparently vesicular texture of this CSB suggested it might have been volcanic in origin, as its extensively perforated surface has the appearance of porous volcanic rock. However, these now empty cavities, would have originally held small quantities of a greenish mineral called Chamosite, an iron rich variety of chlorite originally found near Chamoson in the Swiss Alps. We can now only speculate why this particular stone was chosen; it may have been its speckled green colour when newly excavated or it could have been its texture which, when weathered, is reminiscent of pumice.

A magnified image, Figure 4.6, of the surface of CSB 078 shows the multitude of empty cavities that would have originally held Chamosite, whereas Figure 4.7, shows fresh material with the Chamosite in-situ and was recently collected by the author on Raasay. If we accept the account that this CSB was indeed found on Rannoch Moor, it is probable that the Chamosite was leached out due to its immersion in humic acid, a soluble form of fulvic acid commonly found in boggy environments (Theng 1979: 286, 316; Hillier 2003: 3). Leaching of soluble materials from CSBs during burial has been

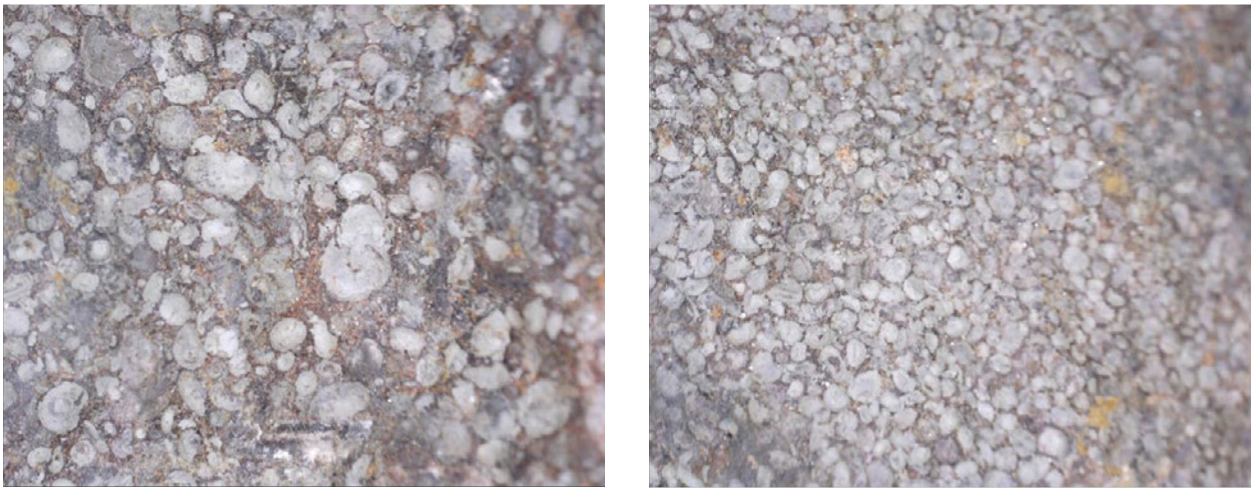
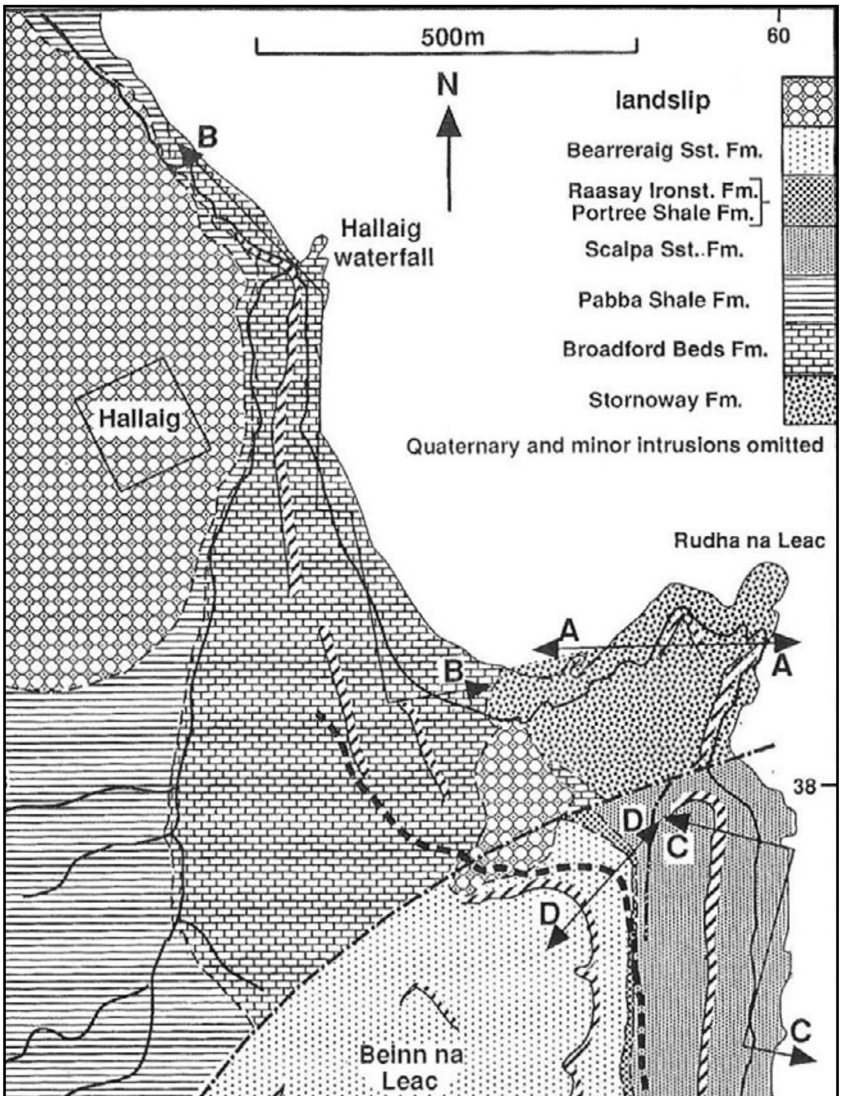


Figure 4.7: Magnified images of samples of Raasay Oolitic Ironstone collected by the author. In this photograph the Chamosite oolites can clearly be seen filling the cavities in the bedrock. C. Stewart-Moffitt 2019.



Map 4.9: Broadford Beds and landslip at Hallaig-Rudha na Leac. After Morton and Hudson. 1995: 222.

noted in at least one other example (Faithfull 2018: pers. comm.). Alternatively, it could have been the textured surface that attracted the craftsperson who made it.

Oolitic ironstone can be found in several locations around Skye; a bed approximately 1mtr thick is visible on the raised beach platform beneath Drinan (between NG 5486 1488 and NG 5467 1466) and on the Ardnish peninsula (NG 6814 2422) at Broadford (Hesselbo and Coe Undated: 9-10). The largest deposits are on the Isle of Raasay in the vicinity of the old opencast workings of Mine 1 (NG 5718 3689); near Inverarish where it outcrops up to 2mtrs thick and at a landslip exposure on Beinn na' Leac near Hallig-Rudha na' Leac, Map 4.9, (Morton and Hudson 1995: 222, 231, 236; Hunter and Ryan 2000). The proximity to the sea of the raised beach platforms at Drinan and Ardnish, along with that of the landslip near the shore on Raasay would no doubt have provided better access than the alternative inland locations.

How CSB 078 came to be found on Rannoch Moor is of course unknown and we can only speculate on the route it took to its journeys end, although what does seem certain is that the material originated from one of the chamositic ironstone outcrops on either Skye or Raasay. Cornstone (limestone) is also available on Raasay at Hallig-Rudha na' Leac and may have been the source of the material used to make LM CSB 002 found at Jeanstown, (now Lochcarron) some 30km to the east. How craftspeople found these unusual stone resources in the areas around Skye, Raasay, Glenelg and Loch Duich, is interesting and suggests they may have been actively looking for unusual materials.

Corrennie Granite

CSB 022, Figure 4.8, has been made from an exceptionally colourful example of pink-red Granite with large translucent Quartz inclusions. This almost certainly originated from the Granite pluton at Tillyfourie (NJ 6442 1241) in Aberdeenshire, where it is today quarried by Breedon Aggregates for roadstone, Figure 4.9. Currently in the British Museum collection, its findspot was simply given as 'Aberdeenshire' when it was donated to the museum at the turn of the century and was originally in the antiquarian collection of archaeologist Canon William Greenwell (1820-1918). This material was first located on a point bar in the River Don near Kenmay (NJ 7222 1560) in 2015, when investigating point bars in rivers as a source of raw materials. Although the location of the raw material does not help us to determine its find spot, it does confirm that this CSB was made from an Aberdeenshire source of stone. It also emphasizes the interest Neolithic people had in colour.

West Coast CSBs: Locally made or imported from northeast Scotland?

A few CSBs have been found on the west coast of Scotland; from CSB 409 at Stoer in the north to CSB 233 at Armathwaite in the south. Several in particular stand out, especially in relation to the materials they have been made from and are discussed below.

Stoer (Gabbro-Norite)

Stoer (NC 0391 2853) is a remote crofting community located approximately 36km north northwest of Ullapool in Assynt. In 1915 local crofter William Munroe discovered CSB 409 in the vicinity of a small stream and it was subsequently acquired by the National Museum. Unfortunately, very little is known about its actual find spot despite extensive attempts by this author and others to trace it. Thanks to the generous support given by members of Historic Assynt, the residents of Stoer and Clachtoll, and the current croft holders, who investigated their historical crofting records, it was finally possible to identify the approximate location of William Munroe's croft, which showed two small streams and a waterfall in the immediate vicinity, both of which ran into nearby Loch an Aigeil (NC 0414 2811).

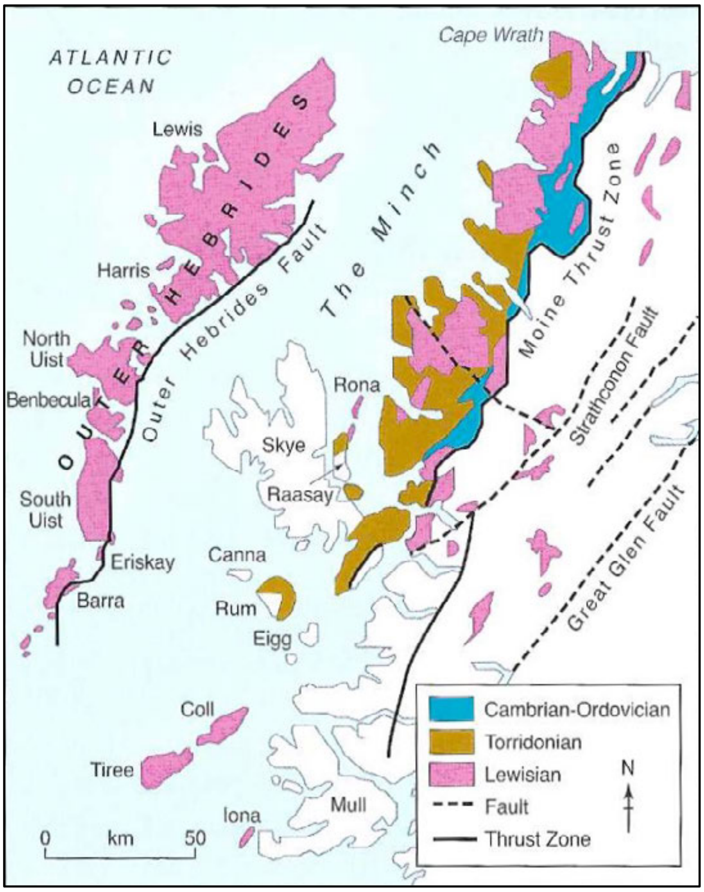
When it was visually examined in August 2018 it was found to be made from '*coarse green clinopyroxene and brownish orthopyroxene + feldspar*' and was characterized as Gabbro-Norite (Faithfull 2018: pers. comm.). Subsequent research of local geological maps showed that the two streams identified on the crofting maps were in close proximity to two separately identifiable geological features known as the Scourie and Badcall dykes (approximate location NC 0425 9280). One of these dykes was comprised of very similar material to that found during the visual examination of CSB 409, confirming that this could potentially be the source of the stone used in its manufacture.

Figure 4.8: CSB 022, from Aberdeenshire © Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2014.

Figure 4.9: Hand Specimen of coarse-grained 'red' Granite with pink feldspar and grey/translucent Quartz from Corrennie Quarry, Aberdeenshire. C. Stewart-Moffitt 2019.

Further research into alternative sources of Gabbro-Norite in and around Aberdeenshire showed that this material also made up the underlying geology of parts of central Aberdeenshire, with a concentrated band north of Inverurie. It covered a wide swathe of land from Huntly in the north, Rhynie in the west, Strathweltie in the south to Belhelvie in the east, in association with the Huntly-knock, Insch, and Belhelvie Granite plutons (Munro et al. 1986: 54-67; Gunn et al. 2015: 44-63). It is also known to outcrop in the form of dykes and intrusions in the areas around Huntly, Old Meldrum, Premnay, Kirkton of Bourtie, Lumphart and Belhelvie. Rocky outcrops such as these would have offered a readily available source of stone through erosion or small-scale quarrying.

So, the question remains; was this CSB made locally at Stoer or in Aberdeenshire? As Stoer is some considerable distance from Aberdeenshire and as there are no other CSBs anywhere near it seems unlikely it was made locally. As there is nothing particularly distinctive about this stone to differentiate it from the Badcall Dyke or those found in Aberdeenshire, on balance it seems more likely to have been made in Aberdeenshire and transported overland to Stoer.



Map 4.10: Lewisian Complex in northwest Scotland and the Western Isles. Gillen. 2003: 40.

Benbecula (Lewisian Hornblendite)

CSB 431 was reportedly found in the 1950s on the southern extremity of Benbecula in the Western Isles and was subsequently donated to National Museums Scotland; unfortunately either the finder was not specific about its actual location, or the museum failed to record it. As part of this study, it has now been visually characterized as probably being made from Lewisian Hornblendite (Faithfull 2018: pers. comm.). This type of material can be found in Lewisian rocks across the northwest of Scotland and the Western Isles, Map 4.10, particularly on the Isle of Lewis, where it can be found as lenses in the gneiss bedrock around Calanais (Hiscock 2010: 20). It also appears in the form of lens shaped masses and 'knots' in the gneiss bedrock near Loch Maaruig in the area around Aline, Morsgail and northeast of Uig, on Lewis (Craig 1931: 9, 15). The availability of Lewisian raw material so close to the find spot of this CSB strongly suggests it was made in the Western Isles.

Inverawe (Micro-Diorite/Appinitic-Diorite)

CSB 287 was reportedly found in the vicinity of Inverawe House, near Taynuilt (NN 0288 3155) in Argyll, in the nineteenth century and was acquired by the then owner, Mrs J.A. Campbell, who donated it to National Museums Scotland in 1880. It was recently visually assessed as being made from a melanocratic medium-coarse igneous rock which was in all probability Meladiorite/Appinite (Faithfull 2018: pers. comm.). The current British Geological Survey maps show a series of north northeast/south southwest trending dykes of the North Britain Siluro-devonian Calc-alkaline Dyke Suite comprised of Microdiorite and Appinitic Dioritic rock, Map 4.11. When this site was visited in May 2019 the dykes were clearly visible above the ground surface and would have been readily accessible during the Late Neolithic.

Although the lands of the Inverawe Estate extend both north and east of their seat at Inverawe House, in 1650 the Marquess of Argyll also gave Campbell of Inverawe control of land to the west, between Ardmucknish and Invermow. It has not been possible to locate Invermow, but Ardmucknish is located between the villages of North Connell and Benderloch where other members of the same family lived (Inverawe.org.uk). This was almost certainly an area which had long been settled by both Neolithic and Bronze Age people, as evidenced by three chambered cairns and seven other cairns within approximately 2km to 3km of

Map 4.11: Geological Dykes of Microdiorite and Appinitic Dioritic rock (lilac lines) near Inverawe House, Taynuilt, Argyll. Courtesy of British Geological Survey 2019.

Campbell donated it to the National Museum. The possibility exists that this CSB was made locally; not only does its morphology suggest it was made by a craftsperson but as Map 4.12 shows, dykes of Mela/Appinite are available to the north and east of this area.

Ardnamucknish. With a lack of Neolithic monuments in the vicinity of Inverawe House and the influence of the Campbell family in the surrounding area, it is possible that the Inverawe CSB may have been found near here and passed on through the family. Unfortunately, its actual location seems to have been finally lost when Mrs

Keills, Islay (Hornfels)

CSB 376 was found at Keills Farm (NR 416 684) near Port Askaig on Islay, Argyll, sometime prior to 1889 and is made from a buff grey Hornfels very similar to that from the Hill of Foudland in Aberdeenshire (Faithfull 2018: pers. comm.). According to the British Geological Survey Research Report RR/12/01, the only Hornfels found near Islay is part of the Blackstones Bank Central Complex of the Atlantean Supersuite located on the seabed by scuba divers (Gillespie et al. 2012). Despite extensive research it appears that no terrestrial Hornfels has been located on Islay, which as suggested earlier in this chapter makes the possibility of it having travelled from Aberdeenshire more likely.

Map 4.12: Geological map of the potential findspot of CSB 287, approximately 10km from Inverawe House in an area heavily occupied during the Neolithic and Bronze Age and in more recent times by the Campbell family. Courtesy of British Geological Survey 2019.

Armathwaite (Felsite)

During this research four CSBs were visually characterized as having been made from felsite, a type of Microgranite found at several locations across Scotland (Faithfull 2018: pers. comm.). Differences in colour and texture and the widespread nature of these locations makes it difficult to identify the raw material sources accurately although, since this review was carried out, a potential source of the material has been suggested for two of these CSBs. Their dark red colouration and texture is due to a high Feldspar content and is similar to that found in the Felsite dome of Black Hill in the Pentland Hills south of Edinburgh (Barron 1998: 20). CSB 290 was found in the bed of the Water of Leith which rises in the nearby hills and flows approximately 3.5km to the northwest of Black Hill and CSB 233 was found at Armathwaite in the Eden Valley, Cumbria. In chapter five we will see it is possible the Armathwaite CSB travelled from the northeast coast to the west via a network of interlinked rivers and routeways. CSBs 190 and 145, are also made from Felsite and have been visually characterized as being made from a type of material that occurs near Peterhead in the northeast of Aberdeenshire (Faithfull 2019: pers. comm.).

Lenzie, Dunaverty Bay and Dunadd Fort (Greenbeds of the Southwest Highlands)

As noted earlier, antiquarians and others have often wrongly characterized some CSBs as being made from 'greenstone'; this quasi-geological term was a catchall label for any green coloured stone that could not otherwise be identified. Despite many artefacts having been wrongly characterized in this way we can now safely use this label for at least three CSBs.

CSB 018 from Lenzie in East Dumbartonshire, and CSB 235 from Dunaverty Bay on the Mull of Kintyre, are visually very similar in colour, texture, and style. CSB 018 was visually characterized in 2011 as probably being from a rock unit known as the 'Green Beds of the Southwest Highlands' (Faithfull 2011: 1). Despite CSB 235 not yet having been visually characterized the striking similarity between their materiality and morphology suggests that, not only have they been made from the same material, but they may also have been made by the same craftsperson. CSB 390 from Dunadd Fort near Lochgilphead in Argyll is made from similar material although it is morphologically different to the other two (Faithfull 2018: pers. comm.). This rock is located between the Mull of Kintyre and Aberfoyle, with exposures at Loch Katrine, Glen Finglas and Tarbert on Loch Fyne (Pickett et al. 2006: 46).

Lack of potential sources of the most common CSB raw materials

It will not have gone unnoticed that, except for Corrennie Granite, no raw material locations have been suggested for either Granite or Sandstone. Initial research into the possibility of identifying any individual sources for Granite or Sandstone CSBs indicated that it was unlikely to be possible in terms of available time or depth of knowledge. The problem in identifying individual Granites is that their mineral composition of Quartz, Feldspar, Plagioclase and Mica often produces similarly coloured material which can vary considerably, even within the same body (Faithfull 2018: pers. comm.). Granite melts can be formed from a mixture of crustal and mantle material, making their identification difficult without geochemical and/or petrographic analysis (Frost et al. 2001: 1). Sandstones present similar problems: like Granite, they are mainly composed of minute fragments of Quartz and Feldspar, with smaller amounts of other minerals. They are often identified by colour variations caused by mineral impurities and can range from red, yellow, and tan to white or grey; while some, such as that found at Hopeman on the southern shore of the Moray Firth, can be identified from the fossils found within it: no fossilisation has been found associated with any CSB. Also, as explained earlier in this chapter, many CSBs are heavily soiled making it difficult, in many cases, to make an accurate colour comparison. Identification of raw material locations of Granite and Sandstone was therefore clearly out of the question from the point of view of time, facilities available and the limited geological knowledge of the author and must therefore be left to future research.

Following the visual characterization of CSBs at Aberdeen University Museum and National Museums Scotland, many previously characterized as 'greenstone' by antiquarians have now been re-assessed and assigned their correct geological designations. Other materials identified by this study, such as Diorite and Dolerite, occur in many parts of Scotland and are not readily attributable to specific locations; likewise, Basalt, Metabasite, Amphibolite and Hornblende are ubiquitous throughout Scotland. Finally, Psammite, another common type of bedrock is found throughout Aberdeenshire, although it cannot readily be attributed to any specific location. However, as Psammite is so common throughout Aberdeenshire, it could be suggested that the majority of CSBs created from this type of material were probably made in this area.

Conclusion

In this chapter I have looked briefly at how the geology and landscape of Scotland was formed some 420 million years ago from the collision of three early continental masses and how both this cataclysmic event and subsequent periods of volcanic activity and glacial erosion were responsible for causing the formation of the stunning and widely different landscape we live in today. Although it has been suggested that CSBs may have been manufactured from glacial debris it was concluded that although it remained a possibility, it was impossible to determine which, if any CSBs, might have been made using such material. Despite the majority of CSBs being brown or black in colour, mainly due to their long-term burial in the ground, we can see from the use of colour and texture in monuments, architecture, and artefacts that Neolithic people appreciated such characteristics and that many CSBs would have had similar attributes.

It was shown that the geological characterization of CSBs in museums was often inaccurate or intermittently recorded for the first eighty years, probably due to a lack of knowledge of the newly emerging science of geology by antiquarians and museum curators. This improved in the late 1930s as education made such knowledge more widely accessible to museum curators and others. While the identification of CSB materiality might tell us a great deal more about their origin, much work remains to be done and the situation is unlikely to improve in the foreseeable future due to a lack of available funds for the necessary expertise.

One of the stated aims of this research was to try and identify the materiality of CSBs in order to learn more about their origin. While it proved impossible to visually characterize every museum collection, the studies undertaken of the two largest collections at Aberdeen University Museum and National Museums Scotland have newly identified the materiality of over 33% of CSBs. Surprisingly, a material not previously recognized in either of the main CSB collections until this research, was a particularly hard stone called Hornfels and following fieldwork a central Aberdeenshire location was suggested for its source. It also unexpectedly detected several previously unknown materials such as Acintolite and Oolitic Ironstone which has shown for the first time that some craftspeople may have been travelling outwith Aberdeenshire to the west coast and the Western Isles to manufacture CSBs from local materials. Finally, the reasons for our inability to accurately compare Granite or Sandstone sources to the materiality of CSBs were explained to be due to their similarity and apparently homogeneous nature.

Chapter Five

Landscape and CSB Distribution

In this chapter Scotland will be arbitrarily broken down into seven smaller regions to allow a more nuanced examination of the similarities and differences of CSB distribution. To better understand their distribution we will look in more detail at how topography, geography, climate, and altitude might have affected agriculture and the potential for subsistence in the areas in which CSBs have been found. Finally, we will consider how CSBs found outwith Aberdeenshire may have been either traded, exchanged, or been made from locally available materials.

What can we gain from studying the Landscape?

The earliest studies of the landscape were undertaken during the Renaissance and were prompted by mounting interest in archaeological remains. At the same time as scholars, antiquarians and surveyors were recording, analysing, and classifying ancient features in the landscape, practitioners of the newly emerging field of topography were producing written descriptions of both the natural landscape and elements of human culture that had been superimposed upon it over the millennia (Johnson 2007: 16). The word 'landscape' did not exist in the English language at that time and is derived from the seventeenth century Old Dutch word 'landskip or landschap', a combination of two separate words, 'land', an extensive view of scenery and 'skip or schap', the Old Dutch word for ship. Even after the word landscape became established in the English language it was, for many years, only used in artistic circles to describe paintings of sea views and the countryside (Darvill 1997: 6). In the late eighteenth century as the Romantic movement evolved, a growing aesthetic appreciation of the natural world, its ancient monuments and the emerging discipline of geology led to a new and fuller appreciation of the setting in which people lived (Johnson 2005: 157). Thereafter, the term landscape was applied to the natural visual world as a whole and included everything that could be seen, experienced and contextualised (Ashmore and Knapp 2003: 1).

In 1953, archaeologist O.G.S. Crawford wrote in '*Archaeology in the Field*' that the use of ordnance survey maps, aerial photography, and documentary evidence, provided by historical and place name evidence, evoked an emotional attachment to landscape and the understanding of individual places (Crawford 1953; Johnson 2005: 35, 158). Shortly after, W.G. Hoskins suggested that the landscape was '*there to be read*' through the observation of its many diverse features. Using the analogy of a palimpsest he suggested, '*it was like an old document that had been written on and erased multiple times*' (Johnson 2007: 37, 57). It has since been suggested that Hoskins' later book '*The Making of an English Landscape*' had inspired future generations of historians and archaeologists, like Maurice Beresford and John Hurst, and indeed myself many years ago, to undertake landscape studies (Johnson 2007: 68).

By the 1960/70s archaeologists were asking a variety of very different questions of landscape, often to analyse large or spatially diverse data sets (Darvill 2002: 1). While some were researching the potential of natural and economic resources that might have been available to past people, others were investigating trading links, individual territories, and the constructed landscape of monuments and settlements. Conceptualised landscapes were being examined to find differences between cultural formation and composition, and if or how particular monument types may have facilitated interactions between diverse cultures or groups of people (Ashmore and Knapp 2003: 2, 11). Ideational landscapes were also being researched in the hope that, the often creative and emotionally constructed concepts and motives behind people's ideas might be revealed, along with an understanding of how such ideas might have been used in the creation or manipulation of individual societies or cultures. The expectation was that some of these ideas and concepts might well manifest themselves in material form through the construction of monuments or the manufacture of artefacts (Ashmore and Knapp 2003: 12-13). However, as Cooney suggested, whichever of the many methods chosen to study landscapes, the reality is that all will have been socially constructed in some way over the millennia (Cooney 1997: 46).

More recently some researchers have suggested that prehistoric people probably considered liminal locations such as caves, mountains, rivers, and springs as places of 'special interest' and may have believed them to be interfaces between one world and another (Bradley 2007: 31). As a result, they might have been considered appropriate locations for burial, deposition and ritual and would have undoubtedly become bestowed with a unique and distinct mental image or identity in people's minds (Ashmore and Knapp 2003: 12; Bradley 2000: 35). In a life of flux and movement they may have taken on an additional importance, providing fixed points within the landscape for navigation and other activities.

Other researchers have taken a greater interest in how past people may have seen the landscape from an experiential point of view by using the concept of phenomenology (Darville 1997: 1). The concept of phenomenology, '*the study and description of a place or event that appears or presents itself to a human subject*', was first proposed by German philosopher Edmund Husserl (1859-1938) in the early twentieth century and further developed by influential philosopher Martin Heidegger (1889-1976) and others (Tilley 2005: 201-202). They proposed that by immersing ourselves in the landscape we might gain deeper and more profound access to past people by seeing their world through the mediums of vision, colour, smell, and experience. Since their original theory was conceived, further work has suggested that we may be able to access other aspects of past people's lives, giving us the ability to see and experience it as they did themselves, rather than adopting the abstract and quantifiable methods traditionally used in archaeological study (Tilley 2005: 202). As Tilley explains *'the bones of the land – the mountains, hills, rock, and valleys, escarpments and ridges – have remained substantially the same since the Mesolithic and can still be observed'* forming the basis for assessing the experiences of past individuals (Tilley 1994: 74; also see Bradley 2000: 33). Although many studies have been conducted through the medium of two-dimensional maps, Tilly suggested that there was no substitute for first-hand experience of the landscape itself, recommending that it was necessary to spend time in the landscape, to begin to understand all it may have offered past people (Tilley 1994: 75).

Thus, the definition of the term landscape has shifted its meaning and the study of landscape continues to evolve in new ways. In this study, the term landscape is used as a simple descriptive tool to describe in more pragmatic ways how soils, climate and altitude may have influenced the choice of where Neolithic people chose to settle and why CSBs were found in some of these locations. While not developing an overtly phenomenological approach, it will consider the potential involvement of rivers, overland routes, and the sea in facilitating the movement of CSBs across the landscape to understand how people may have spread these, both around and outwith, the core region of Aberdeenshire. It will also look at the distribution of CSBs to assess how monuments and artefacts might or might not have been associated with them. I will come back to the subject of phenomenology in chapter eight to understand how and why CSBs appeared in Late Neolithic Aberdeenshire and how they may have been used by Neolithic people as '*the material manifestation of the relationships between humans and the environment*', as suggested by Carole Crumley (Ashmore and Knapp 2003: 6).

CSB Overall Distribution

The Master Database records 495 CSBs which includes 45 cast/replicas, 6 potential forgeries, 38 now lost/missing and 14 sold at auction over the years. Only 295 of these have approximate findspots; information relating to the remainder either went unrecorded or was subsequently lost when they changed hands; almost none of these have any contextual information. As noted earlier, only a small number can be attributed to a field, farm or village with the majority being loosely attributed to parish, town, or county. Despite the uncertainty surrounding CSB findspots, the 59.48% that can be reasonably accurately located, still give us a valuable picture of not only their general distribution, Map 5.1, but also potentially the location of Late Neolithic populations. It seems to confirm their origin and main area of circulation to have been in central Aberdeenshire and, by analysing their materiality, can provide us with clues regarding how far some may have travelled to their final resting place; particularly those outwith the central core.

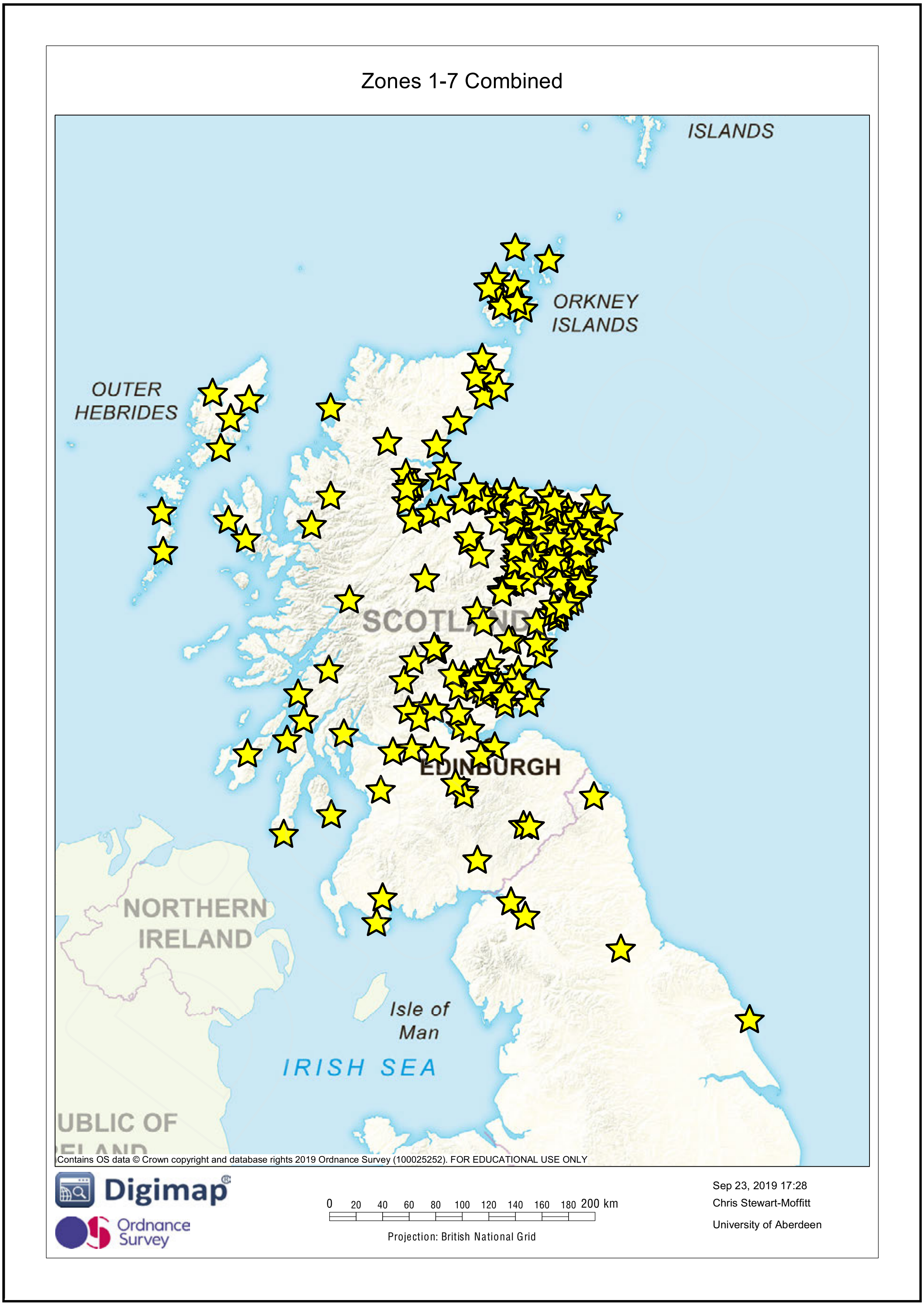
The consolidated distribution of CSBs seen in Map 5.1 has been broken down into seven regions for ease of study and map representation; each of these will be discussed briefly below, followed by a more detailed discussion later in this chapter.

Region 1. The northeast of Scotland, in particular Aberdeenshire, between the Moray Firth and the River Dee, where the majority of CSBs have been found.

Region 2. This is the area immediately to the south of region one and includes the body of land between the River Dee and River Forth; it is replete with finds and has the second highest number of CSBs found. As we will see below, CSBs findspots are often located in and around areas of deep brown-earth soils which were, like some parts of Aberdeenshire, exceptionally fertile and climatically stable.

Region 3. The area between the River Forth and the Humber Estuary has produced few CSB finds. This may be due to either a lower population density, a less fertile and hilly terrain or even the greater distance from their 'main source' in Aberdeenshire. As some CSBs have been found relatively near the coast or in river valleys, their distribution may be related to inshore coastal trade or routes through the landscape.

Region 4. This area extends from the Eden Valley in Cumbria north to Loch Lochy in Inverness-shire. Again, few CSBs have been found in this area, which



Map 5.1: Overall Distribution of CSB findspots. C Stewart-Moffitt 2020.

as we will see below, may be due to a combination of lower population density, marginal agricultural potential, and less favourable climatic conditions. There are indications that some CSBs here may have come from Aberdeenshire, although some may also have been manufactured from local materials. From their predominantly coastal and riverine locations it seems probable that the keepers of these CSBs or the craftspeople making them were using inshore coastal routes to spread these artefacts.

Region 5. Although thinly spread throughout the Western Isles and northwest coast the majority from this region have been found in locations with relatively favourable climates, all of which have easy access to the sea.

Region 6. Apart from those along the northern shore of the Cromarty Firth, almost all CSBs in the area between the Moray Firth and the River Thurso are thinly spread along the coast and were in all probability traded/carried via inshore coastal voyages. As with the other regions they seem to have mostly been found in climatically favourable locations.

Region 7. The majority of CSBs in Orkney have been found on Mainland and were associated with both domestic and monumental architecture; most also appear to have been locally manufactured.

Underlying Geology, Soils and Climate

The landscape of Scotland is extremely diverse with an often rocky and mountainous terrain and vast areas of rocky and acidic soils unsuitable for farming. This limits the use of some areas for settlement, and it is clear from artefactual and monumental remains that some areas of Scotland were favoured more than others. Soil is basically composed of a combination of its underlying geology and the quantity of humus and nutrients left from decomposed vegetation; the quantity and quality of the latter also being influenced by climate, latitude, and altitude. Palynological records suggest that the dominant vegetation throughout much of Scotland during the Early Neolithic would have been woodland (Tipping 1994: 11; Edwards 2004: 57-58; Noble 2017: 29). This would have varied considerably, again depending upon altitude, latitude and climate and would have ranged from a light covering of Birch on northern hills to denser Oak forests further south. When combined with minerals provided by the underlying geology it would have led to the formation of many very different ecosystems, each with a varying potential for subsistence. As well as the above factors, soil depth, hill slope and drainage would have also been important in deciding the suitability of land for growing crops and keeping animals.

We can identify the basic capabilities of soils through the '*Macaulay Soil Classification System*', created by the Macaulay Land Research Institute (now the James Hutton Institute). This is an ongoing classification of soil types throughout Scotland and categorizes land according to its suitability for farming. While it is in essence a study of today's soils, many of which were improved through drainage and manuring between 1770 and the 1850s by enlightened landowners (Tarlow 2007: 78), the fundamental components of the soil would have existed during the Neolithic and would have created a variety of affordances for life. The salient points of the Macaulay System are outlined below.

Class 1 to Class 3.1: Land capable of supporting Arable Agriculture.

- Brown Forest Soils/Brown Earths.
- Deep and well drained.
- Restricted to warmer/drier climate of eastern Scotland.
- Formed in broadleaf forest with recycling of nutrients.

Class 3.2 to Class 4.2: Land capable of supporting Mixed Agriculture.

- Brown earths, humus, and Iron humus podzols.
- Deep organic layer.
- Accumulation of humus.
- Often found on hill slopes where a poorer climate exists, and drainage is limited.

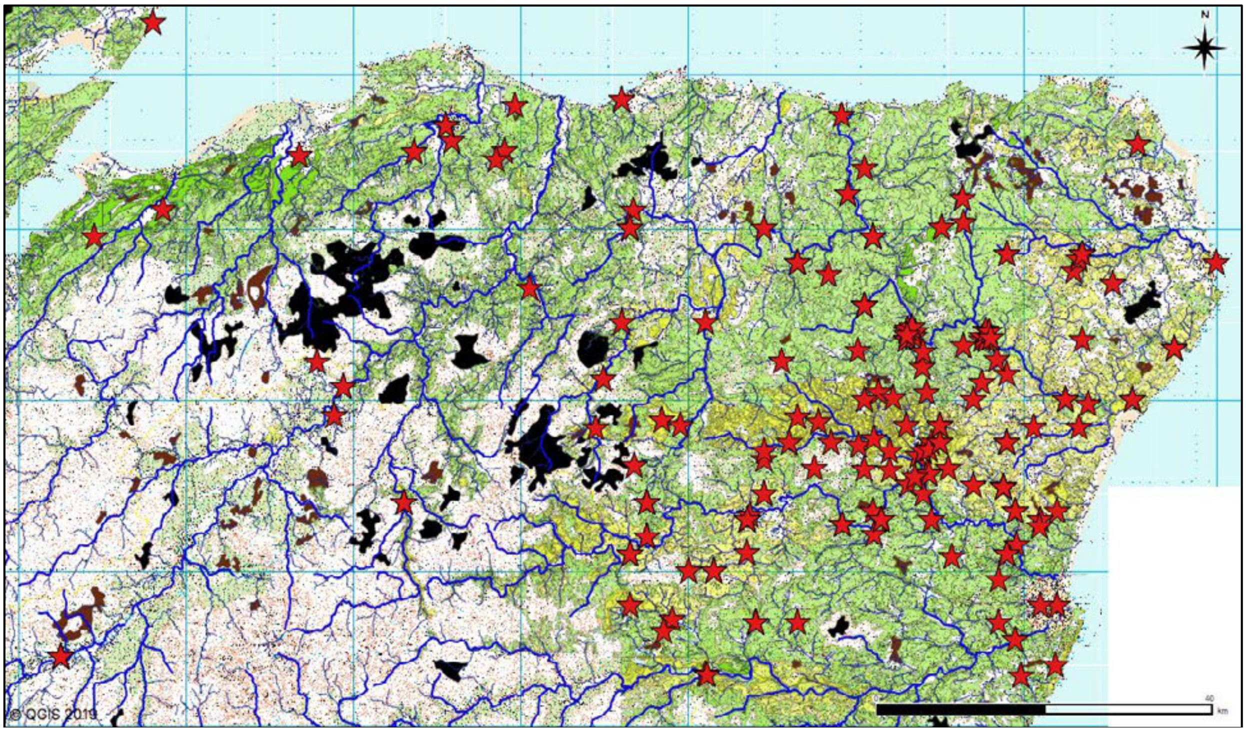
Class 5.1 to Class 5.3: Land capable of supporting Improved Grassland.

- Limitations to use caused by climate, slope, and wetness.
- Generally found in upland areas.

Class 6.1 to Class 7: Land capable of supporting only Rough Grazing.

- Steep, very poorly drained land.
- Shallow soils.
- Found in cool or cold climatic zones, usually upland areas.
- Limited agricultural value.

Use of this database has allowed a tangential study of CSB findspots to be undertaken and enables the illustration of not only their findspots but also the type and quality of land that may have been present during the Late Neolithic. The data in each of the following tables will compare CSB findspots with the local land capability, approximate altitude, probable climate and underlying and surface geology of each region. The colour coded maps that accompany them will visually illustrate that capability and show the distribution of



Map 5.2: CSB findspots (Region 1: Moray Firth to River Dee) farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

CSBs. As was explained earlier, not all CSBs have exact findspots and their concentration, indicated by red stars, may be greater than that shown, as more CSBs potentially remain to be found.

Region 1: Moray Firth to River Dee

A high proportion of CSBs in Aberdeenshire are found in areas of deep brown earth soils which were originally created by ancient forests, Map 5.2, Land Capability Classification 1 - 3.1 coloured yellow. The remainder, along with those found in Morayshire, were on humus-iron podzols, Map 5.2, Land Capability Classification 3.2 - 4.2 coloured green. More detailed data for individual CSB findspots can be seen in Table 5.1, which shows how variable factors such as underlying geology, climate and altitude were involved in producing land with differential farming potential. Examples of how the variability of these diverse factors affected land capability can be seen in Morayshire and the Buchan plain. Despite the land in Morayshire being comprised mainly of humus-iron podzols, it is still graded as prime farmland due to the combination of its underlying Sandstone geology, relatively low altitude, and temperate climate. Apart from a loose concentration around Elgin, where the soil is of poorer quality and may have required more drainage, CSB distribution throughout Morayshire is sparse. This may not reflect the number of CSBs that were present during the Late Neolithic but may instead be due to the type of free draining soils that make up much of this area (Carter 1997: 42). With less drainage and trenching work required for improvement there would have been less opportunity to find any CSBs that might be buried at depth. The Buchan Plain is very different however, the reason for a lack of CSB finds here is more likely due to its thin acid soils which were left unfarmed until the late eighteenth century.

Deep forest soils were less likely to form on land at higher altitudes, on that exposed to harsher climatic conditions, or in locations where the underlying geology was mineralogically poor and, to an extent, explains the contrasting landscape mosaic we see today. Until the improvement period Aberdeenshire would have been considerably stonier as evidenced by the number of field walls, clearance cairns and consumption dykes which were constructed from stone cleared from the land during enclosure (Curtis 2019: 3; Walker et al. 1982: 12; RCAHMS 2008: 1-2). Until it began to be improved most arable land lay in small, scattered areas near the coast and in river valleys surrounded by bogs and stony moorland (Carter 1997: 15; Curtis 2019: 3). It would have also been considerably wetter until these localised areas of bog were drained by landowners and tenants in the early part of the nineteenth century (Carter 1997: 42).

Although the data in the following tables has been compiled from twentieth century datasets, the fertility of the land is basically due to a combination of complex

Table 5.1: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: Moray Firth to River Dee. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~ Location	~ Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
115	Fyvie	~48-104 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Diorite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
014	Fyvie	~45-100 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite & Conglomerate			Humus-Iron Podzols with some Alluvial Soils	3.2
165	Fyvie	~45-104 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Hornfels	Humus-Iron Podzols, Brown Soils & Alluvial Soils	3.1 & 3.2
456	Fyvie	~47-109 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate			Humus-Iron Podzols, Brown Soils & Alluvial Soils	3.1 & 3.2
334	Fyvie	~45-100 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite with Conglomerate nearby			Humus-Iron Podzols with some Alluvial Soils	3.2
090	Fyvie	~48-115 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Brown Soils, Humus-Iron Podzols and Alluvial Soils	3.1 & 3.2
166	Fyvie	~45-104 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Hornfels	Humus-Iron Podzols, Brown Soils & Alluvial Soils	3.1 & 3.2
333	Auchterless	~75-125 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate		2-Mica Granite	Brown Soils	3.1
012	Auchterless	~73-164 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite			Humus Iron Podzols	3.1 & 4.2
050	Andrewsford	~110-124 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Humus-Iron Podzols	3.1
135	Lambhill Farm	~135-160 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite & Semipelite		Hornfels	Humus-Iron Podzols & Mineral Gleys	3.1 & 3.2
038	Blackford House	~130-145 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite		Biotite Granite	Humus-Iron Podzols	3.1 & 3.2
412	Methlick	~24-75 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite + Muscovite/Biotite Granite in vicinity	Quartz-Microbabbro & Granite Dykes	Sandstone	Humus-Iron Podzols + some Alluvial Soils	3.1 & 3.2

393	Methlick	~22-80 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro and Muscovite-Biotite Granite Dykes	Biotite Granite	Humus-Iron Podzols & Alluvial Soil	3.1 & 3.2
136	Methlick	~24-86 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Quartzite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
373	Methlick	~24-86 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Sandstone	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
083	Methlick	~24-75 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite + Muscovite/Biotite Granite in vicinity	Quartz-microgabbro & Granite Dykes,		Humus-Iron Podzols + some Alluvial	3.1, 3.2
163	Haddo	~37-70 mtrs	Moderately Exposed with Moderate Winters	Muscovite-Biotite Granite	Haddo House Pluton: Gabbroic Rock. & Quartz-microgabbro Dyke		Brown Soils	3.2
LM CSB 012	Little Meldrum Farm	~45-90 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Melagranite Biotite		Brown Soils & Mineral Gleys	3.1 & 3.2
394	Braicklay	~79-115 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite	Quartz-microgabbro Dyke & Muscovite-biotite Intrusion	2-Mica Granite	Humus-Iron Podzols	3.1
LM CSB 014	Craigdam	~83-100 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Muscovite-Biotite Granite	Granite	Brown Soils & Mineral Gleys	3.1
339	Tarves	~70-100 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	NE Grampian Granitic Suite: Foliated-biotite Meta-melagranite	2 Mica Granite	Brown Soils & Humus-Iron Podzols	3.1
013	Tarves	~138-173 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Foliated-biotite Meta-melagranite. Muscovite-biotite Granite		Humus-Iron Podzols	3.2
052	Ellon	~7-55 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Quartz-microgabbro Dyke	2-Mica Granite	Humus-Iron Podzols, Mineral Gleys & Brown Soils	3.1 & 3.2
199	Ellon	~8-54 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Quartz-microgabbro Dyke		Brown Soils, Humus-Iron Podzols & Mineral Gleys	3.1 & 3.2
208	Slains	~29-55 mtrs	Exposed with Fairly Mild Winters	Pelite, Semipelite & Psammite	Amphibolite & Hornblende Schist Dykes		Mineral Gleys & Browns Soils	3.1 & 3.2
LM CSB 019	Dudwick	~104-160 mtrs	Exposed with Moderate Winters	Psammite, Pelite & Semipelite			Mineral Gleys	3.2
117	Logie Buchan	~20-40 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite	North Britain: Calc-alkaline Dyke Suite	Hornfels	Mineral Gleys	3.1
307	Dyce	~38-84 mtrs	Moderately Exposed with Moderate Winters	Granite	Aberdeen Pluton: Foliated Granite	Quartzite	Humus Iron Podzols	3.2
Auc 10	Dyce	~81-105 mtrs	Exposed with Fairly Mild Winters	Granite			Brown Earths	3.2

005	Dyce	~40-80 mtrs	Moderately Exposed with Moderate Winters	Foliated Granite	Aberdeen Pluton: Foliated Granite	Granite	Humus-Iron Podzols with some Alluvial Soils	3.2
189	Dyce	~40-80 mtrs	Moderately Exposed with Moderate Winters	Foliated Granite	Aberdeen Pluton: Foliated Granite	Granite	Humus-Iron Podzols with some Alluvial Soils	3.2
139	Udny	~25-136 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Earths	3.1 & 3.2
395	Udny	~25-136 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Microgabbro & Basalt Dyke	Sandstone	Brown Earths	3.1 & 3.
LM CSB 015	Cloisterseat	~64-76 mtrs	Moderately Exposed with Moderate Winters	Amphibolite and Hornblend Schist			Brown Soils & Mineral Gleys	3.1 & 3.2
047	Belhelvie	~90-93 mtrs	Exposed with Moderate Winters	Psammite & Semipelite	Belhelvie Basic Intrusion: Gabbro, Norite, Peridotite	Gabbro	Peat	6.2
207	Belhelvie	~57-135 mtrs	Exposed with Fairly Mild Winters	Gabbro & Norite	Belhelvie Intrusion: Gabbro, Norite & Peridotite		Brown Soils & Humus-Iron Podzols	3.1 & 3.2
443	Oldmeldrum	~78-178 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Insch Pluton, Gabbroic, with Norite, Serpentinite, Tremolite		Brown Earths + Some Alluvial	3.1 & 3.2
087	Bennachie	~173 mtrs	Exposed with Rather Severe Winters	Granite	Bennachie Pluton: Leucogranite & Aplictic Microgranite		Peaty Podzols	6.2
418	Premnay	~150-233 mtrs	Moderately Exposed with Rather Severe Winters	Psammite & Semipelite	Insch Pluton: Norite & GabbronoriteBennachie Pluton: Microgranite & Leucogranite	Hornfels	Brown Soils	3.1, 3.2
312	Newhills	~68-145 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite + Interbedded Sandstone & Conglomerate	Aberdeen Granite Pluton	Biotite Granite	Humus-Iron Podzols	3.2
263	Bructor	~65-102 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Insch Pluton: Serpentinite & Tremolite Schist + Olivine Gabbro & Olivine Gabbronorite		Brown Soils	3.1
181	Bourtie	~107-132 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Insch Pluton: Serpentinite & Tremolite Schist + Olivine Gabbro & Olivine Gabbronorite		Brown Soils	3.1
172	Cushieston	~120-150 mtrs	Moderately Exposed with Moderate Winters	Norite & Gabbronite		Biotite Granite	Brown Soils	3.1
442	Oldmeldrum	~86-157 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite	Insch Pluton: Norite & Gabbronite	Sandstone	Brown Soils & Mineral Gleys	3.1 & 3.2
349	Oyne	~111-144 mtrs	Moderately Exposed with Moderate Winters		Insch Pluton: Norite & Gabbronorite	Sandstone	Brown Soils	3.1

086	Lumphart	~65-111 mtrs	Moderately Exposed with Moderate Winters	Nortite & Gabbronorite	Insch Pluton: Nortite & Gabbronorite		Brown Soils & Alluvial Soils	2, 3.1 & 3.2
269	Shadowside	~113-140 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
255	Shadowside of Bourtie	~128 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
262	Shadowside of Bourtie	~128 mtrs	Moderately Exposed with Moderate Winters	Psammite & semipelite			Brown Soils	3.1
032	Bourtie	~126-196 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
091	Clisham	~90 mtrs	Sheltered with Moderate Winters	Norite & Gabbronorite			Brown Soils	3.1
478	Hill of Barra	~78-196 mtrs	Moderately Exposed with Moderate Winters	Psammite, Semipelite, Troctolite & Serpentinite	Insch Pluton: Serpentinite & Tremolite Schist	Granite	Brown Soils	3.1
221	Inverurie	~54-98 mtrs	Sheltered with Moderate Winters	Psammite & Semipelite		Granite	Alluvial & Brown Soils	3.1
258	Inveramsey	~62-115 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Earths + Some Alluvial	3.1
118	Fintray	~96-151 mtrs	Moderately Exposed with Moderate Winters	Pelite & Semipelite			Humus-Iron Podzols with some Alluvial Soils	3.2
013	Aberdeen	~10-115 mtrs	Exposed with Fairly Mild Winters	Granite, Conglomerate & Sandstone	Aberdeen Pluton: Foliated Granite		Humus-Iron Podzols, some Alluvial Soils	3.1, 3.2, 4.1 & 5.2
200	Aberdeen	~1-130 mtrs	Exposed with Fairly Mild Winters	Granite, Conglomerate & Sandstone	Aberdeen Pluton: Foliated Granite		Humus-Iron Podzols, some Alluvial Soils	3.1, 3.2, 4.1 & 5.2
119	Elrick	~67-95 mtrs	Exposed with Moderate Winters	Semipelite, pelite & Psammite	Quartz & Microgabbro Dyke	Amphibolite	Brown Soils	3.1
476	Keith Hall	~53-115 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite		Fine-grained Siltstone or Serpentine	Alluvial Soils	2
031	Keith Hall	~50-115 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Alluvial Soils + Brown Earths	2, 3.1
467	Leslie	~170-243 mtrs	Exposed with Rather Severe Winters	Serpentine, Olivine-Gabbro, Norite & Gabbronite	Insch Pluton: Serpentinite	Insch Gabbro	Brown Soils	2 & 3.1
144	Leslie	~178-243 mtrs	Moderately Exposed with Rather Severe Winters	Olivine-Gabbro	Insch Pluton: Serpentinite	Dolerite	Humus-Iron Podzols	3.1

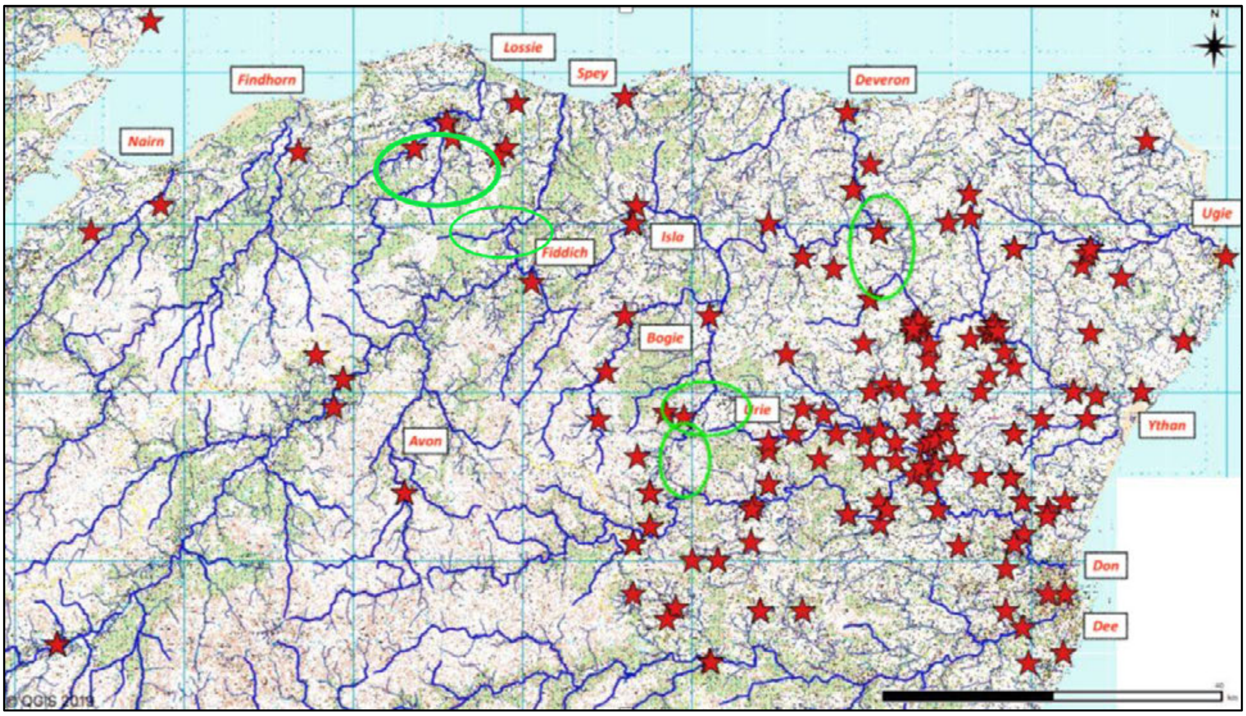
458	New Mill	~108-140 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Humus-Iron Podzols, Peaty Podzols & Alluvial Soils	3.2 & 4.1
093	Pitinnan	~125-159 mtrs	Moderately Exposed with Moderate Winters	Norite & Gabbronorite	Insch Pluton: Norite & Gabbronorite		Brown Soils	3.2
127	Kinkell	~53-105 mtrs	Sheltered with Moderate Winters	Psammite & Semipelite	Porphyritic Felsite Dykes	Granite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
151	Kemnay	~79-138 mtrs	Moderately Exposed with Moderate Winters	Foliated Muscovite-Biotite Granite		Biotite Granite	Humus-Iron Podzols	3.2
147	Kemnay	~78-138 mtrs	Moderately Exposed with Moderate Winters	Granite Foliated-muscovite-biotite & Microdiorite	Tillifourie Pluton: Folioated Tonalite & Foliated Granodiorite	Gabbro	Humus-Iron Podzols with some Alluvial Soils nearby	3.2 & 2
LM CSB 025	Craigearn	~85-98 mtrs	Moderately Exposed with Moderate Winters	Foliated Tonalite & Foliated Granodiorite		Quartztie	Humus-iron Podzols	3.2
111	Kintore	~46-75 mtrs	Moderately Exposed with Moderate Winters	Granite	Kenmay Pluton: Granite, Foliated muscovite-biotite	Quartzite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
116	Monymusk	~98 mtrs	Moderately Exposed with Moderate Winters	Quartz-microgabbro & Muscovite-Biotite Granite Dykes	Tillyfurie Pluton: Foliated Tonalite & Foliated Granodiorite	Hornfels	Brown Soils, Humus-Iron Podzols & Mineral Gleys	3.2
197	Monymusk	~98 mtrs	Moderately Exposed with Moderate Winters	Foliated Tonalite & Foliated Granodiorite	Tillyfourie Pluton: Foliated Tonalite & Foliated Granodiorite	Hornfels	Brown Soils, Humus-Iron Podzols & Mineral Gleys	3.2
196	Kinmundy	~58-105 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
236	Kinmundy	~58-105 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
025	Fetternear House	~90 mtrs	Moderately Exposed with Moderate Winters	Psammite, Semipelite & Foliated Tonalite, Foliated Granodiorite			Humus-Iron Podzols	3.2
264	Maiden Stone	~160 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Brown Soils	3.1
168	Gaucyhillock	~96 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite		Hornfels	Brown Soils	3.1
178	Ardtannies	~60-159 mtrs	Sheltered with Moderate Winters	Psammite & Semipelite		Hornfels	Brown Soils	3.1
420	Ardoyne	~150-190 mtrs	Moderately Exposed with Moderate Winters	Norite & Gabbronite		Meladiorite	Brown Soils	3.1 & 3.2
LM CSB 027	Meikle Wartle	~138 mtrs	Moderately Exposed with Moderate Winters	Norite & Gabbronite			Mineral Gleys	3.1

343	Buchromb	~115-227 mtrs	Sheltered with Rather Severe Winters/ Moderately Exposed with Rather Severe Winters	Quartzite, Psammite & Semipelite + Graphitic Schist		Garnet Metabasite	Alluvial Soils + Humus-Iron Podzols	3.1, 3.2 & 4.2
178	Ardtannies	~60-159 mtrs	Sheltered with Moderate Winters	Psammite & Semipelite		Hornfels	Brown Soils	3.1
173	Turriff	~27 -135 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite and Pelite + Conglomerate		Amphibolite	Humus Iron Podzols + Some Alluvial	3.1, 3.2 & 5.2
338	Turriff	~27-135 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate			Humus-Iron Podzols, Brown Soils & Alluvial Soils	3.1 & 3.2
218	Turriff	~27-135 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Brown Soils, Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
324	Turriff	~27 – 135 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite & Conglomerate		Microgranite	Brown Soils, Humus-Iron Podzols & Alluvial Soils	3.2
284	Inverkeithny	~53-177 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite		Metabasite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
183	Inverkeithny	~46-192 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite		Amphibolite	Humus-Iron Podzols	3.2
256	Inverkeithny	~102-123 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Humus-Iron Podzols	3.1
159	Cuminestown	~130-154 mtrs	Exposed with Moderate Winters	Sandstone, Siltstone and Mudstone			Humus-Iron Podzols	3.1
019	King Edward	~33-90 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Humus-Iron Podzols + Alluvial Soils	3.1 & 3.2
092	Milton of Byth	~105 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite & Sandstone			Brown Soils	3.2
177	Cuminestown	~97-105 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Siltstone, Mudstone & Conglomerate			Brown Soils	3.1
441	Mountblairy	~25-89 mtrs	Moderately Exposed with Moderate Winters	Micaceous Psammite, Semipelite & Pelite			Humus-Iron Podzols	3.1 & 3.2
035	Old Deer	~40-95 mtrs	Exposed with Moderate Winters	Semipelite, Pelite & Psammite	Foliated-biotite Meta-melagranite.		Brown Soils, Humus-Iron Podzols & Mineral Gleys	3.1 & 3.2
028	Old Deer	~40 – 95 mtrs	Exposed with Moderate Winters	Semipelite, Pelite & Psammite	Foliated-biotite Meta-melagranite & Gabbroic Rock		Brown Soils & Mineral Gleys	3.1 & 3.2
160	New Deer	~92-140 mtrs	Exposed with Moderate Winters	Micaceous Psammite, Semipelite, Pelite, Muscovite-Biotite Granite	Maud Pluton: Gabbroic Rock. Quartz-microgabbro Dyke	Hornfels	Humus-Iron Podzols, Brown Soils & Mineral Gleys	3.1 & 3.2

114	Bog of Foudland	~205-250 mtrs	Moderately Exposed with Rather Severe Winters	Hornfelsed Pelite & Hornfelsed Semipelite		Hornfels	Humus-Iron podzols	4.1 & 4.2
413	Huntly	~100-187 mtrs	Moderately Exposed with Rather Severe Winters		Huntly-knock Pluton: Orthopyroxen-Gabbro, Clinopyroxene-Norite, Olivine-gabbro	Meladiorite	Alluvial Soils + Humus-Iron Podzols	3.1 & 3.2
011	Marnoch	~63-260 mtrs	Moderately Exposed with Moderate Winters	Psammite, Pelite & Metagabbroic and Ultramafic Rock	Quartzite	Sandstone	Humus-Iron Podzols & Mineral Gleys	3.2
491	New Keig	~161-201 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite	Bennachie Pluton: Leucogranite & Microgranite	Quartzite	Brown Earths + Some Mineral Gleys	3.1
483	New Keig	~130-220 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite	Bennachie Pluton: Leucogranite & Aplitic Microgranite	Serpentinite	Brown Soils & Mineral Gleys	3.1
142	Leochel-Cushnie	~255-350 mtrs	Exposed with Rather Severe Winters	Migmatitic Psammite & Migmatitic Semipelite		Hornfels	Brown Soils	3.2
211	Alford	~136-204 mtrs	Moderately Exposed with Rather Severe Winters	Psammite, Semipelite & Pelite with Quartz-Diorite nearby			Brown Soils, Alluvial Soils and some Nonecalcareous Gleys nearby	3.1
419	Clova	~304-512 mtrs	Exposed with Rather Severe Winters	Sandstone & Psammite	Insch Pluton: Syenitic Rock & Serpentinite		Humus-Iron Podzols, Peaty Podzols & Mineral Gleys	3.2, 5.2 & 6.3
466	Muggathaw Inn	~182 mtrs	Moderately Exposed with Rather Severe Winters	Migmatitic Psammite with Migmatitic Semipelite	Felsite Dyke		Brown Soils & Humus-Iron Podzols	3.2, 4.1 & 4.2
209	Leochel-Cushnie	~310-359 mtrs	Exposed with Rather Severe Winters	Migmatitic Psammite & Migmatitic Semipelite			Brown Soils, Humus-Iron Podzols & Mineral Gleys	3.2 & 4.2
012	Kildrummy	~200-249 km	Moderately Exposed with Rather Severe Winters	Sandstone, Psammite & Semipelite			Humus-Iron Podzols & Alluvial Soils	3.2
149	Kildrummy	~190-351 mtrs	Exposed with Rather Severe Winters	Sandstone, Mudstone, Siltstone & Psammite, Semipelite, Pelite		Hornfels	Humus-Iron Podzols, Brown Soils & Alluvial Soils	3.2
146	Kildrummy	~200-249 mtrs	Moderately Exposed with Rather Severe Winters	Sandstone, Psammite & Semipelite		Biotite Granite	Humus-Iron Podzols & Alluvial Soils	3.2
140	Kildrummy	~190-270 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite, Pelite, Psammite & Sandstone			Brown Soils, Humus-Iron Podzols and Alluvial Soil	3.2
452	Towie	~223-350 mtrs	Moderately Exposed with Rather Severe Winters	Migmatic Psammite with Migmatic Semipelite	Porphyritic Felsite & Felsite Dyke		Brown Soils, Humus-Iron Podzols with some Alluvial in River Valley.	3.2 & 4.2
Auctioned CSB 08	Towie	~222 mtrs	Moderately Exposed with Rather Severe Winters	Migmatitic Psammite & Migmatitic Semipelite	Felsite and Porphritic Felsite Dykes		Brown Soils, Humus-Iron Podzols, Mineral Gleys & Alluvial Soils	3.2, 4.2 & 5.2
453	Lumphanan	~168-275 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite, Psammite & Pelite	Aplitic Micrograninte Dyke. Micro-granodiorite & Meladiorite & Hornblende Intrusions		Humus-Iron Podzols	3.1, 4.2 & 5.2

134	Keith	~111-175 mtrs	Moderately Exposed with Moderate Winters	Limestone, Quartzite, Calcareous Psammite & Calcareous Semipelite	Keith Intrusions: Metagranite	Gabbro	Humus Iron Podzols & Alluvial Soils	3.2
343	Buchromb	~115-227 mtrs	Sheltered with Rather Severe Winters/ Moderately Exposed with Rather Severe Winters	Quartzite, Psammite & Semipelite + Graphitic Schist		Garnet Metabasite	Alluvial Soils + Humus-Iron Podzols	3.1, 3.2 & 4.2
414	Ardkeeling	~68-156 mtrs	Moderately Exposed with Moderate Winters	Sandstone + Conglomerate		Diorite	Humus-Iron Podzols	4.1
LM CSB 001	Ardkeilling	~92-105 mtrs	Moderately Exposed with Moderate Winters	Pebbly & Gravelly Sandstone			Humus-Iron Podzols	3.1 & 3.2
499	Cabrach	~303-400 mtrs	Exposed with Rather Severe Winters	Gritty Psammite, Pelite, Graphitic Pelite & Sandstone	Andesite Dyke	Micro Granite	Brown Soils	4.2
411	Hillock of Echt	~261 mtrs	Exposed with Rather Severe Winters	Pelite, graphitic	Meta-ultramafitite & Metabasalt Dykes	Amphibolite	Humus-Iron Podzols	4.2
481	Essie	~274-260 mtrs	Exposed with Rather Severe Winters	Norite & Quartz Biotite	Insch Pluton: Monzonite, Olivine & Serpentinite		Brown Soils	3.2
060	Cruden	~12-56 mtrs	Exposed with Fairly Mild Winters	Granite	Peterhead Pluton: Granite	Biotite Arkose Sandstone	Humus-Iron Podzols & Mineral Gleys	3.2
053	Cruden	~1-30 mtrs	Exposed with Fairly Mild Winters	Granite	Peterhead Pluton: Granite	Quartzite	Humus-Iron Podzols, Mineral Gleys & Regosols	3.1, 3.2 & 5.3
340	Peterhead	~7-43 mtrs	Exposed with Fairly Mild Winters	Granite	Peterhead Pluton: Granite	Hornfels	Mineral Gleys	3.1
380	Brae of Biffie	~44-100 mtrs	Exposed with Moderate Winters	Semipelite, Pelite & Psammite		Dolerite	Brown Soils & Mineral Gleys	3.1
383	Lonmay	~19 mtrs	Exposed with Fairly Mild Winters	Semipelire, Pelite & Psammite		Psammite	Humus-Iron Podzols	3.2
281	Migvie	~220-310 mtrs	Moderately Exposed with Rather Severe Winters	Migmatic Psammite, Migmatic Semipelite	Morven-Cabrach Intrusion: Norite. Logie-Coldstone Intrusion: Tonalite	Gabbro/Diorite	Brown Soils	3.2
174	Tarland	~88 mtrs	Moderately Exposed with Rather Severe Winters	Granodiorite	Tomnaverie Intrusion: Granodiorite	Biotite Granite	Humus-Iron Podzols & Alluvial Soils	3.1 & 3.2
480	Strathweltie	~170-190 mtrs	Moderately Exposed with Rather Severe Winters	Granodiorite	Tomnaverie Intrusion: Granodiorite & Tarland Intrusion: Norite & Gabbronorite		Humus-Iron Podzols	3.2
LM CSB 030	Aboyne	~115-187 mtrs	Sheltered with Rather Severe Winters	Limestone			Humus-Iron Podzols	5.1
213	Aboyne	~115-187 mtrs	Moderately Exposed with Rather Severe Winters	Limestone (Calcsilicate Rock)	Amphibolite, Hornblende Schist & Porphyritic Microgranite		Brown Soils & Humus-Iron Podzols	3.2, 4.1 & 5.1

266	Learney	~145-225 mtrs	Exposed with Rather Severe Winters	Tonalite & Quartz-Diorite	Torphins Intrusion: Tonalite & Quartz-Diorite & Aplitic Microgranite		Humus-Iron Podzols	3.2
220	Countesswells	~102-164 mtrs	Moderately Exposed with Moderate Winters	Psammite & Semipelite			Humus-Iron Podzols	4.2
108	Cults	~10-79 mtrs	Sheltered with Moderate Winters	Psammite & Semipelite	Aberdeen Pluton: Foliated Granite	2-Mica Granite	Humus-Iron Podzols with some Alluvial Soils	3.1 & 3.2
327	Mill of Cromdale	~190-210 mtrs	Sheltered with Rather Severe Winters	Psammite		Amphibolite	Peaty Podzols	4.2
268	Tomintoul	~291-408 mtrs	Moderately Exposed with Rather SevereWinters	Psammite, Semipelite and Calcsilicate rock			Humus-Iron Podzols & Peaty Gleys	4.1
438	Dalraich	~172-182 mtrs	Exposed with Rather Severe Winters	Quartzite & Psammite		Hornfels	Humus-Iron Podzols	4.1
388	Elgin	~25 mtrs	Moderately Exposed with Fairly Mild Winters?	Sandstone & Calcrete?		Hornfels	Humus Iron Podzols	3.2
LM CSB 020	Urquhart	~10-35 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone & Pebbly Sedimentary Bedrock		Possibly Syenite or fine-grained Hornblende and Feldspar	Mineral-Iron Podzols	3.2 & 4.1
LM CSB 021	Meikle Geddes	~21-59 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone		Quartzite	Humus-Iron Podzols & Alluvial Soils	2 & 3.1
130	Croy Wood	~59-94 mtrs	Moderately Exposed with Moderate Winters	Sandstone		Microdiorite	Humus-Iron Podzols	3.2
009	Buckie	~1-45 mtrs	Exposed with Fairly Mild Winters/Moderately Exposed with Fairly Mild Winters	Cullen Quartzite, Psammite, Semipelite. Sandstone, Mudstone, Limestone, Siltstone & Conglomerate	Andesite & Microdiorite Dykes		Brown Soils, Humus-Iron Podzols	3.1
460	Forres		Moderately Exposed with Fairly Mild Winters	Sandstone		Yellow Sandstone	Humus-Iron Podzols & Alluvial Soils	2 & 3.2
319	Banff		Exposed with Fairly Mild Winters	Micaceous Psammite, Semipelite and Pelite		Hornfels	Humus-Iron Podzols & Alluvial Soils	3.2
272	Herd Hillock	~40 mtrs	Moderately Exposed with Moderate Winters	Pebbly & Gravelly Sandstone		Metabasite (Dolerite)	Humus-Iron Podzols	4.1
422	Elgin	~40 mtrs	Moderately Exposed with Moderate Winters	Pebbly & Gravelly Sandstone		Hornfels	Humus-Iron Podzols	3.2



Map 5.3: CSB findspots (Region 1: Moray Firth to River Dee) compared with major rivers (named) and tributaries. Green ovals indicate potential routeways between river systems. © Ordnance Survey 2020 (100025252) C. Stewart-Moffitt 2020.

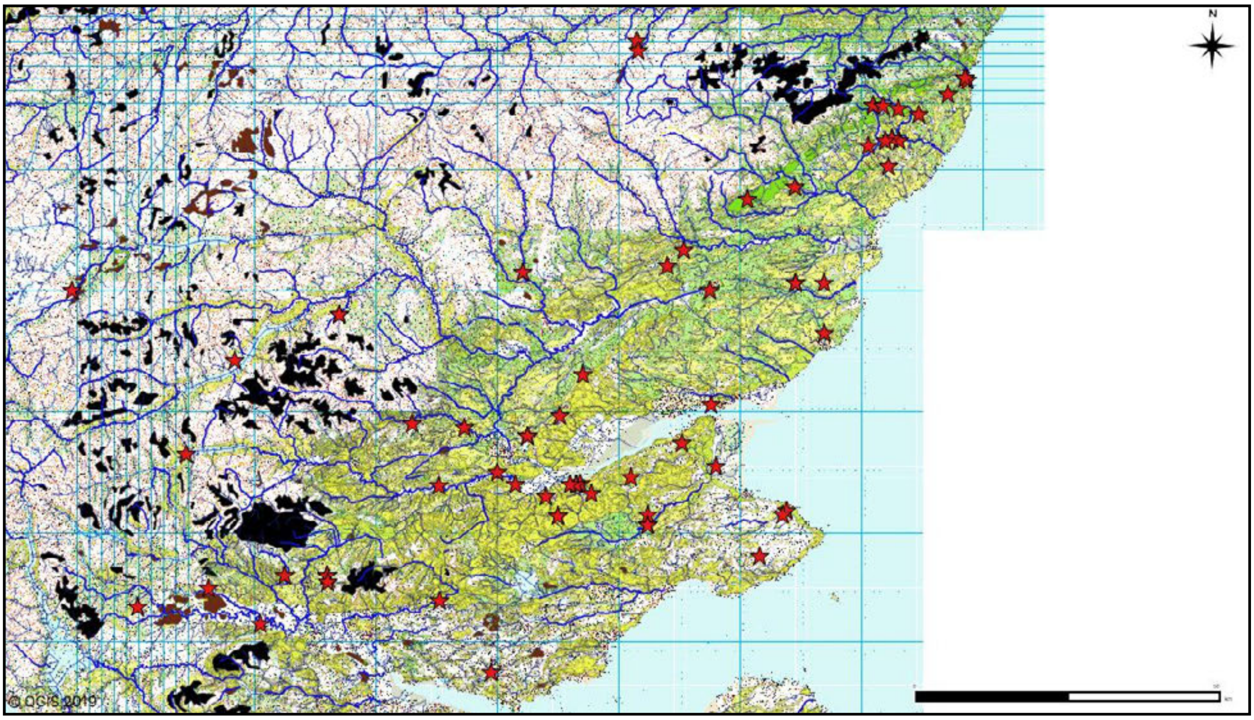
chemical nutrients, provided by both the underlying geology and decayed surface vegetation. Despite society's best efforts, poor soils and growing conditions are often due to minerally deficient underlying geology, poor climatic conditions, and high altitude; it is probable that the less fertile areas would have also existed during the Late Neolithic.

Using the data summarised in Table 5.1, we can see that 70.55% of CSBs in Region 1 were found in sheltered or moderately exposed locations that tend to have mild winters, the remaining 29.45% were found at higher and more exposed altitudes, where winters can be more severe. As the altitude of CSB findspots is generally poorly defined, maximum, and minimum altitudes of each location were recorded: this gives those CSBs in Region 1 an approximate altitude range of between 1 and 408mtrs above sea level and a mean altitude of 120mtrs. Only 48.63% of the above findspots in region one may have been on land capable of arable agriculture while 46.58% of findspots were on land capable of mixed agriculture: the remaining 4.79% were on land only suitable for rough grazing.

As can be seen from Map 5.3 Aberdeenshire is interwoven with a network of major rivers and their tributaries. The three that flow easterly, the Rivers Don, Ythan and Ugie all drain into the North Sea, while the fourth, the River Deveron, flows northerly draining into the Moray Firth. Despite our incomplete knowledge of CSB findspots, many were on average only 2.55km from the nearest river or burn, at which distance people would have been above winter flood levels, but near enough to a source of running water for their personal needs, stock rearing and small-scale arable agriculture. While it is obvious that access to water was an essential part of daily life (Mithen 2010a: 5250) this was not the only reason why Neolithic people were living close to rivers; for them rivers would have been major routeways providing easy access to other people and the possibility of exchanging goods and ideas (Bradley 2019: 18-19; Noble 2017: 72-78; Vianello 2015: 1-2).

Despite the apparent concentrations of CSBs in Fyvie and Methlick, which are almost certainly due to poor location recording or loss of data in the past, the highest concentration of CSBs found has been between the watersheds of the Rivers Don and Ythan. Given the high number of CSBs found in this rich agricultural landscape with its deep brown forest soils, it is probable that this area supported a relatively high population during the Late Neolithic. Occam's Razor suggests that, from the extraordinarily high numbers of CSBs found within this area compared with other parts of Scotland, it was here that the concept first emerged and although obviously difficult to determine it was probably also the centre of CSB production and circulation.

Potential overland connections between interlocking river systems and their tributaries are suggested by green ovals on Map 5.3. The argument for rivers being involved in the distribution of CSBs is underscored by



Map 5.4: CSB findspots (Region 2: River Dee to River Forth) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

Type 7 CSBs that have been found at several locations along the River Ythan, River Deveron, and River Isla. Type 4n CSBs may also have travelled along similar trajectories from their geological origin near the Glens of Foudland, located midway between the River Don and River Ythan.

Further northwest in Morayshire the Rivers Lossie, Spey, Findhorn, and Nairn all flow north into the Moray Firth, each offering a safe landing place at or near its mouth and the possibility of routes south into their watersheds. Whether people were trading or making CSBs along these rivers is unknown, although a single CSB found at Buchromb, on the River Fidditch, does suggest that an important thoroughfare may have existed between Aberdeenshire and Morayshire via the River Deveron and River Isla. The River Fidditch is only 2km west of the source of the River Isla, at Milltown of Auchindoune and could have provided a good overland access to the River Spey, River Lossie and beyond.

Region 2: River Dee to River Forth

It is evident from Map 5.4 that a greater concentration of deep brown earth forest soils, Land Capability Classification 1 - 3.1, coloured yellow, existed in south Aberdeenshire, Angus and Fife than in north Aberdeenshire. As can be seen from Table 5.2 this is due to a combination of the underlying geology of sedimentary and volcanic rocks in the region, a generally moderate to mild climate because of its location between the Grampian mountains and the sea and a generally low altitude. A cluster of CSB findspots can be seen in the vicinity of the Howe of Mearns and another around the head of the Firth of Tay. While almost all CSBs were found in areas having 2 - 3.1/3.2 soils, those outwith these areas were found on humus-iron podzols 3.2 - 4.2.

From the data in Table 5.2 we can see that 100% of the CSBs in Region 2 were found in sheltered or moderately exposed locations with mild winters. Approximate altitudes of CSB findspots in this region range between 1 and 511mtrs above sea level with a mean altitude of 109mtrs. While around 78% of the findspots in region two were capable of arable agriculture, 12% were capable of mixed agriculture and the remaining 10% were only suitable for rough grazing.

Many of the CSB findspots shown on Map 5.5 are grouped along river valleys, lending weight to the argument that they may have been transported/distributed by river. Their locations also suggest that some may have been imported from Aberdeenshire to the mouths of the rivers in this region via a coastal route. It is particularly noticeable that some CSB findspots follow the River Tay and its tributaries as far west as Lawers on Loch Tay, Lochearnhead at the head of Loch Earn, north along the Almond and south along the Earn. Further south still, a few have been found scattered around the higher ground surrounding the carselands of the River Forth.

Table 5.2: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: River Dee to River Forth. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

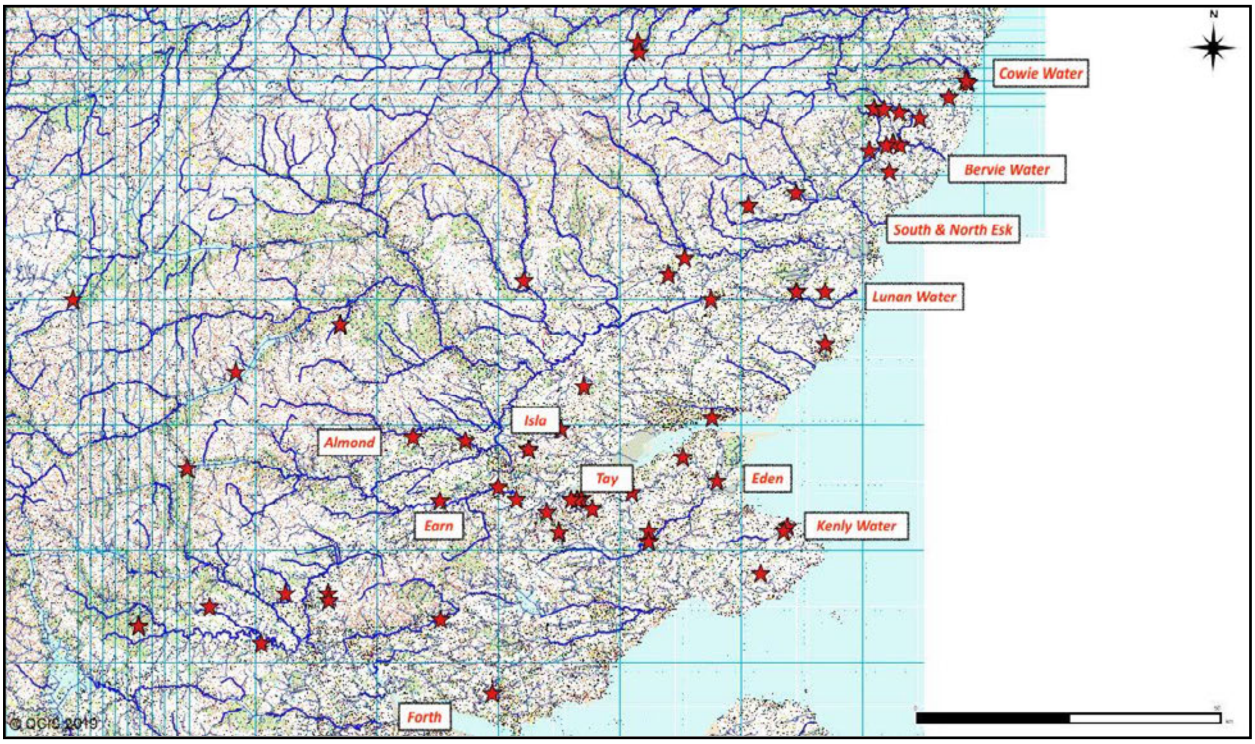
Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
479	Linn of Muick	~351 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite, psammite and Pelite with Amphibolite and Hornblende nearby	Balnacraig Metabasite Member: Metalava & Metatuff	Amphibolite / Hornblende	Brown Soils	5.2 & 6.3
229	Powburn	~60-80 mtrs	Moderately Exposed with Moderate Winters	Mudstone			Brown Soils	2
057	Wynford	~60-68 mtrs	Moderately Exposed with Moderate Winters	Mudstone			Brown Soils	2
228	Glasterlaw	~55-70 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Siltstone & Mudstone with Andesite & Basalt nearby			Brown Soils	3.2
021	Gyratsmyre	~95 Mtrs	Moderately Exposed with Moderate Winters	Mudstone & Conglomerate			Brown Soils	3.1
231	Garvock	~190-230 mtrs	Exposed with Moderate Winters	Conglomerate & Andesitic Lava			Brown Soils & Mineral Gleys	3.2 & 4.2
300	Garvock Hill	~106 mtrs	Moderately Exposed with Moderate Winters	Sandstone & Conglomerate		Amphibolite	Brown Soils	3.1
330	Fordoun	~233 mtrs	Moderately Exposed with Moderate Winters	Mudstone			Brown Earths	3.2
439	Glenfarquhar	~130-251 mtrs	Moderately Exposed with Rather Severe Winters	Conglomerate & Sandstone	Metabasaltic & Andesitic Dykes	Amphibolite	Humus-Iron Podzols	3.2
010	Glenfarquhar	~110-145 mtrs	Moderately Exposed with Rather Severe Winters	Conglomerate & Andesitic Rock			Humus-Iron Podzols	3.2

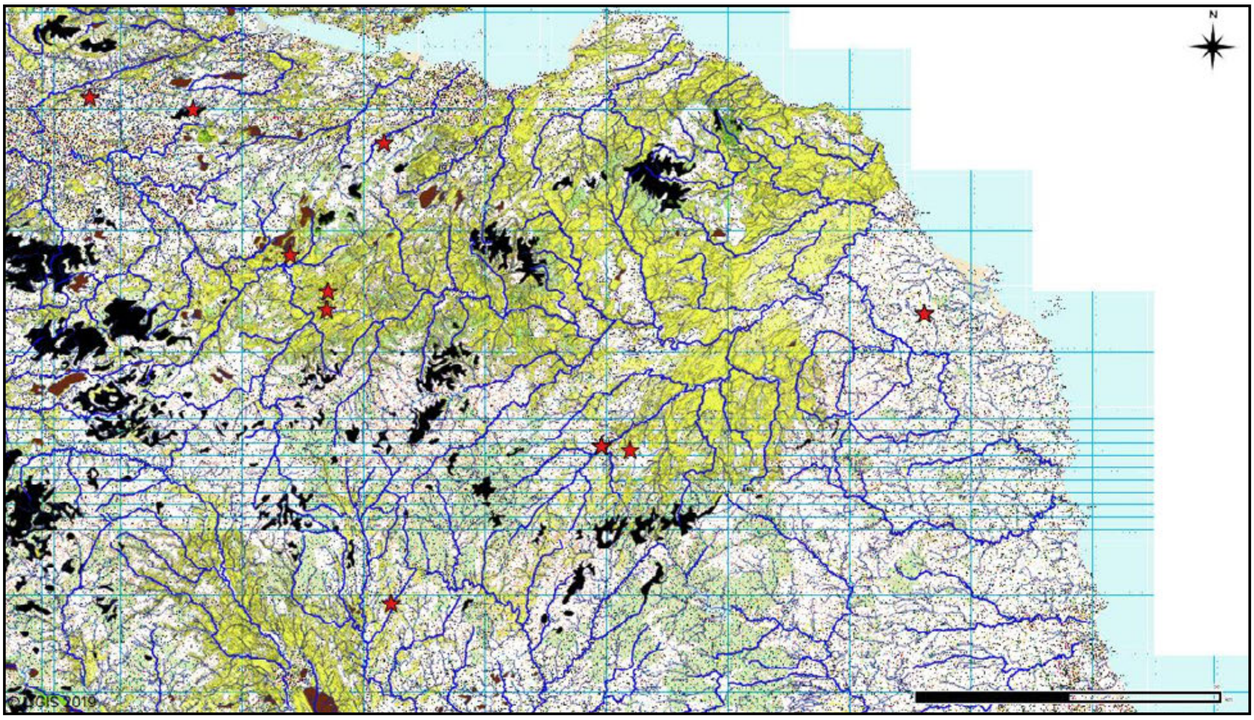
230	Easter Brakie	~66-89 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Siltstone & Mudstone + Andesite & Basalt in vicinity			Humus-Iron Podzols	2
141	Nr. Brechin	~50-75 mtrs	Sheltered with Moderate Winters/Moderately Exposed with Moderate Winters	Sandstone & Mudstone		Metabasite	Humus-Iron Podzols/ Brown Soils	3.2
410	Stonehaven	~10 -80 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone & Psammite		Biotite Granite	Brown Earth Soils & Humus Iron Podzols	3.1/3.2
Auctioned CSB 12	Stonehaven	~2-90 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone		Greenschist	Brown Soils/ Humus-Iron Podzols	3.1
036	Boggartyhead	~73 mtrs	Moderately Exposed with Fairly Mild Winters	Conglomerate & Sandstone			Brown Soils	3.1
LM CSB 009	Briggs of Criggie	~109-131 mtrs	Exposed with Moderate Winters	Sandstone & Sedimentary Conglomerate			Brown Soils	3.2
Auctioned CSB 11	Portlethen	~100-153 mtrs	Exposed with Fairly Mild Winters	Micaceous Psammite	Hill of Blairs Pluton: Muscovite-Biotite Granite	Granite	Humus-Iron Podzols & Mineral Gleys	3.2, 4.1 & 6.1
492	Swallowhouse	~80 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Siltstone & Mudstone			Humus Iron Podzols	3.2
336	West Ferry		Moderately Exposed with Fairly Mild Winters	Sandstone, Siltstone and Mudstone	Porphyritic Microdiorite & Felsite		Alluvial Soils	2
Auctioned CSB 01	Crawford Abbey		Sheltered with Moderate Winters	Sandstone			Brown Soils & Humus-Iron Podzols	3.2
Auctioned CSB 02	Crawford Abbey	~37-67 mtrs	Sheltered with Moderate Winters	Sandstone & Conglomerate	Microgabbro & Basaltic Rock		Brown Soils & Humus-Iron Podzols	2 & 3.2
250	Springfield Asylum		Moderately Exposed with Moderate Winters	Sandstone		Yellow Sandstone	Humus-Iron Podzols & Brown Soils	2
072	River Tay		Moderately Exposed with Moderate Winters			Felsite		Found In River
279	Wester Kinsleith	~100-140 mtrs	Moderately Exposed with Moderate Winters	Andesite & Basalt	Felsite & Basalt Dykes		Brown Soils	3.1 & 5.2

306	Newburgh	~2-84 mtrs	Moderately Exposed with Moderate Winters	Mudstone, Siltstone & Basaltic Andesite		Hornfels	Brown Soils	2
247	Barns Woodside	~2-236 mtrs	Sheltered with Moderate Winters	Mudstone, Siltstone & Basaltic Andesite	Volcanic Conglomerate		Brown Soils	2
299	Lindores	~70-100 mtrs	Sheltered with Moderate Winters	Andesite		Quartzite	Brown Soils	3.2
004	St Fort	~32-42 mtrs	Moderately Exposed with Fairly Mild Winters	Andesite & Basalt			Brown Soils	3.2
329	Mugdrum Island	~1-3 mtrs	Moderately Exposed with Moderate Winters	Mudstone & Siltstone			No Data	
404	Nocharie	~169-236 mtrs	Moderately Exposed with Moderate Winters	Andesite & Volcanic Conglomerate	Quartz-microgabbro Schist Dyke	Hornfels	Brown Soils	5.2
191	Kilmux Farm	~90-195 mtrs	Moderately Exposed with Fairly Mild Winters	Limestone Formation & Sedimentary Rocks			Brown Earths + Mineral Gleys	3.1
074	Frankley Den		Moderately Exposed with Rather Severe Winters	Sandstone, Basalt & Andesite		Felsite	Brown Soils & Mineral Gleys	3.2
249	Carnbee	~62-102 mtrs	Exposed with Fairly Mild Winters	Sedimentary Rock Cycles			Mineral Gleys	3.1
302	St Vigeans	~16-95 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone, Siltstone & Mudstone			Humus-Iron Podzols & Brown Soils	2
382	Gargunnock	~11 mtrs	Moderately Exposed with Moderate Winters	Mudstone & Sandstone	Cornstone, Basalt & Microgabbro	Amphibolite	Brown Soils	3.2
425	Rusky Burn		Moderately Exposed with Moderate Winters	Sandstone		Psammite	Brown Soils	4.1
Auc 14	Gartmore	~72-120 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Siltstone & Mudstone	Basalt & Conglomerate Dykes		Brown Soils	3.2
202	Glenalmond	~152-220 mtrs	Moderately Exposed with Moderate Winters	Sandstone			Humus-Iron Podzols & Mineral Gleys	4.2
212	Lochearnhead		Moderately Exposed with Moderate Winters	Psammite, Semipelite & Limestone	Quartz-microgabbro Dyke		Humus-Iron Podzols	4.2

282	Urlar	~311-511 mtrs	Exposed with Rather Severe Winters	Psammite & Semipelite	Amphibolite	Semipelite	Humus-Iron Podzols	5.1
391	Balnasume	~119-239 mtrs	Moderately Exposed with Rather Severe Winters	Semipelite		Quartzite	Humus-Iron Podzols	4.2
405	Bridge of Dalreoch	~14 mtrs	Moderately Exposed with Moderate Winters	Sandstone		Hornfels	Alluvial Soils	2
407	Bridge of Earn	~9 mtrs	Moderately Exposed with Moderate Winters	Sandstone			Alluvial Soils	3.1
335	Methven Wood	~58-80 mtrs	Sheltered with Moderate Winters	Sandstone		Sandstone	Brown Soils	3.1
433	Kirriemuir	~116-160 mtrs	Moderately Exposed with Rather Severe Winters	Sandstone		Psammite	Brown Soils, Humus-Iron Podzols	3.1 & 3.2
337	Kirriemuir	~105-171 mtrs	Moderately Exposed with Rather Severe Winters	Sandstone & Mudstone		Sandstone	Brown Soils	3.1
369	Abernethey	~7-80 mtrs	Moderately Exposed with Moderate Winters	Sandstone			Brown Soils	2 & 3.1
225	Netherton	~182-191 mtrs	Sheltered with rather Severe Winters	Psammite			Humus-Iron Podzols	4.2
002	Kilbryde	~93-142 mtrs	Moderately Exposed with Moderate Winters	Sandstone, Mudstone & Siltstone	Quartz-microgabbro Dyke		Brown Soils	3.2
461	Sherrifmuir		Exposed with Rather Severe Winters	Olivine-Basalt, Conglomerate & Sandstone		Sandstone	Mineral Gleys, Humus-Iron Podzols & Brown Soils	3.2, 4.2 & 5.3
500	Sherriffmuir		Exposed with Rather Severe Winters	Sandstone & Mudstone		Sandstone	Mineral Gleys, Humus-Iron Podzols & Brown Soils	3.2, 4.2 & 5.3
246	Leuchars	~8-28 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone			Brown Soils & Peaty Gleys	3.1 & 3.2



Map 5.5: CSB findspots (Region 2: River Dee to River Forth) compared with major rivers (named) and tributaries. © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt 2020.



Map 5.6: CSB findspots (Region 3: River Forth to Humber Estuary) compared with farming potential based on Underlying Geology, Climate and Altitude; similar information for England unavailable. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. (No Land Capability data is available for the area to the east of the Scottish Border). © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

Region 3: River Forth to Humber Estuary

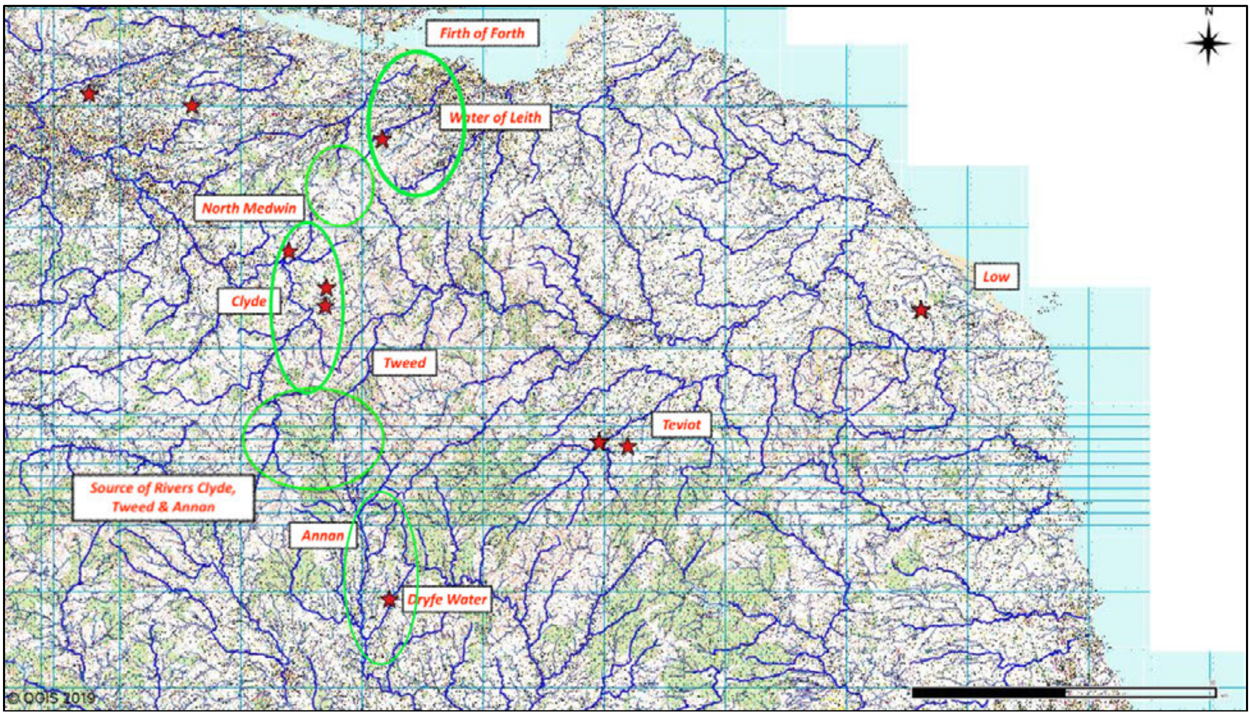
Few CSBs have been found south of the River Forth as can be seen from Map 5.6. Although some have been found on 2 - 3.1 soils, the majority are found on 3.2 and above. As can be seen from Table 5.3. the underlying geology of this region is variable, ranging from sedimentary and volcanic rock in the north to volcanic wacke in the south. While the majority of CSBs found here were in moderately exposed locations with generally mild climates, a few were found at higher altitudes. Those CSBs found in England were all found on good quality

Table 5.3: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: River Forth to Humber Estuary. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
290	Water of Leith		Moderately Exposed with Moderate Winters	Sandstone & Felsite		Felsite	Brown Earths	4.2, 5.2
180	Longriggend	~190-230 mtrs		Scottish Coal Measures, Sedimentary Rocks				
219	Carnwarth	~207-235 mtrs	Moderately Exposed with Moderate Winters	Basaltic rock, Plagioclaise-Microphyric, with Sandstone & Mugearite nearby			Brown Soils, Mineral Gleys and Alluvial Soils nearby	4.1 with 3.2 & 5.3 nearby
288	Biggar	~197-241 mtrs	Moderately Exposed with Moderate Winters	Basalt & Andesite		Amphibolite	Brown Soils	3.2
303	Biggar Shield	~238-358 mtrs	Exposed with Rather Severe Winters	Basaltic and Andesitic Lava	Rhyolite	2-Mica Granite	Brown Soils	4.1
037	Kirkton	~186-250 mtrs	Moderately Exposed with Moderate Winters	Wacke		Gabbro or Amphibolite	Brown Soils	3.2
001	Wilton Lodge	~116-127 mtrs	Moderately Exposed with Moderate Winters	Wacke			Brown Soils & Alluvial Soil	4.2
LM CSB 011	Hetton North Farm, Lowick	~107 mtrs	Moderately Exposed with Moderate Winters	Limestone, Sandstone, Siltstone and Mudstone			Unknown	3.1
244	Houghton-le-side	~130-180 mtrs	Warm and Temperate	Mudstone, Siltstone & Sandstone			Fertile	3.1 / 3.2?
475	Nr. Bridlington	~10-60 mtrs	Warm and Temperate	Flamborough Chalk Formation		Old Red Sandstone	Fertile	3.1 / 3.2?



Map 5.7: CSB findspots (Region 3: North, River Forth to Scottish Border) compared with major rivers (named) and tributaries. © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt 2020.

farmland at low altitudes with moderate to mild climates

Using the data summarised in Table 5.3 we can see that 90% of CSBs in Region 3 were found in sheltered or moderately exposed locations in areas that tend to have mild winters, while the remaining 10% were found at higher and more exposed altitudes, where winters tend to be more severe. The approximate altitude range of their findspots is between 10 and 358mtrs above sea level with a mean altitude of 176mtrs. The land on which CSBs were found in region three was split 50/50 between arable and mixed agriculture.

Although few CSBs have been found this far south, those that have, can again be seen to be located near rivers and their tributaries. Not all seem to have been made from local materials and suggest importation from elsewhere. As noted in the previous chapter, CSB 233 from Armathwaite, in the Eden Valley in Cumbria, is made from a distinctive red Microgranite (Felsite) which has a striking similarity to material found at Black Hill just south of Edinburgh. This material is not found in Cumbria where the geology is composed of mainly sedimentary rocks. CSB 290, found in the Water of Leith, is made from a very similar material which was also visually characterized as Felsite as part of this research. Interestingly the

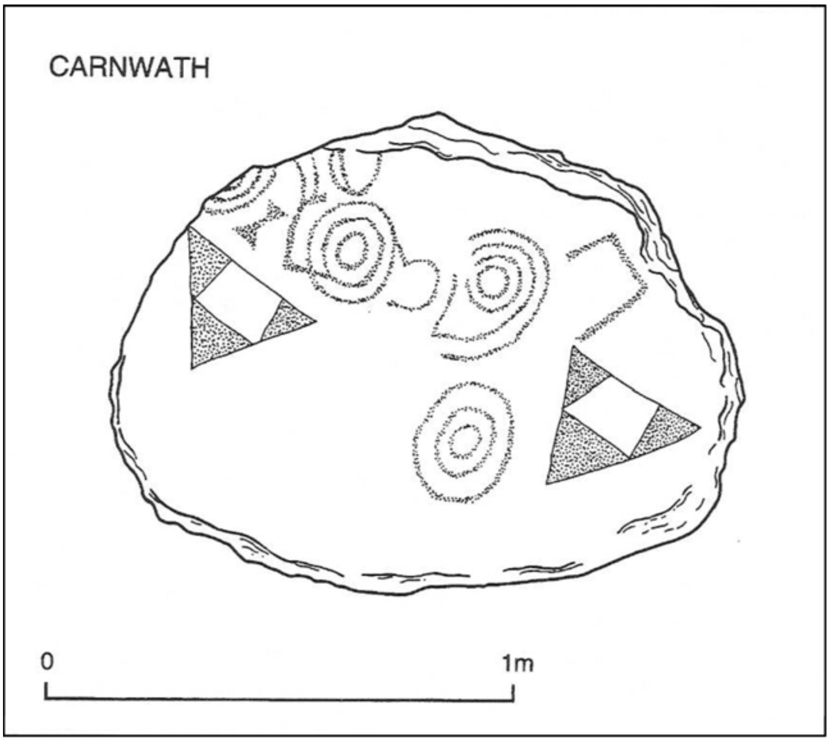


Figure 5.1: Decorated cist cover from Wester Yardhouses, Carnwath, Lanarkshire. Bradley 2002: 59.

sources of the Water of Leith and the River North Medwin lie approximately 4km from one another on the northern edge of the Pentland Hills, and within 3.5km of Black Hill. Further downstream along the North Medwin a weathered stone slab, decorated with symbols typical of a Neolithic date, and which had later been trimmed for use as a cist cover during the Bronze Age, Figure 5.1, was found at Wester Yardhouses, just under a kilometre from the river and provides evidence that people were living here during the Neolithic.

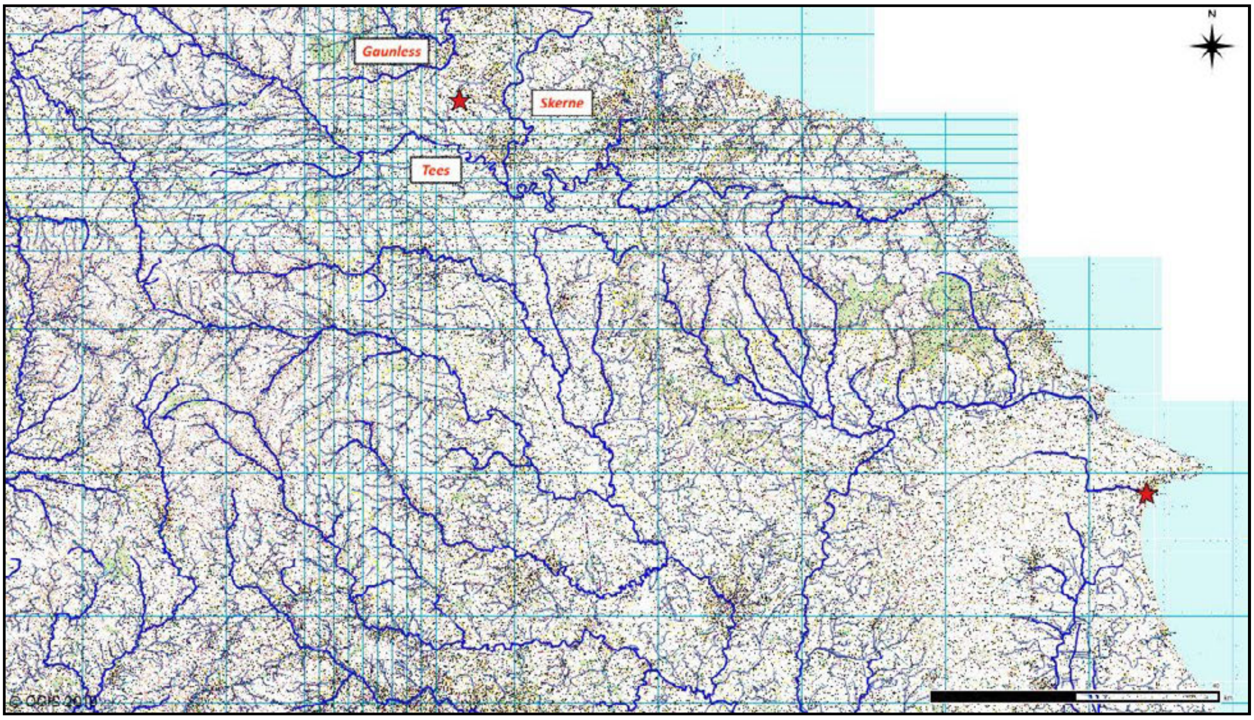
By using CSB findspots and other evidence of Neolithic activity as indicators, I believe it is possible to suggest that a connection might have existed between the Firth of Forth and the Solway Firth during the Late Neolithic, perhaps enabling the Armathwaite CSB to have travelled from its potential source in the Pentland Hills to Cumbria. The green ovals on Map 5.7 show the approximate route that may have been taken using interconnecting rivers and river valleys and it is worth noting that several other CSBs in southern Scotland were also found along this suggested route.

CSBs 288 and 303 may have travelled further to the south towards Biggar which was an important junction on an east-west transisthmian routeway using the Clyde and Tweed (Noble 2006b: 188; Ballin 2008: 20-21). Another, LM CSB 016 was found in the vicinity of The Hewke, Sibbaldbie, Nr. Lockerbie which is close to the junction with Dryfe Water and the River Annan, which itself discharges into the Solway Firth approximately 7km from the mouth of the River Eden. I believe that the interconnectedness of the Rivers North Medwin, Clyde, and Annan plus the evidence of CSBs scattered along their routes indicate a potential routeway south, which may have been in use for millennia. These connections are probably confirmed in the well-known Borders saying *'Annan, Tweed and Clyde rise oot the ae hillside'* (out of the Lowther Hills); an adage which may have been in circulation for centuries or longer and used as an aide memoire for travellers.

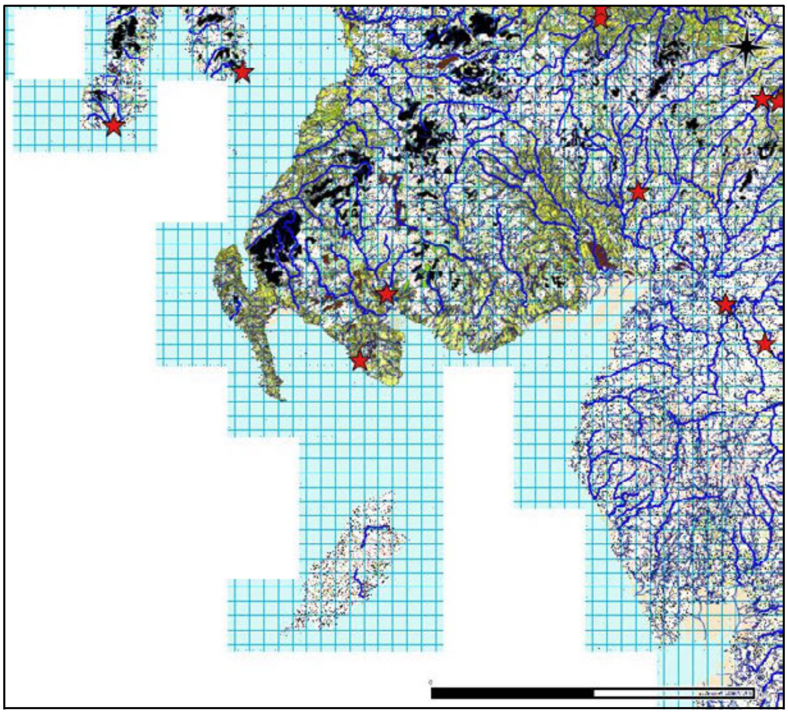
Map 5.8 indicates the locations of the most southerly CSBs which were both found in England. CSB 244 from Houghton-le-Side was found '*three feet below the surface one mile east of Dere Street'* (Speak and Aylett 1996: 179) which is midway between the Rivers Gaunless, Skerne and Tees. It is possible it initially found its way south from Scotland via a coastal route and then inland via the Rivers Wear or Tees and their tributaries. The other, CSB 475 was found during excavations at Sewerby, near Bridlington in East Yorkshire and was originally part of the collection of antiquarian Thomas Boynton, its finder. Although a long way from Aberdeenshire, the findspot is close to important sources of flint near Flamborough Head which are believed to have been traded north into Scotland during the Late Neolithic (Ballin 2011: 45-48, 50-53, 64). It is therefore tempting to suggest it may have been a novelty brought back from Scotland by local traders.

Region 4: River Eden to Loch Lochy

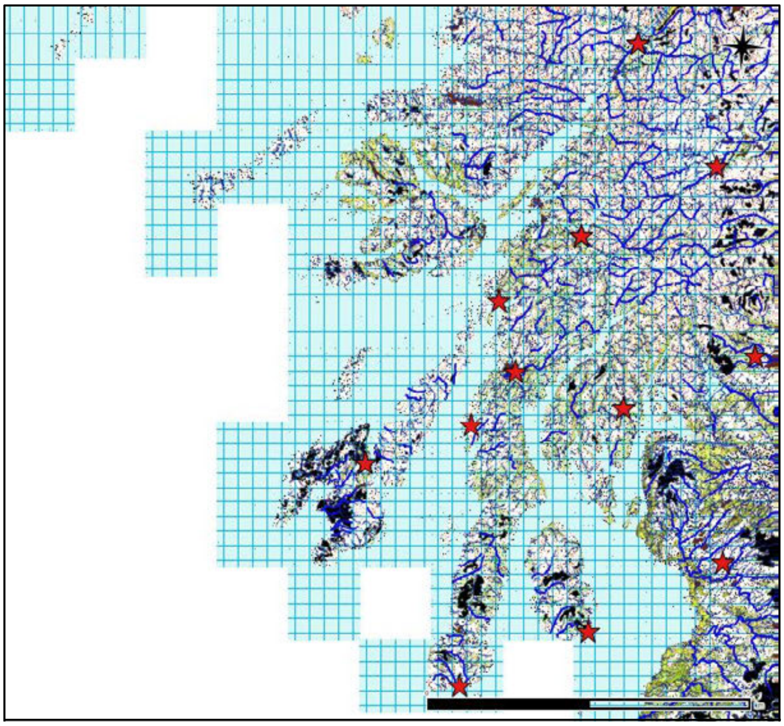
Map 5.9, which covers the southern part of region four includes Dumfries and Galloway, part of the Scottish Borders and the area south of Carlisle along the River



Map 5.8: CSB findspots (Region 3: South, Durham to Humber Estuary) compared with major rivers (named) and tributaries. © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt 2020.



Map 5.9: CSB findspots (Region 4: South, River Eden to Loch Lochy) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.



Map 5.10: CSB findspots (Region 4: North, River Eden to Loch Lochy) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

Eden in Cumbria. CSB 233 was found south of the Solway Firth at the village of Armathwaite which lies in the lower reaches of the mild and fertile Eden Valley in Cumbria. The other, CSB 026, was also found close to the River Eden at Stanwix, near Carlisle; it is yet to be characterized, but is almost certainly not made from locally available stone. Finally, two CSBs found north of the Solway Firth in Dumfries and Galloway also appear to be made from non-local materials and may have travelled from elsewhere.

Map 5.10 covers the northern part of region four where CSBs have been found on the Isle of Islay, the Isle of Arran and at several places on the west coast mainland, all of which tend to enjoy very mild winters despite their often exposed locations. As can be seen from Table 5.4 the underlying geology of this area is variable and although most CSBs have been found in areas where the farming potential of the land has yet to be identified, it could arguably be described in most cases as no better than marginal. The most northern CSB in this area was found at Loch Lochy on the Great Glen and the most southern at Dunaverty Bay near Campbeltown on the Kintyre peninsula; both of which have been visually characterised as having been made from Hornfels. This material is not found at either location and almost certainly originated from the Glens of Foudland in Aberdeenshire, as discussed in chapter four. CSB 078, reportedly found on Rannoch Moor, was made from Oolitic Ironstone from either the Isle of Rassay or the Isle of Skye and was again discussed in the previous chapter. As Maps: 5.11 and 5.12 show, the majority of CSBs in region four were located relatively near the coast suggesting they could have travelled to their final destination by sea.

Using the data summarised in Table 5.4 we can see that 94.12% of the CSBs found in region four were found in sheltered or moderately exposed

Table 5.4: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: River Eden to Loch Lochy. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
233	Armathwaite	~58-118 mtrs	Moderate with Fairly Mild Winters	Mudstone	Armathwaite Dyke: Basaltic-andesite	Microgranite/Acid Porphrite		Rich Fertile Soils
026	Stanwix	~20 mtrs	Moderate with Fairly Mild Winters	Sandstone				City, No Info
003	Moss of Cree	~8-18 mtrs	Moderately Exposed with Fairly Mild Winters	Wacke		Quartzite	Mineral Gleys	4.1
LM CSB 016	The Hewke	~109-206 mtrs	Moderately Exposed with Fairly Mild Winters	Meta-Sandstone & Meta-Mudstone			Brown Soils	4.2 & 5.2
328	Stellock	~43-65 mtrs	Exposed with Extremely Mild Winters	Wacke, Microgabbro	Microgabbro Dyke	Tuff	Mineral Gleys	3.1
068	Jockysthorn	~75 mtrs	Exposed with Fairly Mild Winters	Basalt, Olivine-macrophyric			Mineral Gleys	3.2
018	Lenzie	~50-70 mtrs	Moderately Exposed with Moderate Winters	Limestone		Greenstone (from the greenstone beds north of Glasgow)	Brown Earths	3.2
235	Dunaverty Bay	~1-5 mtrs	Exposed with Extremely Mild Winters	Conglomerate		Visually very similar to CSB 018 below)	Humus-Iron Podzols	3.2
376	Keills	~48-80 mtrs	Exposed with Extremely Mild Winters	Limestone, Metalimestone & Slate	Porphyritic Microgabbro Dykes	Hornfels	Brown Soils	5.1
101	Dippin	~114 mtrs	Exposed with Extremely Mild Winters	Mudstone, Sandstone with Analcime Gabbro in vicinity	North Britain Paleogene Dyke Suite: Basalt, Microgabbro & Andesite dykes			4.2
100	Dergarcha	~19 mtrs	Moderately Exposed with Fairly Mild Winters	Psammite	Microgabbro Dykes		Alluvial Soils	4.2

176	Kilchoan	~10-80 Mtrs	Exposed with Extremely Mild Winters	Semipelite	Basalt & Microgabbro Dyke Swarm			5.2 & 5.3
389	Castle Sween	~6 mtrs	Exposed with Extremely Mild Winters	Metabasalt & Quartzite			Brown Soils & Humus-Iron Podzols	5.2 & 5.3
390	Dunadd Fort	~5-30 mtrs	Exposed with Extremely Mild Winters	Metabasaltic Rock			Humus-Iron Podzols	4.2
287	Inverawe	~6-118 mtrs	Moderately Exposed with Fairly Mild Winters	Quartz-monzodiorite, Andesite & Basalt	Microdiorite & Appinitic Dioritic Dykes	Meladiorite	Humus-Iron Podzols	4.2
078	Rannoch Moor		Exposed with Rather Severe Winters	Granodiorite		Oolitic Ironstone	Peaty Gleys. Peaty Podzols & Basin Peat	6.3
286	Loch Lochy	~34-60 mtrs	Sheltered with Fairly Mild Winters	Psammite	Microdiorite, Felsite & Lamprophyre Dykes	Hornfels	Humus-Iron Podzols	5.2

locations with normally mild winters, the remaining 5.88% were found in more exposed locations, where the winters tend to be more severe. CSB findspots ranged from between 1 and 206mtrs above sea level with a mean altitude of 53mtrs. Opportunities for agriculture in these areas may have been more mixed; while only 31.25% of findspots here were capable of arable agriculture, 37.5% were capable of mixed agriculture: the remaining 31.25% only being suitable for rough grazing.

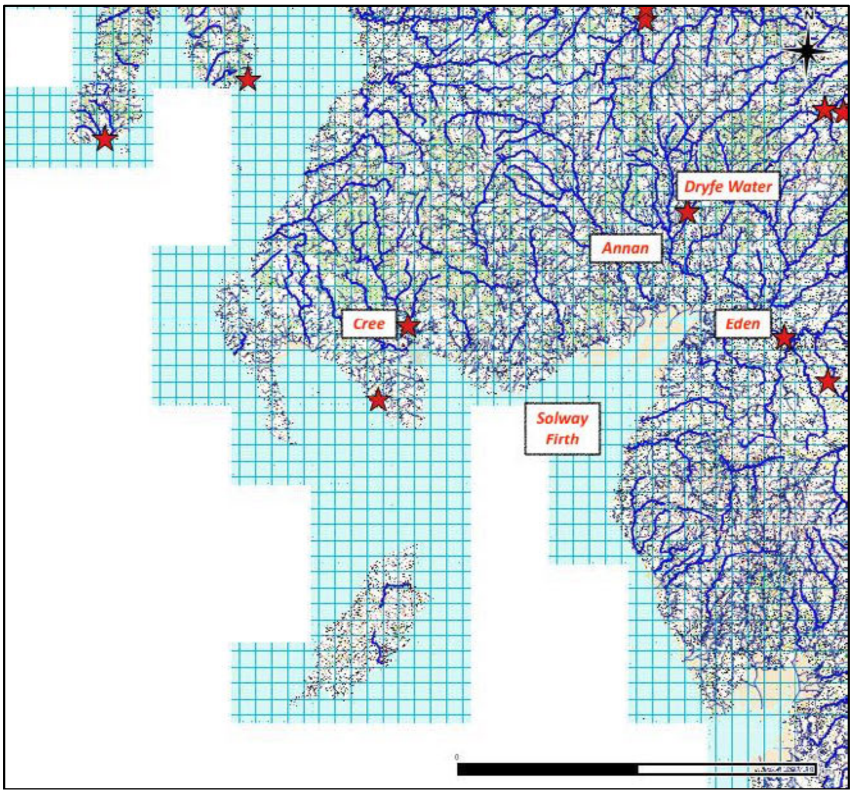
Region 5: Western Isles & Northwest Coast

Map 5.13 shows that the majority of CSBs in the Western Isles and on the northwest coast of the Scottish mainland have been found at low altitude coastal locations in areas of exposed or moderately exposed land which, while normally enjoying mild winters, has a marginal land capability. The underlying geology of this area is varied with both sandstone and volcanic rocks plus a considerable amount of Lewisian Gneiss and associated mineralisation. As Table 5.5 shows, some CSBs have been made from this Lewisian material, suggesting they were manufactured from stone that is only available in the far northwest of Scotland and the Western Isles. Others in this area have also almost certainly travelled from elsewhere and their distinctive morphology and materiality suggests they may have originated in Aberdeenshire.

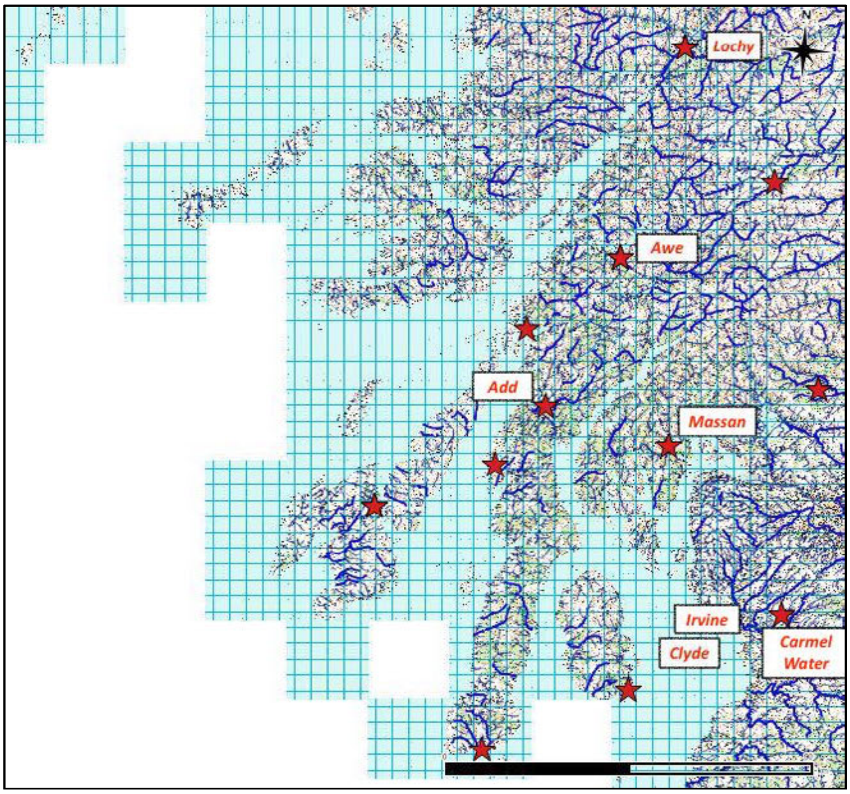
The fact that CSBs have been found so far out into the Atlantic is thought provoking. Although it is possible that some of these could have been manufactured by skilled local craftspeople, the care with which they have all been made, along with their distinctive morphology suggests otherwise. I would argue their distinctive style and finish suggests that those made from local materials in particular were made not by local people but by craftspeople from northeast Scotland. Sea travel between the Scottish mainland and the Western Isles has existed since at least the Neolithic and those CSBs found here suggest they or their makers may have taken one of two or possibly three separate sea routes. The two CSBs found in the southern half of the isles, on Benbecula and South Uist are both five knob variants which, along with another at Roag on the Isle of Skye, suggests that either they or their maker may have taken the relatively short southern sea route from Skye. No five knob variants have been found on the northern half of the Western Isles; of the four CSBs found here, three are six knob variants and the other is a particularly distinctive eight knob variant: it is probable that this latter example originated from the area around the River Ythan in Aberdeenshire, where most of this Type have been found.

The shortest northern sea route between mainland Scotland and the Isles of Lewis and Harris is between Poolewe/Gairloch and Stornaway and may have also been used by people during the Neolithic; in the last century it was also the route taken by boats carrying the mail (Haldane 1971: 176-179; MacKenzie 2012: 39). Historically the mail for Lewis and Harris was delivered to the mail boat in Poolewe at the end of a mail walk that started in Dingwall on the east coast, delivering to people living along its route. These 'mail walks' were designed to be the shortest and most direct route between two locations and this one also passed through Kinlochewe where another particularly well made CSB was found.

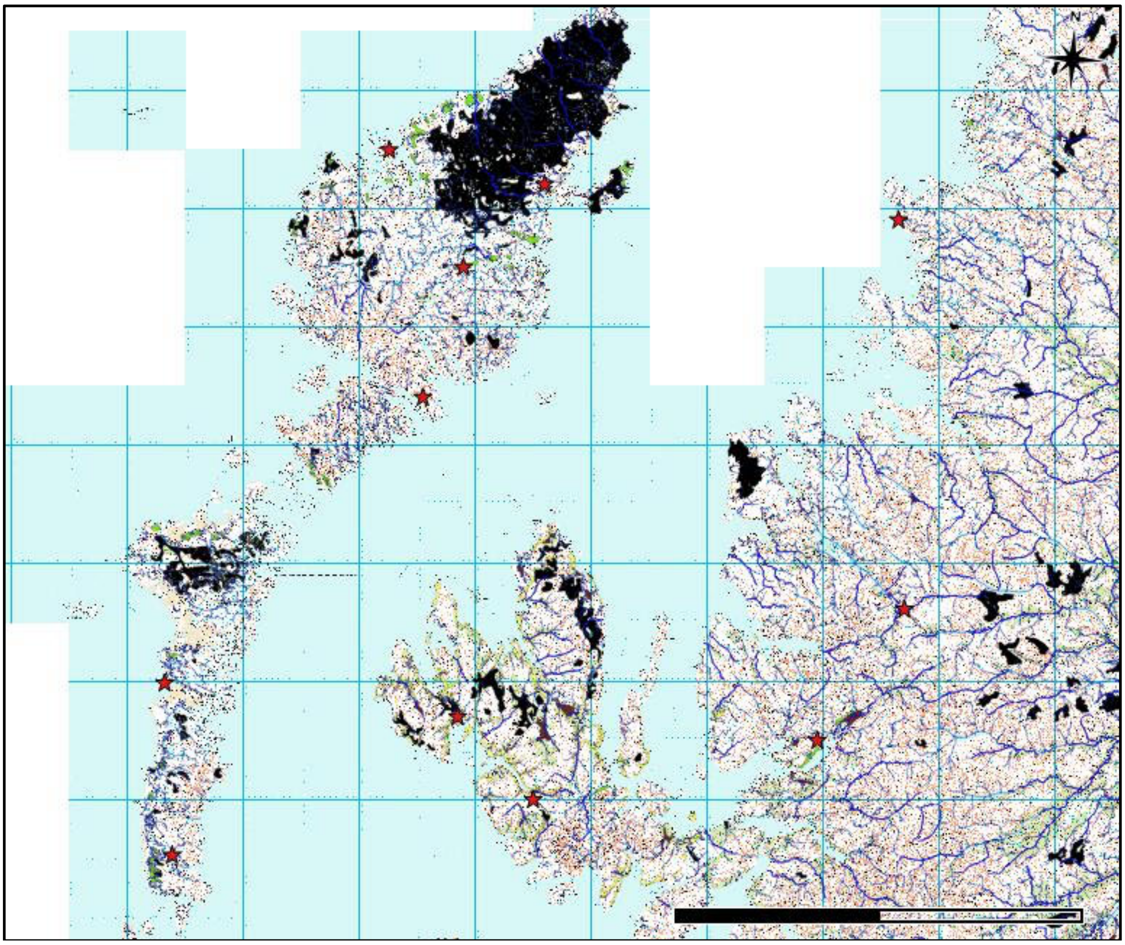
It is possible that this may have been a similar route to that used by Neolithic people travelling between the Moray and Cromarty Firths and the west coast via lochs,



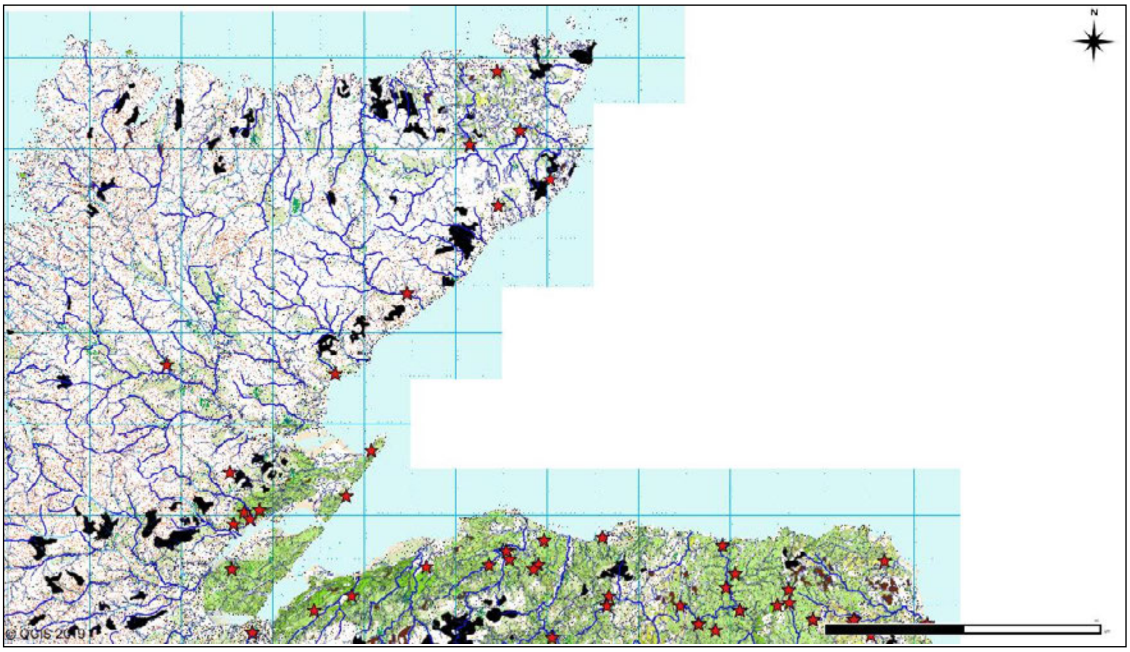
Map 5.11: CSB findspots (Region 4: South, River Eden to Loch Lochy) compared with major river (named) and tributaries. © Ordnance Survey 2020 (100025252) C. Stewart-Moffitt 2020.



Map 5.12: CSB findspots (Region 4: North, River Eden to Loch Lochy) with major rivers (named) and tributaries. © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt 2020.



Map 5.13: CSB findspots (Region 5: Western Isles & Northwest Coast) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.



Map 5.14: CSB findspots (Region 6: Moray Firth to Thurso) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

Table 5.5: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: Western Isles and Northwest Coast. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
409	Stoer	~5-60 mtrs	Very Exposed with Extremely Mild Winters	Sandstone, Scourian Gneisses & Scourie & Badcall Dykes	Scourie Dykes: Meta-microGabbro & Amphibolite Badcall Dykes: Meta-clinopyroxen-Norites	Gabbro-Norite (Badcall Dyke?)	Undefined	6.3
234	Bruchaig		Moderately Exposed with Moderate Winters	Sandstone, Psammite & Orthogneiss		Peridotite	Alluvial Soils	5.2
015	Laxdale	~3-25 mtrs	Exposed with Extremely Mild Winters	Conglomerate		Hornblend Gneiss	Mineral Gleys & Alluvial Soil	4.1 & 6.1
070	Croir	~9-69 mtrs	Exposed with Extremely Mild Winters	Gneiss	Amphibolite		Peaty Gleys	6.3
440	Balallan	~7-106 mtrs	Exposed with Extremely Mild Winters	Protocataclastite, Amphibolite and Gneiss			Humus-Iron Podzols	5.2
020	Kyles Scalpay	~9-80 mtrs	Very Exposed with Extremely Mild Winters	Gneiss			Peaty Gleys	5.3
431	Benbecula	~2-5 mtrs	Very Exposed with Extremely Mild Winters	Lewisian/Scourian Gneiss	Ortho-Amphibolite	Probably Lewisian Hornblendite	Undefined	4.2, 5.1, 5.2, 5.3 & 6.3
436	Lochboisdale	~2-10 mtrs	Very Exposed with Extremely Mild Winters	Lewisian Gneiss		Garnet Metabasite	Undefined	6.3
214	Roag	~10-26 mtrs	Exposed with Extremely Mild Winters	(Sky Lava Group) Basalt & Microgabbro		Reina Lava (Skye Lava Group)	Brown Earths	5.1
454	Satran	~9-50 mtrs	Moderately Exposed with Fairly Mild Winters	Basalt	Hawaiite & Trachyte Dyde		Unidentified	5.2
LM CSB 002	Jeantown (Lochcarron)	~84 mtrs	Moderately Exposed with Fairly Mild Winters	Psammite & Mylonites		Probably Limestone	Humus-Iron Podzols	5.1

Table 5.6: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: Moray Firth to Thurso. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
351	Olrig	~20-140 mtrs	Exposed with Fairly Mild Winters	Siltstone, Sandstone & Mudstone		Hornfels	Humus Iron Podzols + Some Alluvial	3.2, 4.1, 4.2 & 5.3
392	Ben Tharsuinn	~714 mtrs	Extremely Exposed with Very Severe Winters	Augen Gneiss, Granite & Gneissose.		Sandstone	Peat	7
368	Alness	~16-64 mtrs	Moderately Exposed with Fairly Mild Winters / Moderate Winters / Sheltered with Moderate Winters	Sandstone		Dolerite	Humus-Iron Podzols with some Alluvial Soils	2 & 3.1
424	Greenlonachs	~110-150 mtrs	Moderately Exposed with Moderate Winters	Sandstone		Diorite	Humus-Iron Podzols	3.2
470	Ben-a-Chielt	~287 mtrs	Exposed with Fairly Mild Winters	Sandstone			Blanket Peat	6.3
396	Contullich	~92-134 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone		Metabasite	Humus-Iron Podzols	3.1
469	Watten	~17-35 mtrs	Exposed with Fairly Mild Winters	Siltstone, Mudstone & Sandstone		Quartzite	Mineral Gleys	3.2
471	Kilphedar	~69 mtrs	Moderately Exposed with Moderate Winters	Granite & Microgranite		Sandstone	Brown Soils	5.3
029	Novar	~8-317 mtrs	Sheltered with Moderate Winters/Moderately Exposed with Fairly Mild Winters/Moderately Exposed with Moderate Winters	Sandstone		Andalusite Crystals in Grey Matrix	Humus-Iron Podzols	3.1 & 4.2
064	Balnaguisich		Moderately Exposed with Fairly Mild Winters	Sandstone			Humus-Iron Podzols	3.1
367	Achness	~21 mtrs	Sheltered with Moderate Winters	Psammite & Orthogneiss	Hornblendite Dyke		Humus-Iron Podzols & Alluvial Soils	4.1, 5.3 & 6.1
LM CSB 013	Dale Moss	~64-68 mtrs	Exposed with Moderate Winters	Siltstone, Mudstone & Sandstone			Blanket Peat	6.3

474	Tarbat Church	~15 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone		Amphibolite	Humus-Iron Podzols	3.1
487	South Yarrows	~117 mtrs	Exposed with Fairly Mild Winters	Siltstone, Mudstone and Sandstone			Peaty Gleyed Podzols	6.3
033	Novar	~6-120 mtrs	Moderately Exposed with Fairly Mild Winters/Sheltered with Moderate Winters/Moderately Exposed with Moderate Winters	Sandstone			Humus-Iron Podzols	3.1 & 4.2
473	Balintore	~6-27 mtrs	Moderately Exposed with Fairly Mild Winters	Sandstone			Humus-Iron Podzols	3.1
398	Tomnahurich	~56 mtrs	Sheltered with Fairly Mild Winters	Sandstone		Actinolite	Humus-Iron Podzols	3.1
210	Golspie Tower Farm		Moderately Exposed with Fairly Mild Winters	Sandstone, Mudstone, Chert & Limestone		Porphyrite	Humus-Iron Podzols	3.2

rivers, and straths. All the CSBs found along this route are skilfully made, as are those found in Lewis and Harris. The morphology of those found in Lewis and Harris suggests that a different craftsperson from those found in the southern half of the Western Isles could have been involved in their manufacture.

Using the data summarised in Table 5.5 we can see that 100% of CSBs in region five were found in sheltered or moderately exposed locations with mild winters. The maximum and minimum altitudes of each location were between 2 and 106mtrs above sea level with a mean altitude of 33mtrs. While none of the findspots in region five were capable of arable agriculture alone, 18.8% were capable of mixed agriculture and only 4.79% were suitable for rough grazing: the remaining 76.41 % being completely untamed.

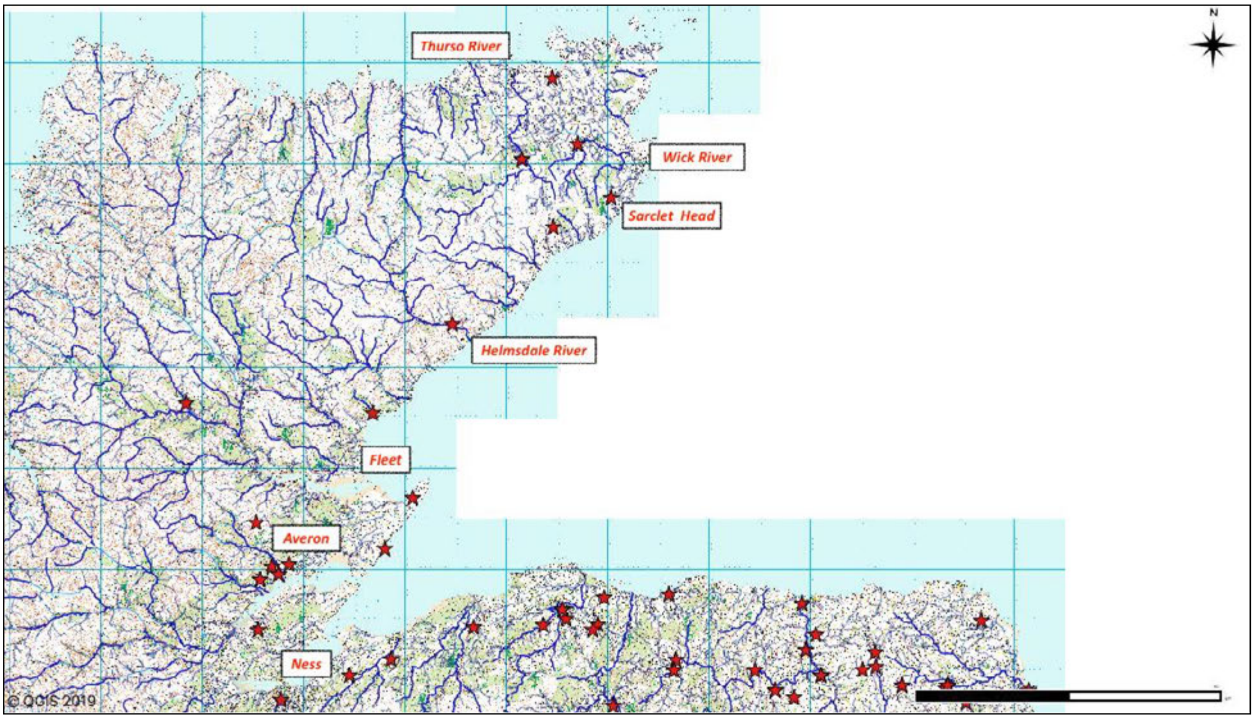
Region 6: Moray Firth to River Thurso

Map 5.14 shows CSBs found on the east coast between the Moray Firth and Thurso. While many of those found around the Moray and Cromarty Firths were located on Type 3.2 - 4.2 soils, those found further north were located on relatively small pockets of marginal soils. In the south most are located on land underlain by sedimentary rocks which produce good quality Type 2 - 3.1 soils and when combined with sheltered or moderately sheltered locations and fairly mild winters offer good arable conditions.

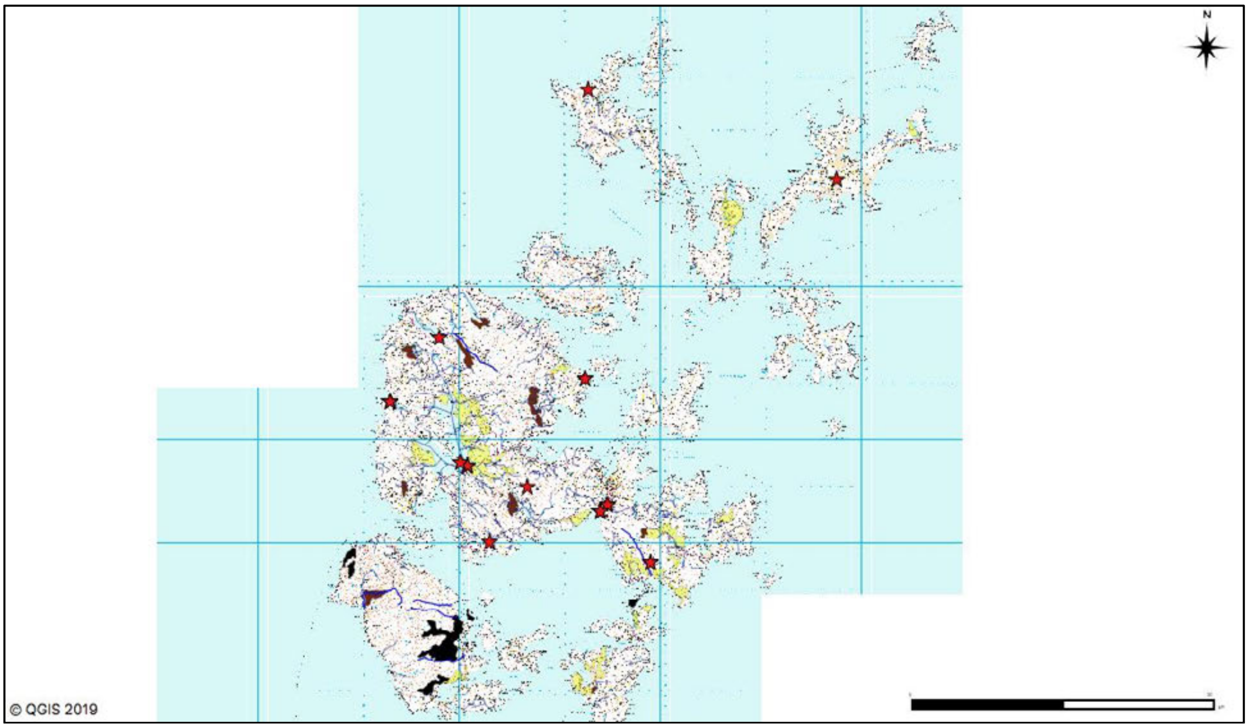
Using the data summarised in Table 5.6 we can see that 94.4% of the CSBs in region six were found in sheltered or moderately exposed locations which tend to have mild winters, the remaining 5.6% were found at higher and more exposed altitudes, where winters are more severe. Region six CSB findspots were located at an altitude of between 6 and 714mtrs above sea level, the latter being a mountain top location, with a mean altitude of 124mtrs. Only 55.56% of the above locations in this region were capable of arable agriculture, 22.22% were capable of mixed agriculture and the remaining 22.22% were only suitable for rough grazing.

Map 5.15 shows that apart from a distinct grouping of CSBs on the north side of the Cromarty and Moray Firths and that found inland near the waterfall at Achness, most were found relatively near the coast. How CSBs arrived in these remote locations is unknown but it is possible they were subject to, 'down the line exchange and trade' between local people and itinerant summer inshore trading ventures, like the flint traders from Yorkshire who are believed to have traded as far north as Orkney.

The north/northeast coast of Scotland is mainly comprised of a combination of stony beaches and high sea cliffs, however most CSB findspots along this section of coast are either near a river estuary or offer an alternative safe landing place such as a sandy beach. The final scatter between Wick and Thurso in Caithness almost certainly derives from exchange focused on people that lived along the Wick and Thurso river valleys and were, from their materiality, probably made in and around Aberdeenshire.



Map 5.15: CSB findspots (Region 6: Moray Firth to River Thurso) compared with major rivers (named) and tributaries. © Ordnance Survey 2020 (100025252) C. Stewart-Moffitt 2020.



Map 5.16: CSB findspots (Region 7: Orkney) compared with farming potential based on Underlying Geology, Climate and Altitude. Yellow signifies: Arable. Green signifies: Mixed Agriculture. Black and Brown: Blanket and Basin Peat. © Ordnance Survey 2020 (100025252) and © James Hutton Institute. C. Stewart-Moffitt 2020.

Region 7: Orkney

The majority of CSBs from Orkney, Map 5.16, were found on land that currently remains unclassified; while some of this may be marginal a high proportion of Orkney offers good quality grazing land. As Table 5.7 shows, the underlying geology of those parts of Orkney where CSBs were found is mainly comprised of sedimentary rocks with some camptonite dykes; being hard, the latter material was often used for the manufacture of stone tools. Most of Orkney lies at a relatively low altitude, situated as it is between the Atlantic Ocean and the North Sea, making it very exposed: despite this it tends to have very, to extremely mild winters.

Table 5.7: Locational, Underlying Geology, Intrusions, CSB Materiality and Soil Information and contemporary Macaulay Land Classification for CSB findspots: Orkney. C. Stewart-Moffitt 2020.

Climate (Col 4)	Sheltered to Moderately Exposed/Fairly Moderate or Mild Winters	Sheltered to Moderately Exposed/Moderate or Mild Winters	Sheltered to Moderately Exposed/Rather Severe Winters	Exposed Rather Severe Winters

Macaulay Land Classification (Col 9)	Arable Agriculture	Mixed Agriculture	Improved Grassland	Rough Grazing

CSB	~Location	~Altitude	Climate	Underlying Geology	Dykes & Intrusions	CSB Geology	Soil Type	Macaulay Land Classification
242	Ness of Brodgar	~4 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone			Brown Soils	4.1
048	Stenness	~1-37 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone			Brown Soils & Mineral Gleys	4.2 & 5.1
059	Hillhead	~77 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone		Microgabbro	Mineral Gleys	4.2
045	Hillhead	~77 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone			Mineral Gleys	4.2
051	Sanday	~3-23 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Sandstone & Mudstone		Sandstone	Brown Soils & Calcareous Soils	4.2 & 5.2
416	Hall of Rendall	~6 mtrs	Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone			Brown Soils	4.1
238	Holm	~9-62 mtrs	Very Exposed with Extremely Mild Winters	Siltstone,Mudstone & Sandstone			Brown Soils & Peaty Gleys	4.1, 5.1 & 5.2
239	Skara Brae	~5-63 mtrs	Very Exposed with Extremely Mild Winters	Siltstone,Mudstone & Sandstone	Camptonite Dykes		Brown Calcareous Soils	5.2
493	Skara Brae	~9 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone	Camptonite Dykes		Brown Calcareous Soils & Saline Gleys	5.2 & 6.2
498	Skara Brae	~10 mtrs	Very Exposed with Extremely Mild Winters	Siltstone, Mudstone & Sandstone	Camptonite & Lamprophyre Dykes	Dolerite	Calcareous Soils	5.2

Relatively low-lying, Orkney CSB findspots in region seven were at an approximate altitude of between 1 and 77mtrs above sea level with a mean altitude of 29mtrs. CSB findspots in this region were split 50/50 between arable and mixed agriculture. As discussed in chapter seven, Orkney CSBs have distinct morphological characteristics and, while a few almost certainly derive from exchange, the majority seem to have been made locally from local materials.

Summary

It would appear that people were generally taking advantage of the best quality land available to them in climatically stable areas and where possible avoiding exposed or poorly drained land and stony wastes. The limited availability of top quality 'brown earth soils' meant this type of land would not always be available for growing arable crops which suggests that the main occupation of many was more likely to have been animal husbandry. The proximity of CSBs to rivers is noticeable and while it may have been largely due to the needs of animals, it also offered people a way of travelling through the landscape to meet and trade with others. It seems evident that rivers and their connection with the coast also offered a faster way of moving CSBs over larger distances, avoiding otherwise inhospitable terrain.

The distribution of CSBs by land, river, and sea

Although it is not possible to define exactly how CSBs were transported around Scotland, it is probable they not only travelled overland, but also by river and sea in much the same way as people and goods moved around Scotland until the early part of the twentieth century. Some particularly distinctive stone resources such as flint, pitchstone, bloodstone and porcellanite certainly travelled by sea and allow us a glimpse of the routes and distances involved.

Journeys by land and by river

The first routeways through the landscape would have been created by animals looking for fresh sources of grazing with many following rivers and streams to ensure access to water. As Mesolithic and Neolithic populations flourished, these already well-trodden pathways would have expanded into a network linking individual groups of people (Noble 2017: 78). A journey along these river networks may have involved some travel on water and despite the potential dangers of rapids and flash floods, people would have used them to meet other groups, to trade and to provide access to natural resources (Noble 2006b: 183-190).

Although log boats (McGrail 1998: 56-87; Van de Noort 2012: 92) or coracles (Hornell 1946: 127-131; McGrail 1998: 173-191) may have been used to travel on deeper and unobstructed sections of river, the dangers of capsizing and sinking due to semi-submerged trees and other river debris, would have been a constant threat, especially in the spring and autumn or after storms, to say nothing of the difficulties of paddling against a fast flowing current or through rapids. Even a lightweight craft such as a coracle would have been cumbersome to transport for any distance on foot and it is likely that crossing rivers may have relied on more expedient methods where necessary. Travelling on foot, closely following the banks of rivers and burns, may also have been physically challenging because of fallen trees and undergrowth (Noble 2017: 43, 70, 77-78; Haughey 2016: 110), while wild animals and bogs could have presented other serious hazards. It is probable that islands, river confluences and oxbows all offered safe places to stop overnight or meet, trade, and find new partners. It is clear however that some travel would only have been possible at specific times of the year, perhaps timed to coincide with the celebration of important events at monumental locations along the way or when rivers were not in spate or blocked by debris.

Evidence of early prehistoric log boats is more often found in northwest Europe and Ireland rather than in Scotland, due to the combination of the timber used and its burial conditions (Cheape 1999: 852). In Ireland, log boats have been in existence for over 7000 years, the earliest being dated to the late Mesolithic or early Neolithic. Three have Neolithic radiocarbon dates: Co. Antrim *3700-3382 cal BC*; Co. Armagh *3620-3340 cal BC* and Co. Fermanagh *3502-3350 cal BC* while another from Co. Down had a dendrochronological date of 2739 ± 9 BC (Fry 2000: 123-128). While several log boats have been found in Scottish rivers, none have been radiocarbon dated to the Neolithic. Most of these were found during the Improvement Period and were subsequently lost before radiocarbon testing became available in the mid twentieth century. Although one found near the River Clyde at Old St Enoch's Church in Glasgow in 1780, was dated to the Neolithic by association from a Jadite Axe found in its forepart (Mowat 1996: 40) and another, found further down the Clyde near Milton Island, Dunglass in 1868 was dated by association from the six Stone Axes found in its interior (Mowat 1996: 72).

Coracles of one kind or another made from a frame of willow withies and covered with skin or hide have been used the world over for millennia. They were more recently known to have been used, until the late nineteenth century, on the River Spey where they were called 'curraghs' and were used for fishing and the movement of rafts of timber (Hornell 2014: 111-129). The only surviving Scottish coracle from this period is now in the collection of the museum at Elgin and was found in the rafters of a cottage at the Mains of Advie in Moray sometime around 1868 (Elgin Museum pers.

comm.). The earliest potential evidence for a coracle was found during the excavation of an early Bronze Age cemetery at Barns Farm, Dalgety in Fife, when a large wicker 'coffin' was discovered containing a crouched inhumation, cremated remains and a food vessel. It was hollow, with an elongated D shaped profile, its bottom and flared sides made from a very thin organic material which, from later analysis, was shown to be hide. The excavator noted it was associated with a fishy deposit (excavator's comments – undefined substance). This, along with its size and shape and the fact that it was close to the River Forth, led the excavator to speculate that the 'coffin' may have actually been a coracle (Watkins 1980: 317-286).

People have settled beside rivers for millennia and many early civilisations were founded on major rivers like the Nile, Tigris, Euphrates, Danube, Indus and Yangtse (Vianello 2015: 2). In the same way the early inhabitants of Scotland also settled near the junctions of major rivers and their estuaries. Further inland, river confluences also seem to have been important places to gather, form communities and build monuments. The courses of rivers in the Late Neolithic would have undoubtedly looked quite different to those of today as work undertaken during the Improvement Period removed meanders, oxbows and boggy areas by straightening, canalising, diverting, and dredging to improve haugh lands in the valley bottoms, making them suitable for the new and improved methods of farming that were being adopted. Weirs associated with the large number of mills that sprang up in the Aberdeenshire countryside during the seventeenth and eighteenth century changed, not only the course of rivers but also their depth, making it more difficult today to visually assess how the prehistoric riverscape may have looked in the Late Neolithic.

Probably the nearest we can come to seeing the original course of the main rivers and streams during that period is from General William Roy's 'Great Map', otherwise known as 'The Military Survey of Scotland 1747-55'. Commissioned and used by English Army patrols to suppress rebellious Scottish Clans, it was 'critical' that the courses of all rivers and streams were accurately surveyed (Tabraham 2007: 32; Gardiner 1977: 441). Assuming Roy's Map was as accurate as later commentators suggest, this may be as close as we can get to the Neolithic riverscape, or at least a pre-modern riverscape. A glimpse of the changes made by later farming and milling needs can, in some places, be traced in Google Earth satellite images which show faint images of relict river channels, oxbows and previously boggy land that may have existed in an earlier period. It's interesting to consider that, had the Great Map not been produced when it was, this ancient prehistoric riverscape would have been lost as, just forty years after it was completed, the advent of the agricultural and industrial revolutions changed the Scottish landscape forever.

As can be seen from the maps in this chapter the majority of CSBs were located near rivers and their tributaries, with the average distance being 2.55km from the nearest. Neolithic farmers had an absolute need to be near secure sources of fresh running water as, while Neolithic cattle were smaller than those farmed today, around the size of the modern Dexter (weighing approximately 300kg) or ancient Chillingham breeds (weighing approximately 280kg), they still needed between six to twelve gallons of water a day and up to twice that in the summer or when the females were lactating (Cummings and Morris 2018: 2).

It has been suggested previously that several overland routes using rivers and long-established pathways, as well as inshore coastal routes and in some cases longer sea journeys were how CSBs travelled from their heartland in Aberdeenshire, throughout Scotland, to the Isles and south into England. In some instances, they may have travelled with a single individual, in others they may have been traded person to person over time, during many shorter journeys. Regardless of how the actual mechanism of travel might have taken place, the findspots of outlying CSBs offer an opportunity to speculate on the possible routes used by Neolithic people.

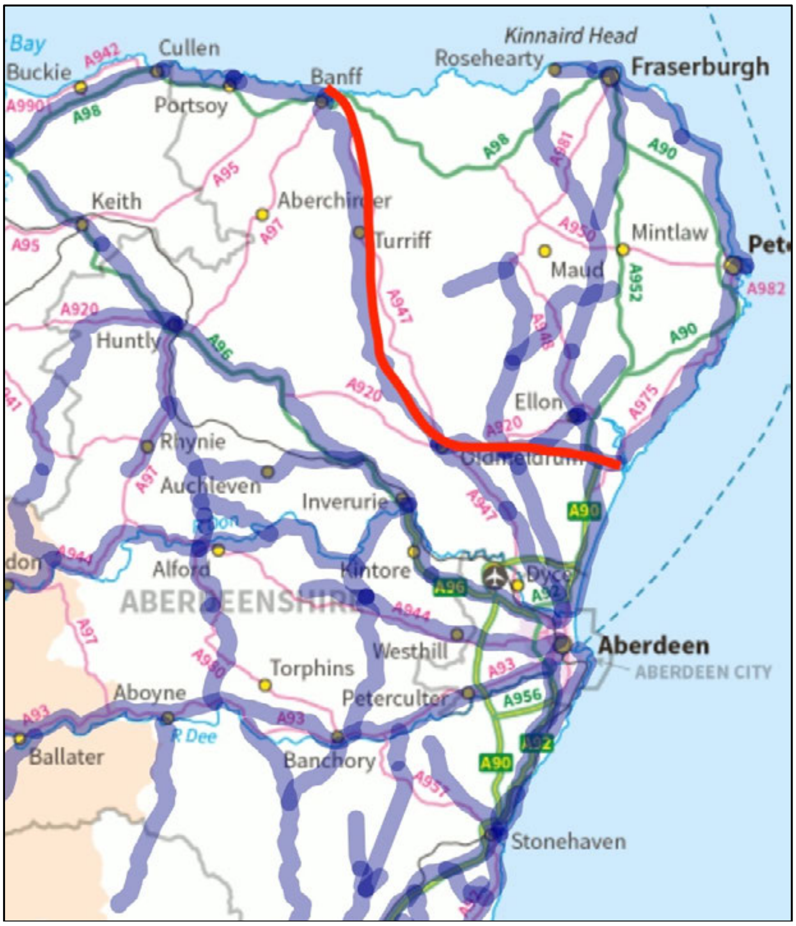
While the River Ythan is not physically connected to the River Deveron, they are connected by an overland route in the form of a gentle Strath. Approximately 8km long and bounded by broad rolling hills, this route was surveyed by General Roy for use as a military road between Oldmeldrum and Banff (Roy's Roads: 2015). The section between Oldmeldrum and Turriff was later used as a drove road to walk cattle to market (Haldane [Map]: 2015) and it is probable that such routes had been used for millennia, Map 5.17. The River Ythan and River Deveron may also have provided a safe overland short cut between the North Sea, at Newburgh on the east coast of Aberdeenshire and the Moray Firth at Banff, avoiding an otherwise circuitous and exposed sea voyage around Kinnaird Head and the rocky shoreline between Rosehearty and Banff (Noble 2006b: 184-185).

Roy surveyed another route to the north and west of the country over the Cairngorm mountains from Alford via Kildrummy, Strathdon and Tomintoul to the River Spey; CSBs have been found in all these locations, Map 5.18. The scattered linear nature of CSBs found along the River Spey from Cromdale to Kingussie and Loch Lochy also suggests that the gently sloping land of Strath Spey may have been a large part of a northeast to west coast routeway. Haldane shows that sections of this route were also in use as drove roads for centuries.

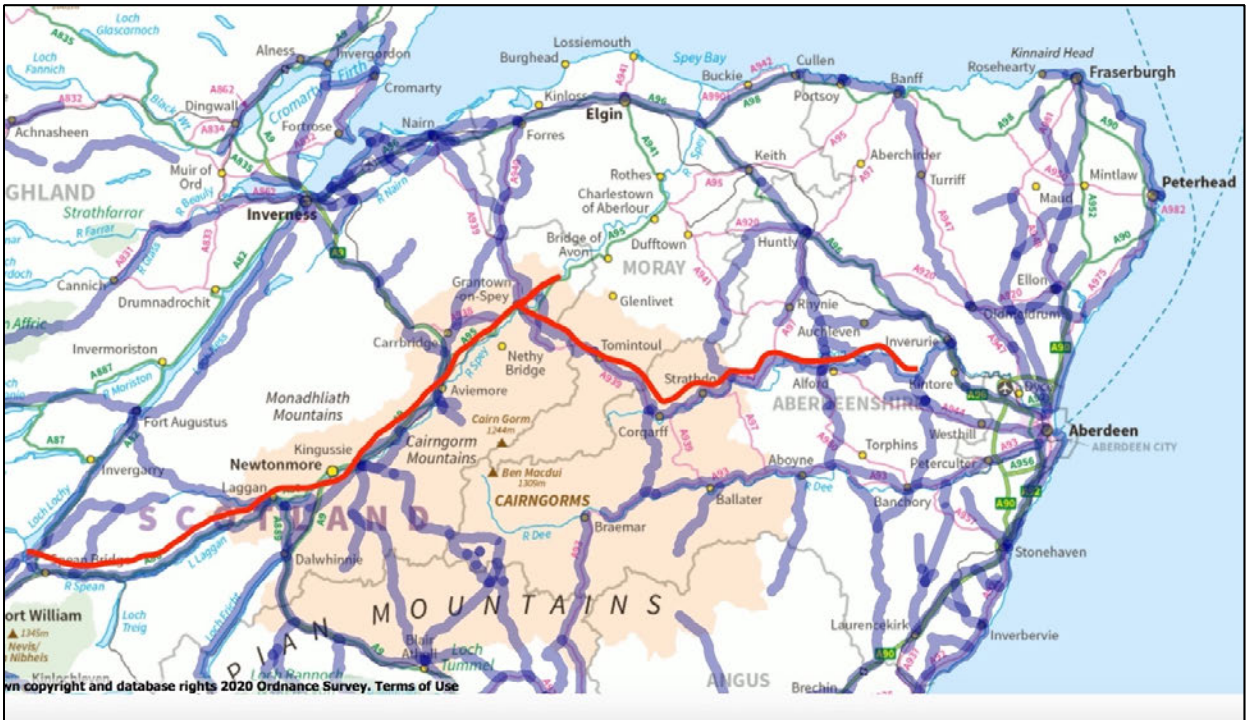
While the tracing of such routeways is speculative, by using CSBs as material markers it may be possible to suggest some of the routes taken by Late Neolithic people. Further confirmation of the existence of these routeways might be discovered by using other types of material culture, monuments, and evidence of habitation in the form of pits etc.

Journeys by Sea

Travel to places separated by impenetrable, hilly, mountainous, or boggy terrain may have necessitated taking more circuitous routes and it is probable that people travelling to coastal locations made the journey by boat rather than on foot. Travel to the Western Isles and Orkney especially would have to be made by sea using the shortest possible route. It seems unlikely that log boats would have been stable enough for anywhere other than rivers and estuaries unless they were lashed together in pairs or had outriggers. Although evidence exists for paired log boats in the Indian sub-continent, Oceania, and Poland, none exists for Britain, Ireland or in the North Sea basin (McGrail



Map 5.17: Potential route between Newburgh and Banff avoiding Kinnard Head (marked red). Blue lines indicate the route or roads surveyed by General Roy. After Roy's Roads website ©Simpson, D. 2015. C. Stewart-Moffitt 2020.



Map 5.18: Potential routeway between Aberdeenshire and Loch Lochy with northern spur to Cromdale (marked red). Blue lines indicate the route or roads surveyed by General Roy. After Roy's Roads website ©Simpson, D. 2015. C. Stewart-Moffitt 2020.

1998: 70-71; Van de Noort 2012: 154-157). Without a large crew the beaching and relaunching of log boats in surf would have been impossible because of their weight, rigid construction, and inflexibility while a larger crew to enable beaching and relaunching would have left less room for cargo. Coracles would have also proved impractical due to their lightweight construction, making it unlikely they would survive a sea journey.

Other than the two types of vessels mentioned above what else might have been available to Late Neolithic travellers for coastal voyages? It has been suggested that hide or skin covered boats were probably commonplace in the four or five millennia following the last glacial retreat and were responsible for the settlement, not only of Britain, but also Ireland (McGrail 2004: 172; Van de Noort 2012: 149). The use of such boats is nevertheless theoretical, their relatively lightweight organic construction is unlikely to have survived burial and to date no trace of skin covered boats from the prehistoric period have been found. However marine archaeologist Robert Van de Noort suggests that archaeological evidence of early paddles might be considered testimony to their existence (2015: 32). Despite the uncertainty surrounding such craft, practicality suggests that early Neolithic settlers would almost certainly have resorted to hide or skin boats to cross between Europe and Britain. Although it has been argued by some researchers that skin boats would have quickly become waterlogged, a modern voyage, undertaken by Tim Severin in the skin boat Brendan seems to counter this argument (Cummings and Morris 2018: 2; Van de Noort 2015: 32; Severin 2005: 261). The Brendan, built to prove the voyages of St Brendan the Navigator, had a length of 11mtrs and a displacement of around five tonnes (Severin 2005: 257-267).

Our current knowledge of skin boats stems from the modern Irish Curragh and the Greenland Umiak used for whaling; both are built from a lashed wooden framework which was covered with sewn hides or skin. In terms of size the Dingle Curragh is around 7mtrs in length and the Umiak around 9mtrs in length, allowing ample room for both crew and cargo. All of these skin boats could be propelled by oar or sail (Hornell 2014: 155), although it is generally thought that Neolithic skin boats would have been paddled, as sails do not appear to have been used until the Late Bronze Age or later. Despite this, Claidhbh O'Gibne, who has studied and built prehistoric styled curraghs in Ireland, believes that slatted sails made from woven willow mat may have been available to early skin boat navigators (O'Gibne 2012: 145-146).

Sea voyages in the Neolithic would only have been undertaken by those with considerable experience of the sea who understood the vagaries of the weather and tidal conditions (McGrail 1998: 258-285; Cooney 2003: 324-325). In Scottish waters it is probable that most journeys would have been undertaken between April and October to avoid late winter storms and to take advantage of the often relatively settled weather in the early autumn. An intimate knowledge of the coastline and landing places would be essential, along with both topographical and man-made landmarks such as burial cairns (McGrail 1998: 276-278; Cooney 2003: 325; Noble 2006: 109-115). These Neolithic navigators would be acknowledged experts in their field, 'professional boatmen', whose expertise could be called upon by those wishing to travel or trade further afield. Although such terminology is modern and may seem grandiose for the period, we should fully acknowledge their unique skills and fearlessness in the face of such a potentially dangerous and unforgiving environment and in such relatively slight craft.

Landing places would have been particularly important to prehistoric navigators as hide or skin covered boats would generally be unsuited to rocky or stony shores, with sandy beaches being the preferred option. Beaching and relaunching these boats would have been a relatively simple process when compared with a log boat. Even with a small crew, the provision of a few lightweight rollers or inflated seal skins, would have greatly assisted the process of rolling the boat into or out of the water and cushioning it from damage. Once out of the water the boat could be quickly unloaded, turned upside down and used as a makeshift shelter from the weather (McGrail 1998: 267).

River mouth locations like the Culbin Sands near Findhorn, Littleferry near Golspie and Luce Sands on the south-west coast have been described by researchers as 'maritime havens'. These were locations that offered a sandy beach, a secure place to shelter from the elements and the potential to hold 'beach markets' to trade safely with local groups (Bradley et al. 2016: 2). In addition to these 'maritime havens', sandy beaches and other coastal locations would have offered relatively safe landing places in the event of a storm and allowed traders and others access to groups living near the coast. CSB 487 for example, found at South Yarrows, may well have arrived by sea. Despite being thwarted by high cliffs along this part of the coastline, with no obvious landing places, a narrow cleft in the cliffs at Sarclett may have offered access to this community and a safe haven in the event of bad weather.

Sarclett Haven was used as a fishing station in the early nineteenth century and there was a proposal to build a village here c.1803, the stony beach seen in Figure 5.2 might not have proved an ideal landing place for a skin boat, but it is the only practical location for a considerable distance in either direction where a landing might be made along this section of coast.

Voyage lengths based on a replica skin boat and curragh

In 2016 a replica of a prehistoric skin boat made from willow and cowhide and crewed by five volunteers from the Orkney Rowing Club, was rowed 14km across the Pentland Firth in 4hrs and 50 minutes (Orcadian: 2016). As they had to negotiate strong local tidal conditions the actual distance travelled was much greater than this. Taking these figures as a rough guide and using tides to their advantage, Neolithic navigators would probably have been able to easily achieve distances of at least 14km a day, a distance which readily equates to suitable and regularly occurring landing places along much of the east coast of Scotland, apart from the section between Latheronwheel and Wick. Travel on any day would of course have been weather dependent and many journeys would have been delayed by inclement weather. Despite these delays journey times might have been offset by travelling for longer distances during the long hours of daylight and calm evenings that Scotland enjoys during the summer and autumn.

Anecdotal evidence of travel by skin boat comes from the voyage of the Causeway Coast Maritime Heritage Group currach Colmcille from Ireland to Iona in 1997. Unlike its prehistoric predecessor, made from a willow frame covered with hide, the Colmcille had a timber framework, covered with canvas, in the style of a traditional curragh or Naomhog. She was considerably sleeker and lighter than a prehistoric boat and was 12mtrs in length, she carried a crew of twelve and was able to island hop up to 32km a day. Each pair of oars were rested for ten minutes in each hour and all oars were rested for an hour in the middle of the day, enabling an overall speed of around three knots (Ruddock pers. comm.). The 7.6mtr replica willow and hide boat, built by Claidhbh O'Gibne at the Boyne Currach centre was considerably heavier because of its more robust construction and so may have been somewhat slower. Since her launch Colmcille has made several more voyages to Scotland, France, and Portugal, proving that skin boats were certainly capable of such voyages. As was suggested earlier many of her voyages were disrupted by bad weather, causing inevitable delays or diversions.

The geological characterization described in chapter four suggests that the majority of CSBs may have been manufactured in Aberdeenshire with a small number being carried over the sea to the Western Isles, Ireland, and Orkney; these potential sea routes will be examined next.

Summary of Sea and River Travel

Skye and the Western Isles

As discussed in chapter four, it is argued that some of the CSBs found in the Western Isles may have been made in the islands from locally available materials. Nevertheless, the quality of the craftsmanship involved suggests that rather than being made by a local craftsperson they could have been made by a traveller from northeast Scotland who was skilled in their manufacture. It is known that sea travel existed between the Scottish mainland and the Western Isles during the Neolithic as evidenced by the number of Neolithic tombs (Henshall 1972: 113-120, 117, 119) and Late Neolithic domestic structures (Ballin Smith 2018: 64) found there. As noted earlier, two or three routes might be suggested to provide access from the mainland to locations in the Western Isles where CSBs have been found, some of which may have involved island hopping. One is via a relatively short southern sea route (approximately 57km), from Loch Brackadale on the Isle of Skye to Lochboisdale on Uist, while another is via Loch Dunvegan, also on Skye, to the island of Benbecula (approximately 45km). The third route is from Poolewe or Gairloch on the Scottish mainland to the Eye peninsula on the Isle of Lewis, which is, at around 60 to 70km, the shortest crossing between these two points.

Figure 5.2: Sarclett Haven, Caithness © Google Images 2020.

Northern Scotland and Orkney

The majority of CSBs to the north of Aberdeenshire have been found within a short distance of the coast which might suggest an inshore coastal route. Good opportunities for trade are suggested by the sandy beaches that exist along the southern shore of the Moray Firth, the Culbin Sands, and the sheltered Cromarty Firth. Further north Littleferry, at the mouth of the River Fleet, may have served the communities around Strath Fleet and probably Golspie to the north; CSBs have been found at all these locations. There is less evidence for safe beaching places north of Golspie and landing was probably less easy, due to a combination of stony beaches, cliffs, and narrow outflowing rivers such as that at Helmsdale. Once north of Latheronwheel, an impenetrable line of towering cliffs would have made landing virtually impossible until reaching Wick, except for Sarclett if the weather was suitable. The final challenge to Neolithic seafarers would have been the hazardous waters of the Pentland Firth with its challenging tides and currents, possibly forcing them to wait for days on end before suitable weather presented itself to enable a safe crossing of this final stretch of water to Orkney. Exactly who made such journeys is of course unknown; they may have been local traders, or those from England who are believed to have travelled to Orkney with flint from the Flamborough Head area (Ballin 2011: 45-48, 50-53, 64). Wherever these intrepid seafarers were from, their cargo would undoubtedly have changed constantly as they travelled north and south, perhaps taking advantage of more exotic and unusual objects like CSBs and Grooved Ware, as well as more prosaic cargo.

Southern Scotland and Northern England

Many CSBs appear to have travelled south to Kincardineshire, Angus, Perthshire, Fife, and Stirlingshire; made from material only available in Aberdeenshire these CSBs stand out as being exotic. While it is possible that some travelled overland across the high exposed moorland area of the Cairn O' Mounth, between Aberdeenshire and Kincardineshire, it may have been more practical to transport them along an inshore coastal route. The east coast is punctuated by many rivers which in some cases reach a considerable distance inland: CSBs have been found along the course of many of these. Bervie Water penetrates deep into the Howe of Mearns, where CSBs have been found in its deep fertile soils which are protected from cold onshore winds by Garvock Hill. Further south near Montrose CSBs have been found along the Rivers North and South Esk, Lunan Water and Brothock Water near Arbroath; safe beaching points exist near the mouth of all four of these rivers. Further down the coast, the River Tay, with its many tributaries, may also have provided major transportation links into the interior of the country, as CSBs have been found along its length, travelling as far west as Lawers on Loch Tay. Three have been found at Newburgh and another on nearby Mugdrum Island in the middle of the Tay estuary, while others have been found along the River Earn as far as its source near Lochearnhead.

None have been found in coastal areas south of the River Forth, although that at Lowick in Northumberland may have been landed in the vicinity of Holy Island Sands, which would appear to have offered a safe beach landing for a skin boat. Only two CSBs have been found further south on the eastern side of the country; the first some 28km inland at Houghton-le-side could have arrived via the Rivers Tees or Wear, while the other is believed to have been found at Sewerby near Bridlington (Hull Museum 2016: pers. comm.). Excavation here has shown it to have been occupied through the Middle to Late Neolithic (Fenton-Thomas 2009: 14). Located approximately 6km west of the flint resources near Flamborough Head and having a relatively safe beach to land on might suggest this CSB being brought south by those trading Yorkshire flint to Scotland.

West Coast and Ireland

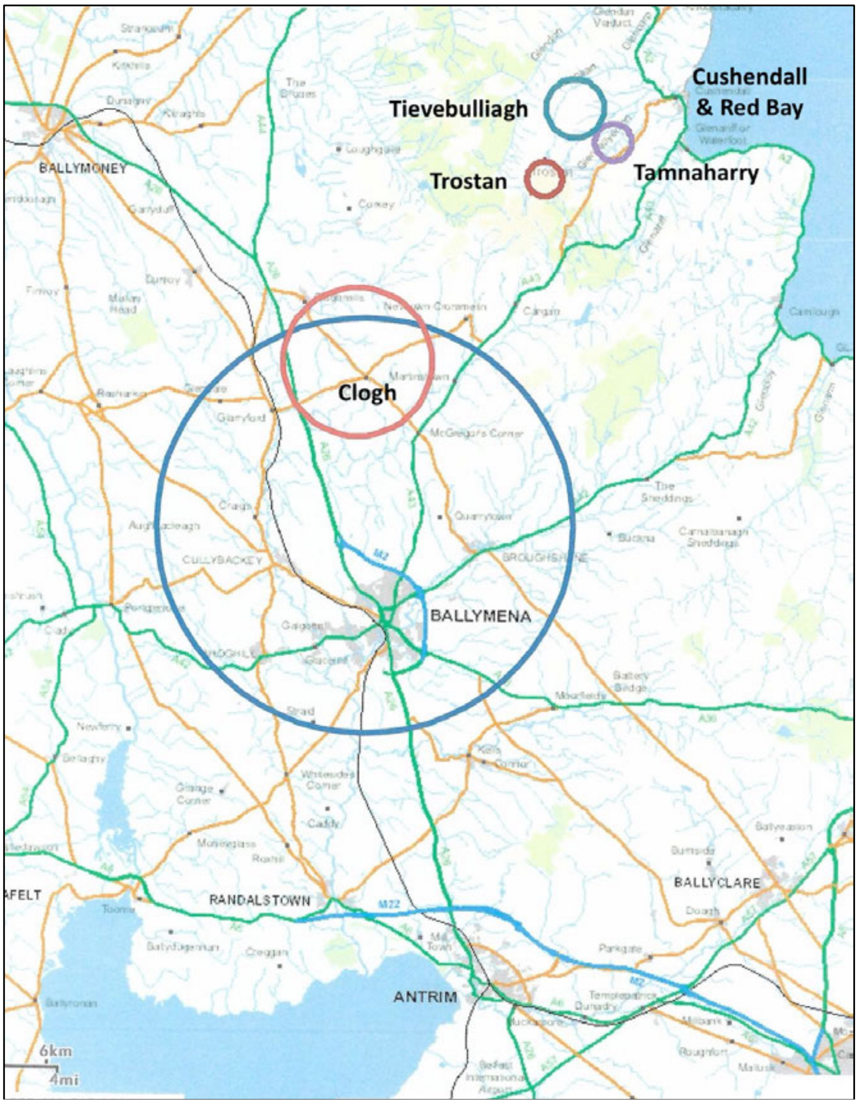
The shortest crossing point, approximately 22km, between Scotland and Ireland is from Dunaverty Bay at the southern end of the Kintyre Peninsula in Argyll to the sandy beaches of Cushendall and Red Bay in Antrim lying at the foot of the mountain of Tievebulliagh where Porcellanite Axes were quarried. A cache of three Stone Axes were found near Southend which is just 0.6km from Dunaverty Bay; two were Group IX made from Porcellanite and the other was Group VI made from Borrowdale Volcanic Tuff (Canmore: Southend) while another Porcellenite Axe was found at Dalsmirren approximately 7.5km to the north northwest. It seems possible that those CSBs found in Ireland may have been part of the trade in Porcellanite Axes from Tievebulliagh and Rathlin Island especially when we consider that CSB 235 was found on the shore at Dunaverty Bay, suggesting it may have been lost in transit.

On a clear day Ireland is clearly visible from Dunaverty and the distinctive flat-topped mountain of Trostan and the prominent 'widows peak' of Tievebulliagh which sits immediately behind Cushendall, would have provided prominent landmarks, Map 5.19. Not only is Cushendall close to the quarries of Tievebulliagh but, at the turn of the century, a Neolithic porcellanite workshop was found at Tamnaharry in Glen Ballyemon just 4km inland (Knowles: 1905: 383). This workshop produced many Porcellanite roughouts, along with a few Polished Axes and may have been one of the locations at which they were traded or exchanged. Interestingly, CSB 034 was reportedly found in the vicinity of Ballymena some 28km to the southwest of Cushendall; its location was not further defined, and it is possible it originated elsewhere within the Ballymena administrative area. Another Porcellanite workshop was in the township of Clogh which is just 11.5km to the north of Ballymena and may have provided a further possible location for exchange to have taken place, see Map 5.19 (Knowles 1905: 383).

As plain stone balls have been found at several locations in Ireland the Scottish Archaeological Research Framework has commented that it therefore *'permits the suggestion that they could have provided the design inspiration for Scottish Carved Stone Balls'* (ScARF 2020: 5.2.4). However, a visit to the Ulster Museum in Belfast failed to find any plain balls of a suitable size and only two were seen at the National Museum in Dublin. These were found at Loughcrew which is approximately 136km to the southwest; one was 78mm in diameter while the other was 67mm in diameter. There is also a plain stone ball in the British Museum collection which has an Antrim provenance and has a diameter of 68mm. I would argue that these hardly provide sufficient evidence for the concept of plain stone balls providing the design inspiration for Scottish CSBs. In fact, it could as easily be argued that the plain stone ball found in Antrim arrived with CSBs from Scotland where much greater numbers of plain balls have been found.

Conclusion

In this chapter we looked briefly at how landscape studies have changed over time, from the original studies of separate topographic, ancient, and historical landscape features to those of today, where people and whole cultures are researched using large and diverse data sets. We have seen how such studies can be utilised to research constructed, conceptualised and ideational landscapes and considered how people may have been manipulated in the construction of societies and cultures. We have also seen how such landscapes had the potential to change the lives of the people who lived in them and how people themselves changed their landscapes.



Map 5.19: Potential landing and exchange locations in Antrim. © OSNI 2020. C. Stewart-Moffitt 2020.

While all these perspectives are important, this chapter has dwelt more on the physical aspects of landscape, climate and the contemporary Neolithic landscape of monuments, settlement, and activity zones to see how they may have impacted on the spread, use and deposition of CSBs. To better understand CSB findspots, we have looked at the fundamental components of modern soil types, considering physical properties like the underlying geology, climate, and altitude, which has led to a better understanding of the places people were inhabiting during the Late Neolithic. Perhaps unsurprisingly, the analysis of soils showed that 79% of CSBs were found in sheltered to moderately exposed locations in areas that generally have moderate to good winters and a stable climate; the remaining 21% were found in either exposed locations or places that tend to have severe to very severe winters. While altitude was more difficult to assess without more information regarding CSB findspots, it was possible to say that CSBs have been found between 1mtr and 400mtrs, with a mean altitude of 114mtrs. Overall, 25% of CSBs were found in soil categories 1 – 3.1, suitable for arable agriculture, 47% of CSBs were found in categories 3.2 – 4.2 suitable for mixed agriculture and the remaining 28% of CSBs were found on land suitable for rough grazing. This, perhaps unsurprisingly, appears to show that people were seeking out and inhabiting prime land, suitable for both agriculture and settlement and it was in these landscapes, the landscapes of the everyday, that CSBs found their final resting place, before being rediscovered in the eighteenth to twenty-first centuries.

In comparing the underlying geology of CSBs findspots and the materials used in their manufacture I have shown that many were not made from local material and travelled from further afield. When considering the potential methods used to move CSBs around the landscape, it has been suggested that this probably took place via rivers and inshore coastal routes, with longer sea voyages being necessary to reach the outer islands.

Chapter Six

CSB links to Monuments and other Artefacts

This chapter will compare CSB findspots with the location of Neolithic and Bronze Age monuments, contemporary artefacts and natural locations and features in the Landscape to investigate possible links with CSBs. This desktop analysis includes all prehistoric archaeological features and artefacts found within a 3km square, centred on each approximate CSB findspot. On a very basic level, categorizing the findspots suggested that while many of these locations showed evidence of occupation during both the Neolithic and Bronze Age: far fewer had evidence for later prehistoric activity, Charts 6.1 and 6.2.

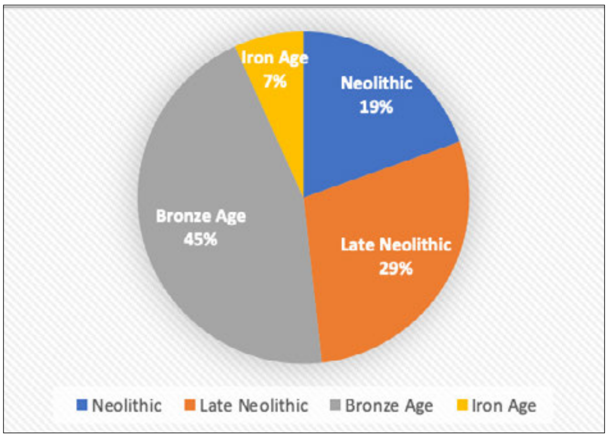


Chart 6.1: Approximate percentage of Neolithic, Late Neolithic, and Later Bronze Age and Iron Age monuments associated with the area surrounding approximate CSB findspots. C. Stewart-Moffitt 2020.

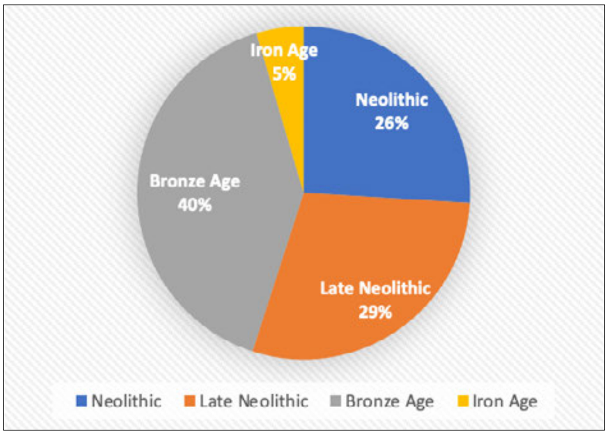


Chart 6.2: Approximate percentage of Neolithic, Late Neolithic, and Later Bronze Age and Iron Age artefacts associated with the area surrounding approximate CSB findspots. C. Stewart-Moffitt 2020.

Monumental associations

Using information provided by Historic Environment Scotland's Canmore and PastMap databases the location of Stone Circles, Recumbent Stone Circles and Henges were compared to CSB findspots, Maps 6.1, 6.2 and 6.3. Excavation shows that stone circles began to be built around the beginning of the third millennium BC (Richards 2013: 2; Bradley 2016a: 112), suggesting that some at least may have been contemporary with the production and use of CSBs. However, to date none have been found within their perimeter, and only seven (3.4%) have been found within 1km of them; additionally, as Chart 6.3 shows, the majority (76%), were found over 10kms away from them. Although built as meeting places, it appears that CSBs were not part of whatever took place inside these structures.

Interestingly, Recumbent Stone Circles occupy a very similar geographical area to the central Aberdeenshire distribution of CSBs, Maps 6.1, 6.2 and 6.3, although their construction is generally considered to be later in date than the manufacture of CSBs. Many of these monuments are located around Donside and Inverurie, a small number flank hills along the River Deveron, while a handful are located in Buchan, Deeside, and to the south of Aberdeenshire. In areas like the Gairoch and the Howe of Alford, they can be found grouped in small clusters (Welfare 2011: 11, 31), suggesting that a denser population existed in these particularly fertile locations. Strangely though, none have been found in the area surrounding the River Ythan which may be

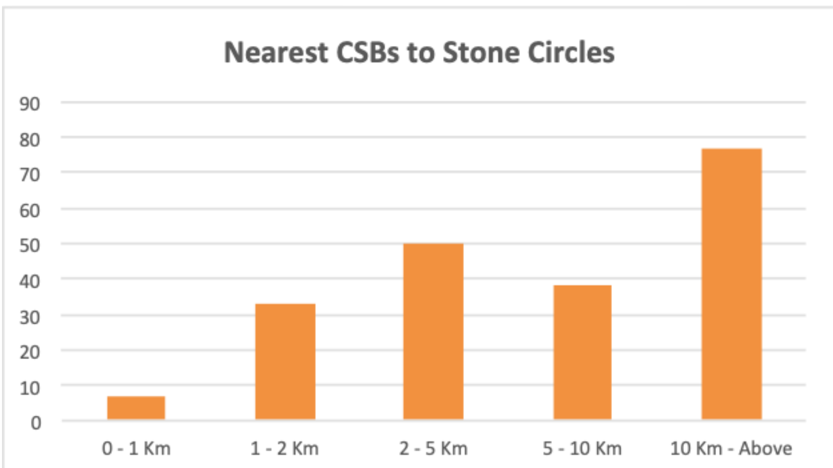


Chart 6.3: Proximity of CSBs to a Stone Circle. C. Stewart-Moffitt 2020.

due to subsequent agricultural destruction, or a smaller population during the Late Neolithic and Bronze Age. Dating of the Recumbent Stone Circle tradition is not precise, but a broad Late Neolithic to Early Bronze Age chronology for the initial construction and subsequent use of these monuments has been suggested (Bradley 2005: 101). In their final form they were comprised of a circle of stones which gradually rose in height to meet the recumbent stone and its two flanking orthostats: Bradley has suggested that these latter stones formed a door, 'closing off' the space to prevent further use (2005: 106). One particularly noticeable feature seen at some Recumbent Stone Circles are Cup Marks carved into the surface of some of the orthostats. Although they look the right size to have held single CSBs, the majority are on vertical surfaces, making it unlikely they were carved for this purpose and simply show reuse of previously decorated stones. However, as Chart 6.4 shows, only three CSBs (4.1%), have been found within 1km of the seventy-four Recumbent Stone Circles listed on Canmore and none were found within their perimeter, again suggesting that CSBs were not associated with the activities that took place inside them. Thirty-four CSBs (46.5%) were located between 2kms and 5kms from a recumbent stone circle, underlining their general proximity but no obvious connection between them and CSBs was identifiable.

Research was also carried out into the proximity of CSBs to Henges, Maps: 6.1, 6.2 and 6.3. These structures are also considered to have been ritual spaces for gatherings and in some cases commemoration. It has been suggested that the inner sanctum of Henges was perhaps restricted to a few privileged people rather than the community as a whole (Thomas 2005: 56). Excavation shows that the Henge at Broomend of Critchie in Aberdeenshire was in use from c. 2150-1900 BC (Bradley 2011: 182) and that at Forteviot, dated from ditch fills, was in use *2468-2236 cal. BC* (Younger 2016: 127-128). Dates from the ditch at the Stones of Stenness in Orkney suggest some monuments may have been earlier – constructed in the early third millennium BC. Chart 6.5 shows that only three CSBs (15%) were found within 1km of the twenty henges listed on Canmore and none were found within their perimeter. Once again suggesting that CSBs were not part of any activities held inside. Smaller hengiform structures were not included in this research.

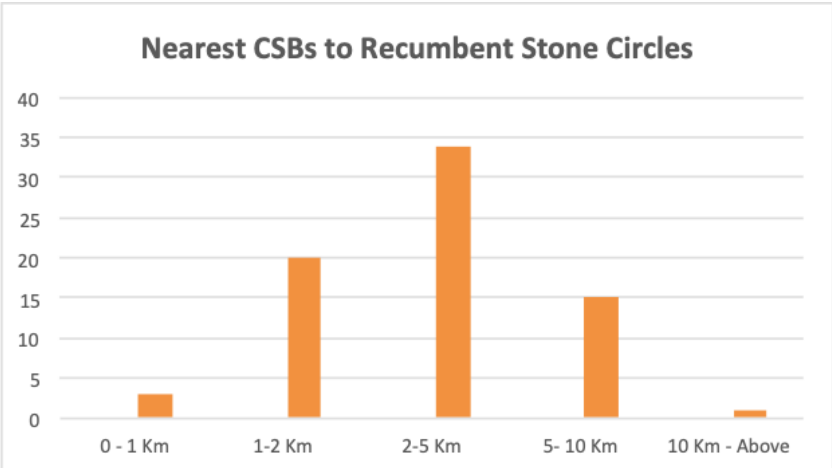


Chart 6.4: Proximity of CSBs to Recumbent Stone Circles. C. Stewart-Moffitt 2020.

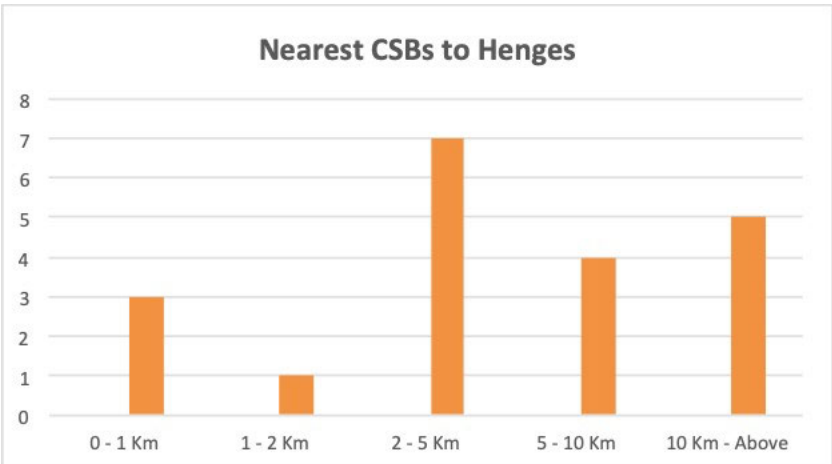
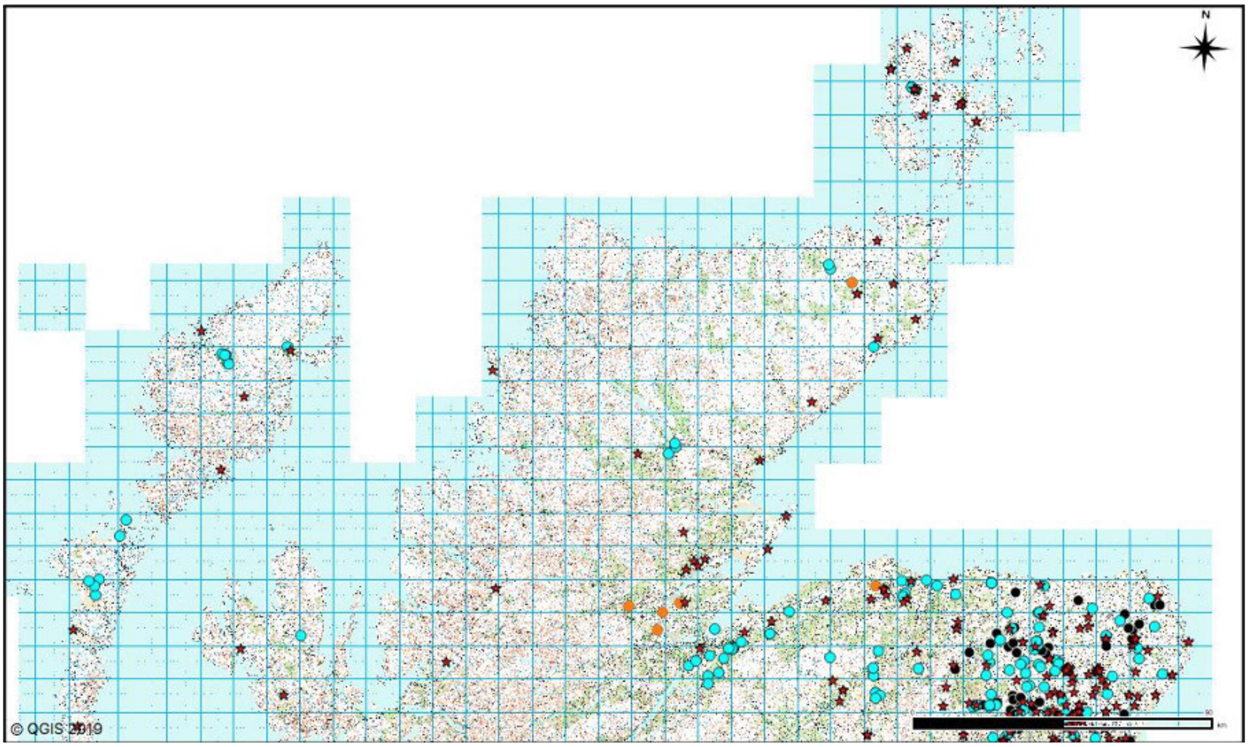
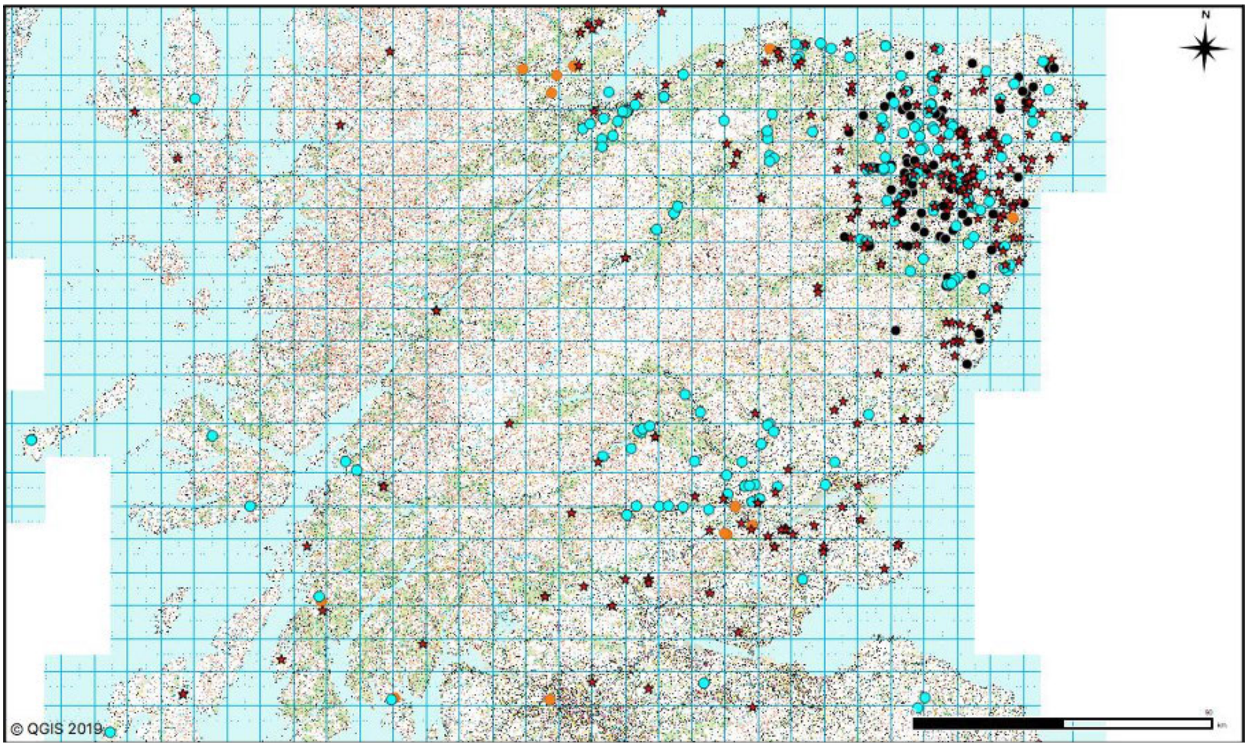


Chart 6.5: Proximity of CSBs to Henges. C. Stewart-Moffitt 2020.

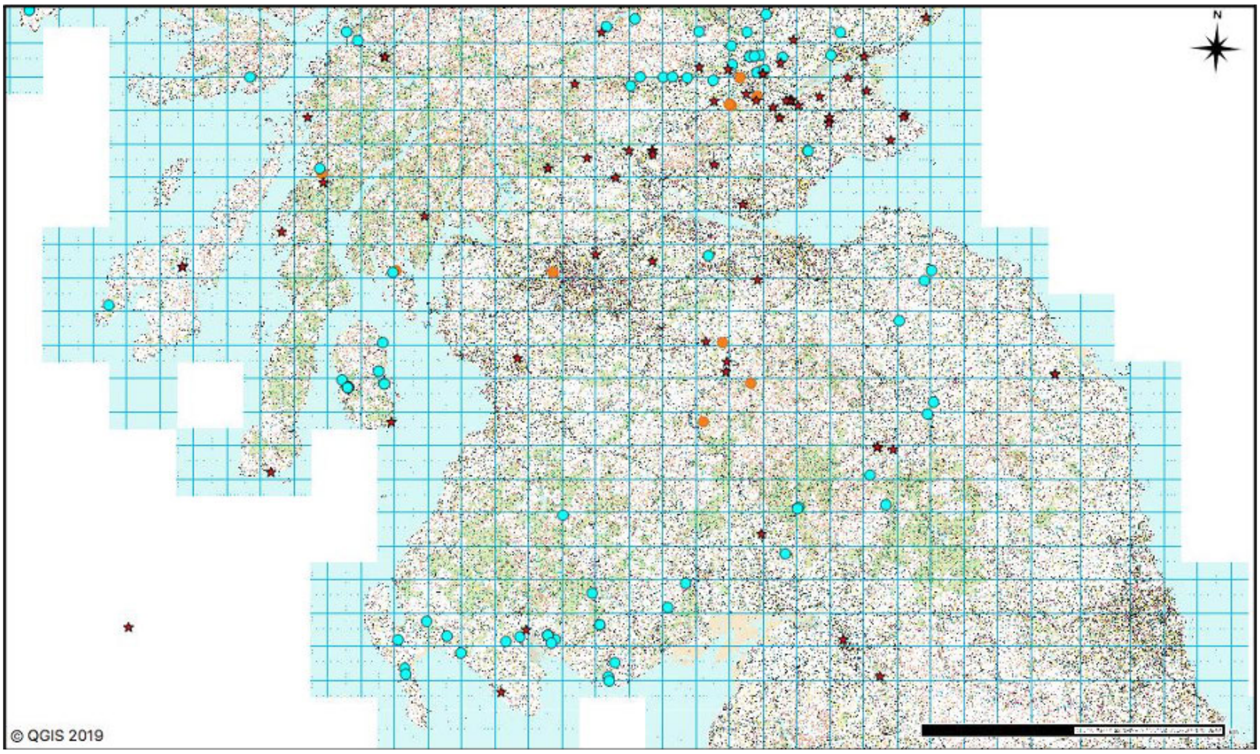
Using the latest datasets, comparison of CSB findspots was made with the known locations of Timber Circles, Palisaded Enclosures, Post Defined Cursus, Timber Halls, Mortuary Structures, Rectangular Timber Enclosures, Rectilinear Enclosures, and Timber Avenues (Millican 2016). Despite the wide range of dates between these monument types and CSBs it was considered important to investigate the possibility of any earlier or later associations that might have existed between them, but as can be seen in Charts 6.6 to 6.13 no obvious relationships were found. In only four cases were CSBs found within 1km of a Timber Circle which almost certainly indicates that no clear connection existed between CSBs and this type of monument. No CSBs were found any nearer than 1km to 2kms of Palisaded Enclosures, Post-defined Cursus, Timber Mortuary Structures or Rectangular Timber Enclosures and were, in most cases, only found at a considerable distance from them.



Map 6.1: Northern Scotland. Comparison of CSB locations with those of Stone Circles (blue dots), Recumbent Stone Circles (black dots), Henges (orange dots) and Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.2: Central Scotland. Comparison of CSB locations with those of Stone Circles (blue dots), Recumbent Stone Circles (black dots), Henges (orange dots) and Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.3: Southern Scotland. Comparison of CSB locations with those of Stone Circles (blue dots), Recumbent Stone Circles (black dots), Henges (orange dots) and Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252. C. Stewart-Moffitt. 2020.

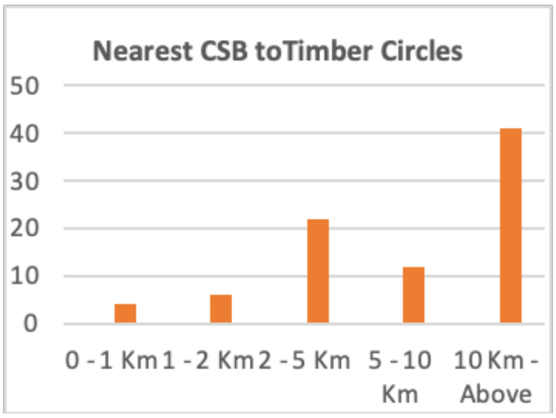


Chart 6.6: Proximity of CSBs to Timber Circles.

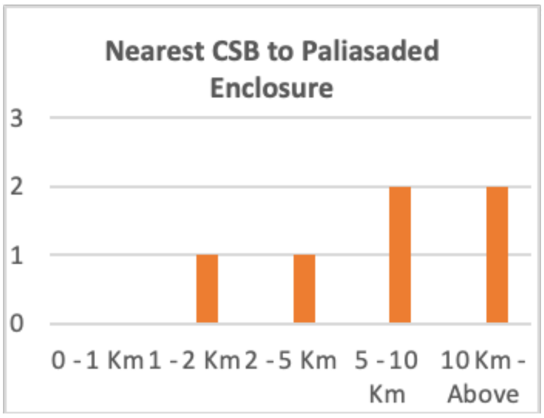


Chart 6.7: Proximity of CSBs to Palisaded C. Stewart-Moffitt 2020. Enclosures. C. Stewart-Moffitt 2020.

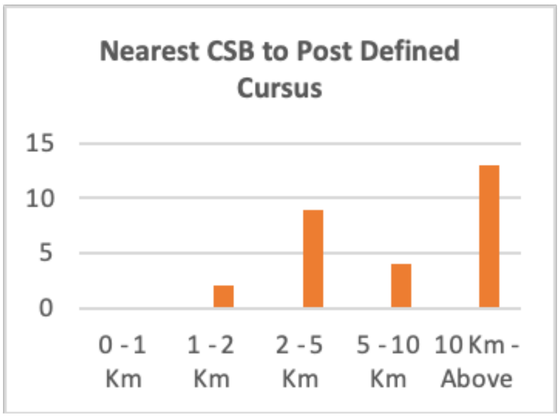


Chart 6.8: Proximity of CSBs to Post-defined.

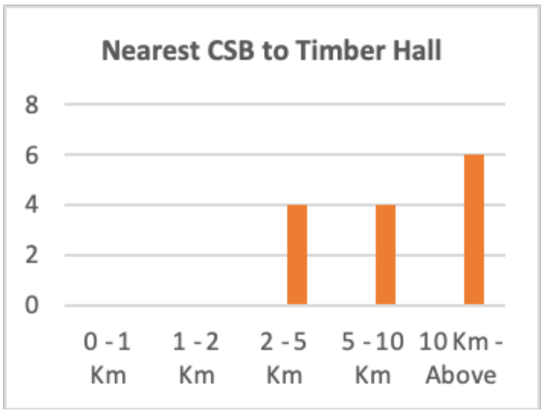


Chart 6.9: Proximity of CSBs to Timber Halls. Cursus. C Stewart-Moffitt 2020. C. Stewart-Moffitt 2020.

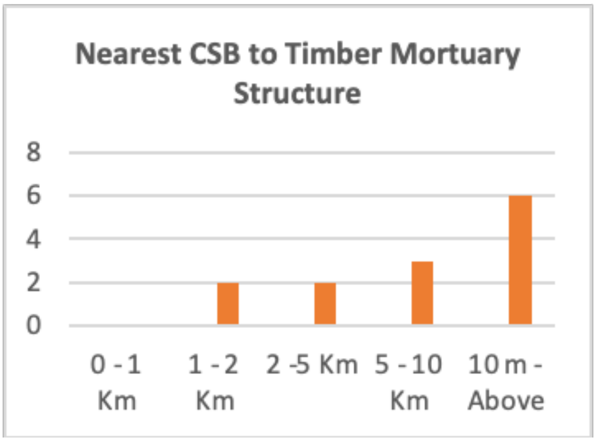


Chart 6.10: Proximity of CSBs to Timber Mortuary.

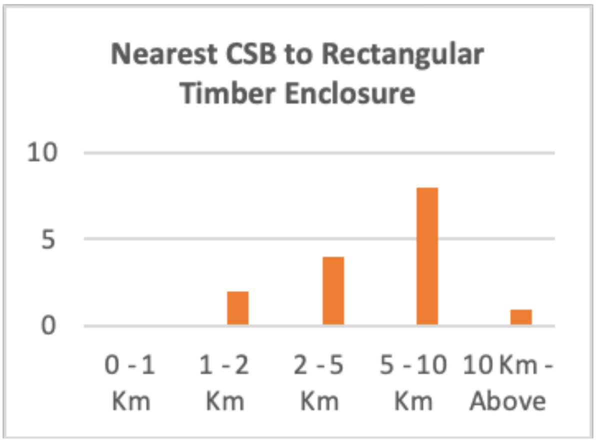


Chart 6.11: Proximity of CSBs to Rectangular Structures. C. Stewart-Moffitt 2020. Timber Enclosures. C. Stewart-Moffitt 2020.

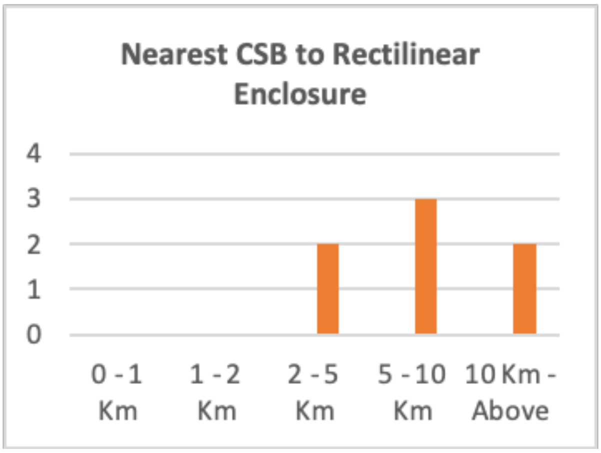


Chart 6.12: Proximity of CSBs to Rectilinear

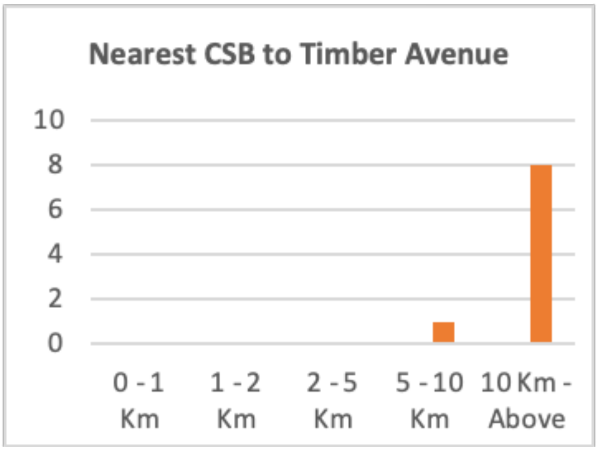


Chart 6.13: Proximity of CSBs to Timber Avenues. Enclosures. C. Stewart-Moffitt 2020. C. Stewart-Moffitt 2020.

Association with other Artefacts

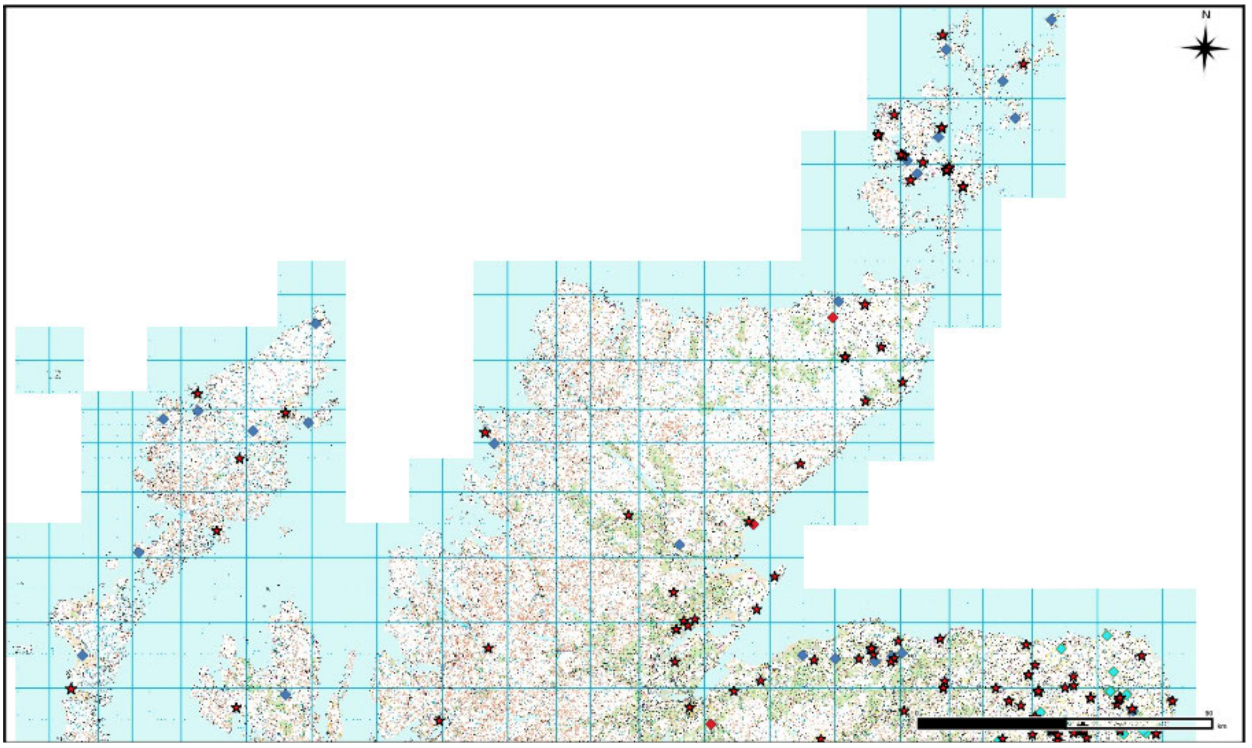
Perhaps unsurprisingly the majority of CSBs were often found in general association with at least one and usually more of the following artefacts: Stone Axe Heads, Polished Axe Heads, Maceheads, Leaf Arrowheads, Flint Knifes, Scrapers, Chisels, Whetstones, Plain Stone Balls or Quern Stones. A few CSBs and other Late Neolithic artefacts were also found in the vicinity of Bronze Age Food Vessels, Cinerary Urns and Beakers. This appears to indicate that either some locations were occupied during both the Neolithic and Bronze Age, or that some CSBs may have been curated well into the Bronze Age. This latter concept might be suggested by CSB 234, reportedly found with a Beaker in a Cist at Kinlochewe in Wester Ross.

Maceheads

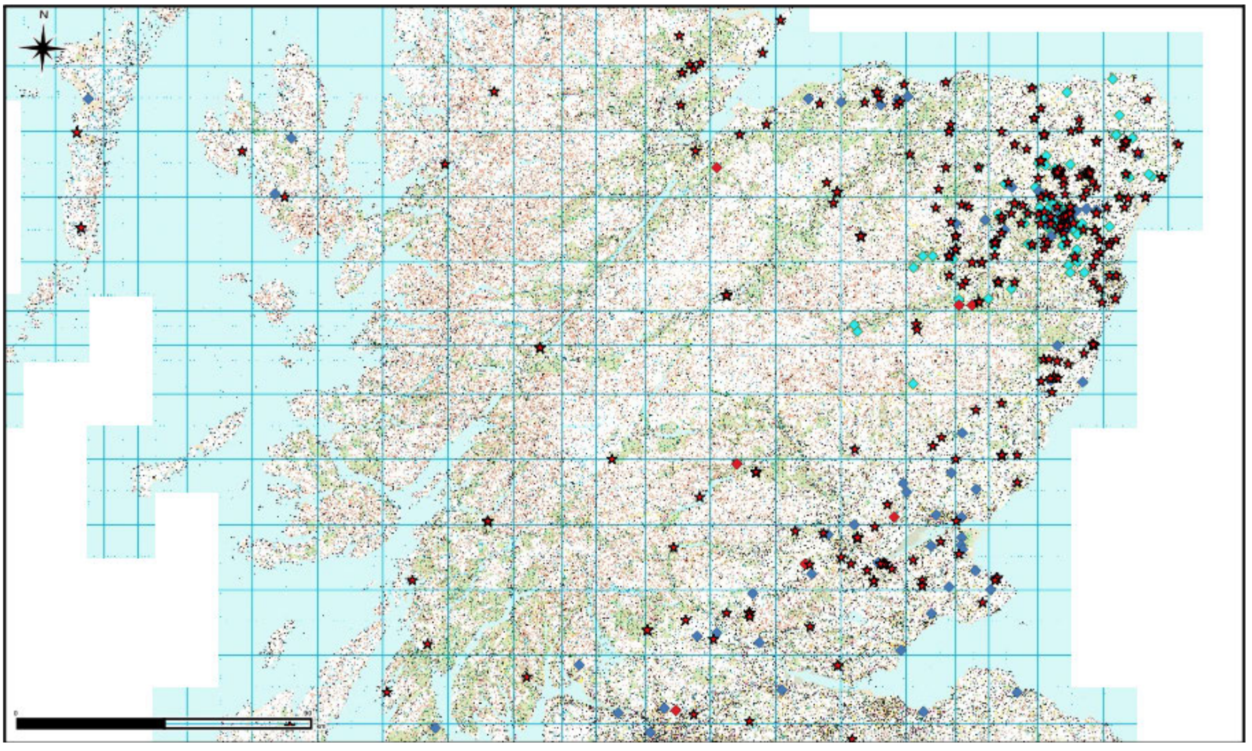
As Maceheads are considered contemporary with CSBs a comparison was made between their findspots and those of CSBs, using data from the Canmore database. This showed a relatively high concentration of Maceheads in Aberdeenshire, indicated by blue diamonds on Maps 6.4, 6.5 and 6.6, were located in an area similar to that of CSBs. Although the few Maceheads found in Morayshire were also roughly comparable to CSB findspots, other locations across Scotland where both these artefact types were found in relatively close proximity were rare. Only six CSBs (5.2%) were found within 1km of a Macehead whereas forty-two were found between 1km and 2kms of each other. Despite CSBs and Maceheads both being Late Neolithic, their lack of 'close' deposition/loss could mean that they were either conceptually different, were not used concurrently, or perhaps had a different currency altogether.

Stone Axe Heads

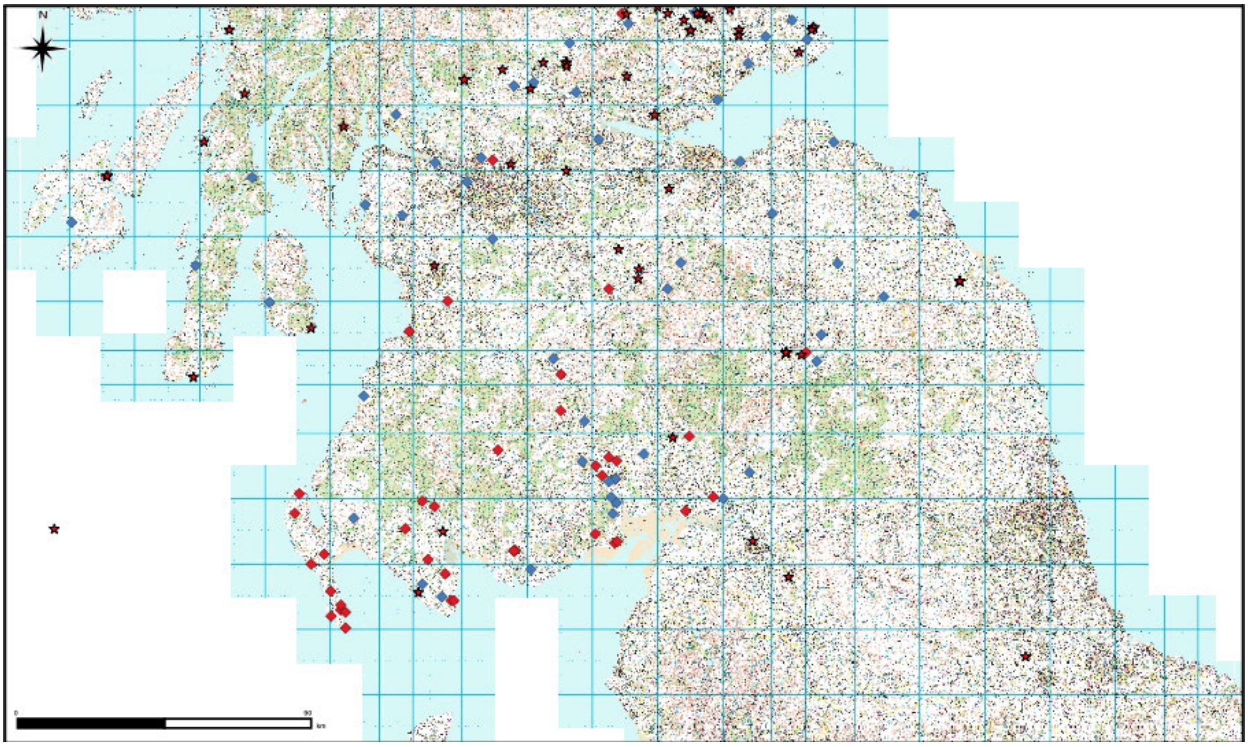
The largest concentration of Stone Axe Heads in Aberdeenshire, indicated by turquoise diamonds on Maps 6.4, 6.5 and 6.6, were found around Inverurie, particularly on land to the north and east. Comparison between Stone Axe Head findspots and the existence of brown forest soils in the same area suggest that it



Map 6.4: Northern Scotland. Comparison of CSB locations with those of Maceheads (dark blue diamonds), Aberdeenshire Axe Heads (turquoise diamonds), Polished Axe Heads (red diamonds), Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.5: Central Scotland. Comparison of CSB locations with those of Maceheads (dark blue diamonds), Aberdeenshire Axe Heads (turquoise diamonds), Polished Axe Heads (red diamonds), Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.6: Southern Scotland. Comparison of CSB locations with those of Maceheads (dark blue diamonds), Aberdeenshire Axe Heads (turquoise diamonds), Polished Axe Heads (red diamonds), Carved Stone Balls (red stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.

was originally heavily forested prior to clearance for agriculture. When CSB evidence is added to the equation it would appear that this area may have supported a relatively dense and prosperous population during the Late Neolithic. The density of later Recumbent Stone Circles and the fertile and productive soils in this area today all add weight to this argument.

Polished Stone Axe Heads

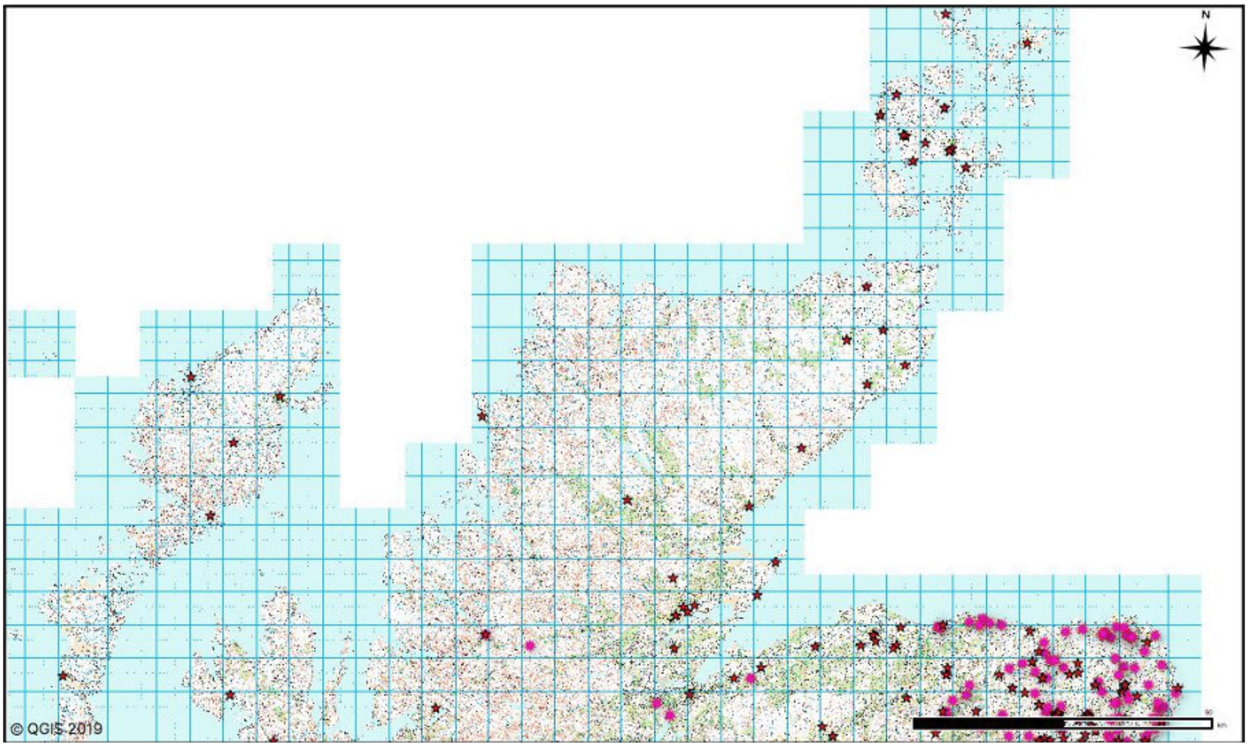
Polished Stone Axe findspots, indicated by red diamonds on Maps. 6.4, 6.5 and 6.6, were also compared with those of CSBs, however it is striking that the majority of Polished Stone Axes listed on Canmore are in the far southwest of Scotland with few in the northeast. This concentration may be due in part to the proximity of this area to the source of Group VI axes from Great Langdale in Cumbria, the lack of them in the northwest possibly being due to the greater distance from their source. No apparent association was noticed between Polished Stone Axes and CSBs.

Beakers

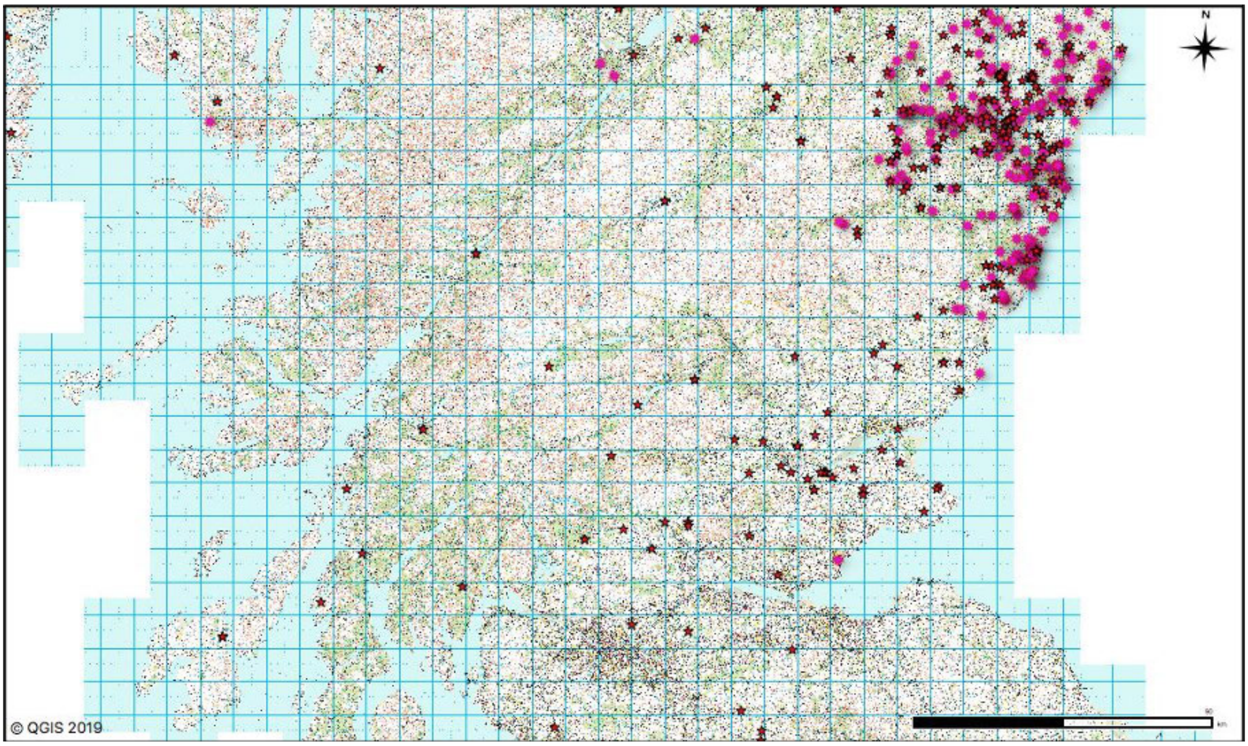
Using information from both the Canmore database and the Northeast Beaker project the locations of Bronze Age Beakers, indicated by pink multistars on Maps. 6.7, 6.8 and 6.9, were compared with those of CSB findspots. Nineteen (8.2%) of CSBs, indicated by red stars, were found within 1 km of a Beaker burial, and as noted earlier, that found at Kinlochewe was located within a Cist which also contained a Beaker. However, the majority, (69.7%) were found between 1km and 5kms distant. The fact that only 19 were found in relative proximity to CSBs may represent continuity of occupation of individual Neolithic landscapes, but it also seems reasonable to expect that at least some CSBs might have been found during later agricultural activity in the Bronze Age and were subsequently curated as novelties.

Grooved Ware

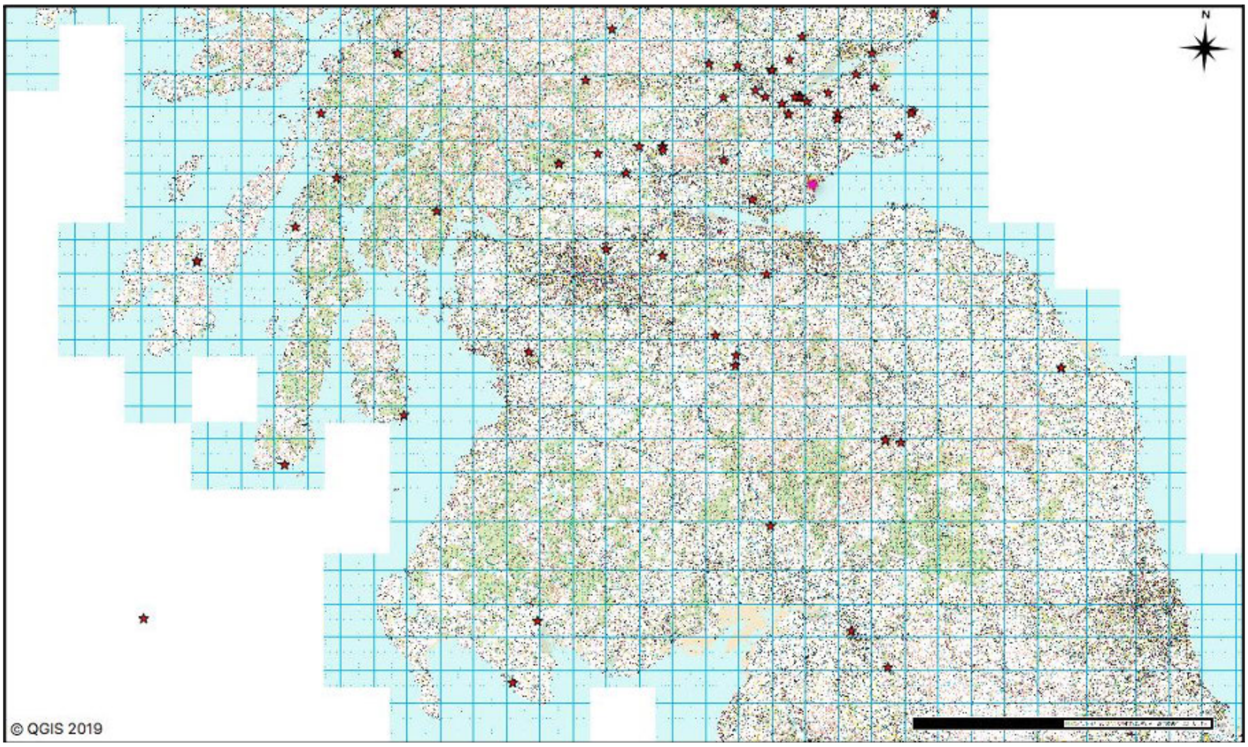
Grooved Ware findspots were also compared with those of CSBs using data from the Canmore database and 'Tracing the Lines' Grooved Ware Project database. The only location where these two artefact types were found 'relatively' close together was at the Ness of Brodgar where CSB 242 was found in association with organic material under the re-modelled buttress of building ten; Grooved Ware being located in other areas of the site. Grooved Ware has also been found at Inverurie, Kintore, Biggar and Forres, all locations with CSB findspots although none were found associated with one another. As the majority of CSBs have been random finds, with no associated artefacts or contextual information, it seems unsurprising that Grooved Ware has not been found in direct association with them and perhaps underlines the more personal association of CSBs with individuals who would have had no place at the type of ceremonial occasions where Grooved Ware is thought to have been used (Bradley 2019: 141).



Map 6.7: Northern Scotland. Carved Stone Ball locations (red stars) compared with those of later Beakers (pink multi- stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.8: Central Scotland. Carved Stone Ball locations (red stars) compared with those of later Beakers (pink multi-stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.



Map 6.9: Southern Scotland. Carved Stone Ball locations (red stars) compared with those of later Beakers (pink multi-stars). © Ordnance Survey 2020 (100025252). C. Stewart-Moffitt. 2020.

Natural Locations and Features in the Landscape

These are physical locations in the landscape that were naturally formed by geological and climatological processes and include mountains and hills, caves, springs, waterfalls, bogs, and rivers. The deposition of votive offerings at natural locations such as these is an important phenomenon in prehistory (Bradley 2007: 33-38). These, often liminal places, may have been seen as boundaries or thresholds between the world of people, where everything was ordered and understood, and other unknown worlds which were in constant chaos; transitory locations where the world of the living ended and 'otherworlds or underworlds' began (Bradley 2007: 35). The fact that people deposited gifts in these places suggests they were attempting to appease those that dwelt above or below the everyday world of people (Bradley 2007: 6). Was the deposition of CSBs connected to such significant natural places?

The 3km square around each CSB findspot was again examined for rivers, islands, mineral and hot springs, waterfalls, caves, bogs, and mountains and while a few CSBs have been found in or near some of these locations, no definitive reasons for their deposition are apparent. It has already been suggested that one dredged from the River Tay might have been lost in transit and that found at the Bridge of Earn may have either been lost crossing the river, or was a ritual deposition at its tidal limit, which was also its fording point (Bradley 2017: 180-182): no location exists for that found in the River Thurso. Apart from the Western Isles only CSB 329 from Mugdrum Island, located in the middle of the River Tay near Newburgh, provides tangible proof of a CSB having been found on an island. Although unoccupied today, it is possible that people may have lived there during the Late Neolithic or that it was a safe haven for traders. Only two CSBs have been found in mountain locations, both are north of the Great Glen and neither have sufficient information to suggest why they were deposited there. Only one has been found near a waterfall; the Achness or Cassley Falls on the River Cassley in Sutherland lie in a relatively remote hilly landscape; immediately southeast of the falls is an area of pasture that has clearly been occupied since the Neolithic as evidenced by a large stone with between 35 and 40 Cup Marks carved into its surface. The remains of at least one or more Broch lie nearby suggesting that although remote, people had occupied this area over a long period of time. In summer the waterfall flows gently over a series of rocky shelves, but in winter it turns into a roaring maelstrom that can be heard from some considerable distance. This is a prime salmon river today, as it almost certainly was in the past, offering an attractive and important source of food for those living nearby. Despite research showing that Neolithic people appear to have eschewed fish, although see Knap of Howar, Papa Westray, in Orkney (Ritchie 1983: 40-121), it seems likely that in these circumstances they may have taken advantage of the relatively easy and nutritious source of food. Finally, no CSBs have been found at or near to caves, mineral or hot springs.

Conclusion

Few relationships were found between CSBs and monuments, artefacts and 'natural places' suggesting they were individual and distinctive artefacts which had their own unique distribution. Their absence from within or near monumental constructions would appear to suggest they did not have a close relationship with monuments and were not used for communal rituals and gatherings but were instead an intrinsic part of everyday life within settlements.

Chapter Seven

The Classification of Carved Stone Balls and a Revised Typology

This chapter will begin by looking at the history of classification to discover how and why, in the eighteenth century, classification was developed to differentiate between individual assemblages in the natural world and why it was later appropriated by antiquarians and archaeologists to study groups of artefacts in archaeological assemblages. It will then reflect on the reasons why classification fell out of favour in the middle of the twentieth century but was later re-introduced by post-processualists.

It will also consider how classification or typology might be used to extract more information from the current CSB assemblage and how it might be used to tell us more about both the artefacts and the people who made and used them. Finally, a revised classification or typology will be introduced using their distinctive morphological features which it is suggested may in some instances show the hand of individual craftspeople.

The Origin of Classification and Typology: Historical Review

The concept of classification was originally proposed in Systema Naturae in 1735 by Swedish botanist, physician, and zoologist Carl Linnaeus (1707-1778) to group plants and animals together into families with similar characteristics, thus creating order in an otherwise chaotic world. The classificatory system Linnaeus devised was widely accepted by the scientific community and was applied to many other disciplines in the following centuries (Capel 2006: 48). It became particularly valuable to archaeologists, anthropologists, and museum curators in the latter part of the nineteenth and early twentieth centuries in the identification of groups of artefacts and structures.

By 1776 Scandinavian antiquarians and historians had concluded that the wide range of artefact combinations, found during excavation at many prehistoric archaeological sites, appeared to belong to different periods (Adams 2008: 1020). In 1813, Danish antiquarian Vedel Simosen (1780-1858) advocated that prehistoric time should be divided into separate periods for stone, copper and iron which would then allow classificatory systems and typologies to be used more readily (Graslund 1987: 17). When the new Danish National Museum opened in 1819, the head of antiquarian collections, Christian Jurgensen Thomsen (1788-1865), arranged the museum's prehistoric assemblage into three separate collections; Stone Age, Bronze Age, and Iron Age after Simosen's original concept (Adams 2008: 1020; Bahn 2005: 260-263). Labelled the 'Three-age System', this was the first attempt at creating a classificatory system for archaeology that separated artefact types into individual cultures and periods and by the 1850s was generally accepted across Europe (Bahn 2005: 260-263).

By the middle of the nineteenth century the Three-age System was further defined by Jens Jacob Worsaae (1821-1885) who had worked at the Danish National Museum with Thomsen in the 1830s. He noticed that the Stone Age could be divided into two separate periods; that of earlier chipped stone tools and later ground and polished stone tools and thus proposed that the Stone Age should be divided into two separate periods based on these distinctly different categories (Adams 2008: 1020; Bahn 2005: 260-263). These new periods were subsequently named the Palaeolithic (Old Stone Age) and the Neolithic (New Stone Age) by English prehistorian Sir John Lubbock (1834-1913) in his 1865 publication '*Pre-Historic Times*'.

By the late nineteenth century, well known figures in the natural sciences and humanities such as Charles Darwin (1809-1882) and General Pitt-Rivers (1827-1900) were using their own versions of the Linnaeus classificatory system. In 1859 Darwin used it to describe how natural selection explained the evolution of animals and plants in his ground-breaking book '*On the Origin of Species*' and in 1875, a lecture given to the Royal Institution of Great Britain in London '*On the Evolution of Culture*' by prominent archaeologist Pitt-Rivers, had typology at its core (Capel 2006: 48-49). Pitt-Rivers was a leading proponent of the use of science in archaeology and during his lecture illustrated how object development progressed from simple to complex by using typology to compare the development of Flint and Bronze Axes, by using '*throwing sticks and New Ireland canoe paddles*' to illustrate the '*chronology of human cultural development*' (Thompson 1977: 136-156).

It was soon realized however, that the Neolithic was not only shorter in duration than its Palaeolithic predecessor but was more varied in its timing, considerably more diverse and much richer in terms of artefact types. These factors caused additional complications to arise when attempts were made to compare apparently similar European sites and cultures (Adams 2008: 1020). Following a detailed study of artefacts across Europe, Swedish archaeologist Oscar Montelius (1843-1921) analysed and grouped individual artefact types into unique attribute clusters or type-series which more clearly displayed their developmental sequence and allowed a greater understanding of their progression from 'simple to greater elaboration' or 'less efficient to efficient' (Greene 2009: 141-145; Montelius 1885: 48; Sorenson 2015: 86). Despite the difficulty of attempting to date artefacts using typology, this new system was to revolutionize the way sites and cultures were studied and enabled the systematic study and identification of cultures through their unique artefact types. The adoption of the Montelius' typological system was seen as an important improvement as it addressed total assemblages of material culture rather than using discrete diagnostic artifacts and led to much more detailed characterization of individual cultures and periods than had been previously attempted (Adams 2008: 1022-1023; Sorenson: 2015: 86). In the 1880s Montelius strove to improve typologies by using relative chronological dating through a method of cross-dating or synchronism. In examining groups of artefacts that had been buried together he attempted to date previously un-datable artefacts through their association with those that could be dated historically. However, while this had been useful in the Middle East and the Mediterranean, extending it into Europe proved less reliable; the further away a historically dated artefact had travelled from its original location the weaker the date became, with the possibility that they had been imported many years or generations earlier (Greene 2009: 141-145).

In the early years of archaeology, typology saw widespread use in the classification of stone tools and pottery and remained a dominant archaeological tool up until the 1950s. As such, most early typologies were diagnostically invaluable, creating order amongst otherwise disorganized assemblages of artefacts, periods, and excavations. Despite this, by the 1940s, some archaeologists were being accused of using typologies as stand-alone building blocks to define and explain past cultures and their associations through shared material culture. Protagonists thought that many of these differences were either accidental or would have been meaningless to their makers and various schools of thought believed that classification should be based on functionalism rather than instrumentalist ideals (Adams 2008: 1024). One of the reasons typologies became side-lined was due to the discovery of radiocarbon dating by American scientist Willard Libby in 1949 (Adams and Adams 2008: 234). Absolute dating now became readily available through the measurement of the rate of radioactive decay of associated organic material and provided archaeologists with a far more accurate dating method. By the 1960s radiocarbon dates were being compared with dendrochronological dates, allowing them to be both extended back in time and calibrated for greater accuracy (Pettitt 2005: 66-68). This showed that the dates of sites and archaeological periods were much earlier than had been originally thought and subsequently lead to earlier dates being allocated to the origins of agriculture and the development of metallurgy.

In 1968, British archaeologist David L. Clarke (1937-1976) introduced an entirely new methodology for producing typologies in his book '*Analytical Archaeology*'. Clarke developed a system of formal systematics using statistics to cluster artefacts into types, assemblages, and cultures (Adams 2008: 1024). The vast amounts of data involved were at first challenging, due to the use of a punched card system, but with the advent of computers in the 1970s the task became easier. However, another problem arose when the plethora of attributes recorded began to produce multiple types and it was eventually argued that splitting ad infinitum was unhelpful and would have been meaningless to the creator of an artefact (Adams 2008: 1024); this echoed an argument put forward by North American archaeologists in the early 1940s.

Almost all typologies contain anomalies, and although some artefacts exhibit known attributes they do not always fit exactly into any previously identified type, it was therefore suggested that every typology should be provided with a miscellaneous section to allow for this eventuality, rather than forcing the anomaly to become an additional type (Cahen and Van Noten 1971: 211). Others suggested that the practice of lumping or splitting, where artefact attributes were either lumped together to form a small number of types or split into many was also unhelpful. It was suggested that these differences occurred because 'splitters' had a sharper eye for diversity than 'lumpers'; as Adams and Adams point out, while lumpers produce the beginning of a type, splitters may take it to the extreme (Adams and Adams 2008: 191, 280-281). As we saw above, Clark's computer constructed typologies were prone to infinite splitting resulting in types that served no useful purpose as they were defined by single artefacts whereas lumping might lead to a loss of types. Kuijpers makes another valid point in that, although typology is the most trusted method of classification that archaeologists use, it is often used simply to allow artefacts to be '*fixed and categorised*' without any attempt at understanding them (Kuijpers 2018: 124-125).

While variation between artefacts is often a natural phenomenon, it is also possible that some may have been due to the personal preferences of individual craftspeople, or their customers and singularities such as these often led to the construction of individual 'types' (Wobst 1999: 127 in Capel 2006: 51). Sorenson also suggests that '*the similarities and differences we use to* *create typologies were meaningful messages in the societies we study*' and were used to '*mark, express and objectify signals, values, norms, hierarchies, identities and social groups*'. She concluded that while artefacts cannot tell us exactly what they were or why they were styled in a particular way '*they are often our only possibility of contact with the past*' (Sorenson 1997: 190). Her thoughts were echoed by MacSweeney who suggested that typologies which studied similarities and differences were necessary and extremely helpful tools for thinking about stylistic variation (2011: 50-51). So it seems that typologies may be composed of deliberate actions on the part of the maker, the end user or groups of people and, while our current knowledge of their individual meaning cannot be identical to that of those who made the artefacts, they could help us to see how '*they may have been understood and employed in the formation of the society at any one time*' (Sorenson 1997: 189).

A final note on the use of typology in this study. Whilst it could be argued that this author is a splitter there were sound underlying reasons behind the decision to split CSBs further than Coles and Marshall. These will be explored further below.

General classification and typology methodology

The authors of '*Archaeological Typology and Practical Reality: A dialectical approach to artefact classification and sorting*' define a typology as '*a collection of things; our ideas about them and the words and pictures we use to describe them, which we then use to say or learn more about those things*' (Adams and Adams 2008: 29, 158). Using this definition as the basis for the construction of a typology we can see that it is possible to design typologies for many different categories of artefacts and an infinite number of individual tasks. Typologies can be used ***descriptively*** to define the visual attributes of an assemblage, ***comparatively*** to compare material from a range of sites, periods, or areas, or ***analytically*** to answer specific research questions. Banning also suggests that '*a typology should be defined as a classification or grouping that has explanatory (or meaningful) relationships with attributes that are not intrinsic to the classification or grouping itself*' (Banning 2000: 53). So, while many of the early descriptive and comparative typologies were designed to bring order to pottery and stone tool assemblages, most modern artefact typologies are specifically designed to be used analytically in the pursuit of further knowledge.

It is clear that typologies are indispensable when studying large quantities of similar artefacts and that they enable researchers to separate the individual characteristics of a group of artefacts into tangible elements which can then be used to organize them into related groups. These characteristics or attributes, may be functional, morphological, include the materials the artefacts are made from, their dimensions, surface treatment or decoration. The careful study of all these elements should assist in subdividing a large group of apparently random artefacts into a smaller number of distinct artefact types and thus enable meaningful analysis (Adams 2008: 1019 and Banning 2000: 1).

A minimum of two attributes are needed to identify any artefact type (Spaulding 1953: 306) and as an infinity of types could potentially exist in any assemblage, it is essential that only those attributes most useful for the immediate purpose are chosen (Adams 2008: 1026; Hurcombe 2007: 55). The attributes chosen should then be illustrated with a 'type image' and should be fully described to enable others to understand how each 'type' fits within the overall scheme (Rouse 1960: 317). It is also important to ensure that the 'types' chosen are consistent, recognizable by others and usable by everyone (Adams and Adams 1991: 237; Banning 2000: 55).

First Attempt at Revising Marshall's 1976/77 classification in 2015

In 2015 as my initial recording of CSB collections progressed, it was clear that additional types and sub-types existed within the corpus and that Marshall's 1976/77 classification needed updating and expanding. While identifying these additional types, care was taken not to create new categories to achieve any pre-conceived aims, and additions and refinements were applied judiciously and only when a need clearly existed. To maintain as much clarity and continuity for those who wished to compare Marshall's classification with this revision, her overall format was generally retained although some subtypes were modified, and additional types were added: these are explained below.

Changes made to Marshall's classification were as follows:

Types 4a to 4c: were now extended to include four additional types numbered **4d** to **4g**.

Type 7: was completely redefined to allow for a particularly distinctive type of CSB.

Type 8: was extended into **Types 8a to 8f**, to define the more accurately the widely varying number of knobs in this type into more manageable groups.

Types 9a to 9d: were extended into **Types 9e to 9g**, to further define individual styles of decoration.

Type 10: which Marshall defined as **Oval** was redefined, as many CSBs could be argued to be oval it was reclassified as possible forgeries.

Table 7.1: 2015 Revised Carved Stone Ball Typology. C. Stewart-Moffitt 2015 – Unpublished.

CSB Type	Number of Knobs or Discs	Description
Type 1	3	Large-rounded knobs.
Type 2	4	Prominent knobs
Type 2a	4	Sharply undercut knobs with slightly raised centres to interspaces.
Type 2b	4	Flattened knobs with prominent raised interspaces (remains the same as Marshall).
Type 3	5	Unchanged and has five knobs or discs.
Type 4a	6	Low or slightly domed knobs with smooth edges.
Type 4b	6	High round or sub round knobs with smooth edges.
Type 4c	6	Flattish round or sub round discs or knobs with rounded tops.
Type 4d	6	Slightly domed knobs with no interspaces and occasionally having flattish tops.
Type 4e	6	Low discs or knobs with low to medium depth triangular interspaces.
Type 4f	6	Round and domed knobs.
Type 4g	6	Very prominent rounded and domed knobs with flattish tops.
Type 5	7	Any seven knobs that have little else in common except in the case of three seven knobbed CSBs that are like Type 4's with six equidistant knobs but have an additional small-elongated knob squeezed in between two of the main knobs.
Type 6	8	Eight dissimilar knobs.
Type 6a	9	Nine main knobs or discs which may be interspaced with additional smaller knobs or discs.
Type 7	Generaly 7 to a maximum of 14	Two large knobs with smaller ones surrounding it in the manner of a 'rosette or flower head'.
Type 8a	Many	Relatively small round 'button like' discs or knobs.
Type 8b	14	Knobs, none of which are sharply cut or well defined.
Type 8c	10-25	Multi sized and shaped knobs.
Type 8d	42	Regularly spaced knobs of various sizes.
Type 8e	26-55	Round or oblate carved stone ball with regularly spaced rounded knobs.
Type 8f	56 plus	Rounded and evenly spaced knobs.
Type 9a	None	Single three-dimensional incised spiral across entire surface.
Type 9b	None	Single or multiple spirals.
Type 9c	Various	Incised lines but excluding cross hatching.
Type 9d	Various	Horizontal, vertical or diagonal incised cross hatching.
Type 9e	Various	Nested triangles or 'Vs' inscribed on the knobs or interspaces.
Type 9f	Various	Concentric incised lines or ground concentric/stepped knobs.
Type 9g	Various	Deliberate peck marks forming shallow pits.
Type 10	Various	Potential forgeries.
Type 11	None	Plain stone balls.
Type 12	Various	Orkney carved stone balls.

Type 11: which Marshall defined as **Large** was also redefined, as while several had a considerably larger diameter than the mean, it was considered that there was insufficient evidence to include them as a separate type. Type 11 was therefore reallocated to a new category of plain stone balls as, at the time of the revision, it was thought that these may have been an early stage in the production of CSBs.

Type 12: was added as it was considered that the distinctive nature of Orkney CSBs meant they should be classified separately.

Details of these changes can be seen in Table 7.1.

Following completion of the above study, electronic copies of the revised typology, database and photographic records were sent to the curators of all museums involved to ensure that each had a record of the entire corpus. Finally, between 2015 and 2016, further research uncovered additional CSBs in two museum collections along with a number in private hands; these were also recorded and photographed and added to the Master Carved Stone Ball and Photographic Databases. Following on from this initial work, questions of communal and personal identity and the potential use of CSBs as symbols, suggested that a further re-examination of the revised typology might throw more light on their use and the importance attached to them by Neolithic peoples which led to the 2017-2020 revision which was an integral part of this research.

Subsequent review 2017 -2020 for this research

What new information might this latest revision reveal?

While most older artefact classifications were descriptive, used to explain how morphological, decorative, and temporal changes took place over time; many provided little in the way of detailed explanation on why artefacts were made, used or how they might have been a part of our ancestors' way of life (Knappett 2011: 158, 168). This study endeavoured to reverse that trend by attempting to read the subtly coded information held within each different type of CSB and to release the hidden stories behind them.

It's possible that some individuals or groups may have shared similar types or styles of material culture with others and may have used the specific attributes of artefacts like CSBs to identify themselves through reference to widely understood visual images or 'gestalts'. The significance of these may have been so distinctive that the message conveyed was immediately understood and helped identify one social group from another (Capel 2006: 49-51; Adams and Adams 2008: 42). Although Capel suggests that the stability of particular social contexts can result in some artefacts remaining unchanged for considerable periods with change only becoming apparent at times of stress or at the introduction of new ideologies, they may also be modified by stylistic influences over time, as can be seen in the horse ornamentation on Iron Age coins (Capel 2006: 49). Unfortunately, in the case of CSBs, temporal stylistic change cannot be measured due to the almost complete lack of accurate chronological dating. Capel suggested that while objects with a high degree of functionality may change little over time, those with a less obvious function may change more frequently; their makers being able to effect change at will, without compromising an object's utility (Capel 2006: 51).

So, with the above possibilities in mind several questions readily suggest themselves. Were CSBs exotic tools, territorial markers, group or clan totems, symbols of power or perhaps a symbol of a newly emerging culture? Why did Late Neolithic people make them and why did they make them in such unusual and extraordinary shapes?

Classification and Typological styles

As Table 7.2 shows, it is possible to construct a range of alternative classifications or typologies for any number of specific uses. While both Coles' and Marshall's classifications were 'comparative' it is possible that descriptive/comparative classification/typologies (blue) such as these could also be used analytically; providing us with spatial, stylistic, functional, and even previously hidden emic (yellow) evidence of Late Neolithic social patterns and cultural information (Banning 2000: 1). However, as discussed earlier, chronological information (orange) is virtually absent from the record.

This latest revision of Marshall's classification retains the same descriptive comparative format as her original but will, using the same information, also attempt to elicit additional spatial, stylistic, functional, and perhaps hidden emic information at the same time. It is the culmination of an ongoing review of both the assemblage seen by Marshall and additional CSBs, recorded during the past two years by this author. While the 2015 revision noted the existence of several additional types of CSB, this latest revision has identified and expanded the classification/typology further.

The aim of this latest revision was to look for morphological variability or variety that might provide an insight into potentially divergent regional traditions or local styles by comparing the differences between CSB types. As a result, several further attributes were

Table 7.2: Examples of modern typology use. After Adams and Adams: 2008. C. Stewart-Moffitt 2020.

Typology Style:	Used to:
• Descriptive	describe artefacts/material.
• Comparative	describe and compare artefacts/material.
• Analytical	learn about the nature and variability of artefacts/material.
• Stylistic	learn about stylistic evolution. identify ethnic/cultural associations. reconstruct social and economic patterns.
• Chronological	learn about chronological ordering of artefacts/material. date associated artefacts, materials and sites.
• Spatial	learn about spatial distribution.
• Functional	reconstruct activities of makers and users. identify different activity areas or sites.
• Emic	understand the mind-set of makers and users.
• Cultural	define and differentiate prehistoric cultures.

Table 7.3: Attributes used to identify CSBs and sub-types. C. Stewart-Moffitt 2020.

• Type of knobs or discs.
• Relative height of knobs or discs/depth of interspaces.
• Raised triangular interspaces.
• Lack of interspaces.
• Undercut knobs or discs.
• Smoothly rounded edges to knobs.
• Sharply defined edges to knobs.
• Flat topped knobs.
• Low domed knobs.
• High domed knobs.
• Deliberately offset knobs/discs
• 'Button like' knobs.
• 'Cap like' knobs.
• Oval or elongated balls.

discovered Table 7.3, which introduced the possibility that some individual craftspeople might be identified.

At a basic level the current research continued to use the three attributes originally identified by both Coles and Marshall:

A deliberately made hand sized stone ball with.......

1. A varying number of knobs or discs carved upon its surface (with the exception of Type 9s which have incised decoration) plus the following.....
2. Additional attributes such as a varying number of knobs or discs, any distinct combinations or placement of them on their surface and the presence or absence of incised, ground or pecked decoration.
3. The correlation between the average ball diameter and the average knob diameter ie: Average Ball Diameter (**AvB/D**) divided by the Average Knob Diameter (**AvK/D**) of each individual CSB (Fletcher and Lock 2012: 6-7). The result of these calculations can be seen as a ratio in the last column of Tables 7.4 to 7.39. The close relationship between these two variables has in some instances supported noticeable visual similarities suggesting that individual craftspeople may have been involved in the manufacture of specific CSB Types.

The discovery and inclusion of additional attributes caused further splitting of Marshall's classification/typology as did her 1976 revision of Coles' c. 1911 classification, however awareness of the potential to split ad infinitum caused the number of additional types to be restricted to those listed below.

Type 1 CSBs: *'three large, rounded knobs'.*

Type 2a CSBs: *'four shallow discs'.*

Type 2b CSBs: *'four slightly domed knobs and interspaces with convex surfaces'.*

Type 2c CSBs: *'four very slightly domed and undercut discs with large triangular interspaces'.*

Type 2d CSBs: *'four slightly domed knobs and prominent raised knobs in the interspaces'.*

Type 2e CSBs: *'prominent, round, domed and undercut knobs'.*

Type 2f CSBs: *'four knobs with wide convex grooves and interspaces'.*

Type 2g CSBs: '*four rounded or globular knobs and deep interspaces*'.

Type 3 CSBs: '*five knobs or discs*'.

Note: Type 4 CSBs were divided into seventeen types, categorized for the purpose of this typology, **4a** to **4p** with an additional **Type 4 Misc** to account for those that do not fit elsewhere.

Type 4a CSBs: '*six slightly domed, round or sub-round knobs with smoothly rounded edges equally spaced in opposing pairs around the surface*'.

Type 4b CSBs: '*smoothly rounded edges equally spaced in opposing pairs around the surface*'.

Type 4c CSBs: '*six flattish round or sub-round discs with rounded tops, each slightly undercut with flattened interspaces and gutters equally spaced in opposing pairs around the surface*'.

Type 4d CSBs: '*six low discs or knobs with low to medium raised triangular interspaces equally spaced around the surface in opposing pairs*'.

Type 4e CSBs: '*six shallow clear-cut round discs with flat interspaces that are equally spaced around the surface in opposing pairs*'.

Type 4f CSBs: '*six slightly domed knobs that run one into another, with a lack of channels or interspaces between them equally spaced around the surface in opposing pairs*'.

Type 4g CSBs: '*six very prominent rounded and domed knobs with flattish tops, some of which may be slightly undercut, equally spaced around the in opposing pairs*'.

Type 4h CSBs: '*six low to medium height round or sub-round knobs with a sharply defined top edge on each knob equally spaced around the surface in opposing pairs*'.

Type 4i CSBs: '*six low to medium height round or oval knobs evenly spaced around the surface in opposing pairs*'.

Type 4j CSBs: '*six well-crafted and proportioned round domed knobs of various heights equally spaced around the surface in opposing pairs*'.

Type 4k CSBs: '*six low round or sub-round knobs equally spaced around the surface in opposing pairs with prominent raised and joined interspaces*'.

Type 4l CSBs: '*oval/elongated or asymmetrical carved stone balls with six round or sub-round knobs with slight undercutting giving them the impression of being 'caps', which are equally spaced around the surface in opposing pairs*'

Type 4m CSBs: '*six knobs or discs unequally spaced around the surface with one knob/disc offset at an oblique angle to the other five*'.

Type 4n CSBs: '*six low, round or sub-round and slightly domed 'button' like knobs equally spaced in opposing pairs around the surface*'.

Type 4o CSBs: '*six smooth slightly domed knobs equally spaced in opposing pairs around the surface*'.

Type 4p CSBs: '*six poorly defined cube-like knobs equally spaced in opposing pairs around the surface*'

Type 4 Misc: 'comprised of miscellaneous six knob CSBs that fall outwith the descriptions given for Types 4a to 4p'.

Type 5 CSBs: '*seven smooth slightly domed knobs*'.

Type 5a CSBs: '*six 'equally' spaced knobs plus an additional smaller rectangular/oval or pear-shaped knob between two of the other six*'.

Type 6 CSBs: '*eight or nine knobs or discs which may vary in shape, size and positioning*'.

Type 7 CSBs: '*an oblate carved stone ball with central knobs top and bottom surrounded by a varying number of slightly smaller knobs around the periphery in the form of a 'flower' head, forming a very distinctive shape*'.

Type 8a CSBs: '*a slightly oblate carved stone ball with relatively small flat 'button' like discs or knobs that usually have sharply cut edges and that are evenly spaced over the surface*'.

Type 8b CSBs: '*twelve to fourteen knobs that are evenly spaced over the surface, none of which are sharply cut or defined and have no interspaces between them*'.

Note: Differentiation between Types **8c** to **8f** became more difficult due to the type of materials used, the quality of the carving and their ability to survive burial for over 5000 years. The final decision therefore was to divide them arbitrarily into four separate groups, to try and identify individuality or similarity. For instance, the three Type 8d CSBs all have 42 knobs, and their morphology suggests they may have been made by a single individual.

Type 8c: CSBs: 'with between ten and twenty-five knobs'.

Type 8d: CSBs: **'with forty-two knobs'**: these three CSBs cause an anomaly as those with forty-two knobs should really be included in 8e however these three CSBs were considered sufficiently distinctive to be kept separate.

Type 8e: CSBs: '**between twenty-six and fifty-five knobs'**.

Type 8f: CSBs: **'with fifty-six plus knobs'**.

It will be noted that many **Type 9** CSBs have also been listed within other types: **CSB 090** is listed in the database as **8a plus decoration 9 (9b, 9c, 9d)** indicating it belongs to **Type 8a** but also has **9b single or multiple spiral decoration**; **9c incised lines but excluding crosshatching** and **9d horizontal, vertical, or diagonal crosshatching**. **CSB 168** is listed as **4n 9 (9b, 9c, 9g)** indicating it belongs to **Type 4n** but also has **9b single or multiple spiral decoration**; **9c incised lines but excluding crosshatching** and **9g peck marks or pits**. As decoration may have been added later this allowed a more accurate compilation of the basic types of CSB. The few Type 9 CSBs that cannot be fitted into any of the basic types are unique and are listed as Type 9 plus one or more suffix which indicates their specific type of decoration. The full listing of Type 9 suffix are shown below:

Type 9a: CSBs: 'single incised spiral over the entire surface of the CSB'.

Type 9b: CSBs: 'single or multiple spiral decoration'.

Type 9c: CSBs: 'incised lines but excluding crosshatching'.

Type 9d: CSBs: 'horizontal, vertical or diagonal crosshatching'.

Type 9e: CSBs: 'nested triangles and/or Vs'.

Type 9f: CSBs: 'incised or ground concentric circular decoration'.

Type 9g: CSBs: 'deliberate peck marks, cupels or pits'.

Type 10: CSBs: Potential forgeries.

Type 11: CSBs: **Orkney.**

Orkney CSBs were given their own Type number, **Type 11**, due to their individuality. A few Orkney CSBs are included in other Types but have the suffix 11 to indicate that they are specifically related to Orkney ie: **CSB 045** is defined as **9 (9f, 11)** which indicates that it has **incised or ground concentric circular decoration and is from Orkney.**

Note 1: Yellow stars on the Type Maps illustrate the approximate location of CSBs with findspots. CSBs with insufficient locational information are not included.

Note 2: The original identification of the materiality of each CSB is listed in black text in column three (Material): in each case the identification must be considered suspect as none have been characterized by an expert geologist/petrologist. Those entries listed in red text have been visually characterized by a Geologist/Petrologist as part of this research and are confirmed to be as accurate as is possible without removing samples of the material and damaging the artefact.

Note 3: During the close examination of CSBs for this revision it became clear that some had several visually and metrically similar attributes, leading to the theory that some could have been made by the same craftsperson. Despite this being totally subjective these have been highlighted in the analysis that follows.

Description and analysis of new and existing types resulting from this revision

The following analysis details the specific characteristics of each individual Type of CSB identified, and a list of approximate findspots where known within each Type. It also describes the materiality of each CSB where it has been visually geologically characterized, its average overall diameter and knob diameter. The ratio of knob diameter to overall diameter has not previously been considered prior to this research but is considered potentially valuable in identifying individual craftspeople. Interestingly, Charts 7.1 – 7.26 show that the ratio of knob diameter to overall diameter is remarkably constant. In some instances, it is suggested that the use of similar materials, CSB metrics, and decoration may potentially indicate a sign that individual craftspeople can be seen. CSBs made by these 'individuals' have been highlighted, pink, bright pink, or rose within each of the following tables.

Each of the Types identified by this review also have a 'Type Image' showing their typical attributes along with a map detailing the location of those CSBs with approximate findspots. It should be noted that as the location of some CSBs can only be confirmed to county level the number of CSBs shown in the text will not agree with the number marked on the corresponding map. Finally, the potential origin of some 'Types' have been suggested based on findspot clustering; reassessment will be necessary as and when additional CSBs are found.

Type 1 CSBs:

Diagnostic Attributes: A carved stone ball with ***'three large, rounded knobs'*** defines this type. (No change to Marshall).

Type Image: None as all three have different morphology.

CSB diameters (AvB/D): between **67.32** and **67.59**mm.

Knob diameters (AvK/D): between **53.20** and **55.38**mm.

Ratio of AvK/D to AvB/D: between **1.27** and **1.40**.

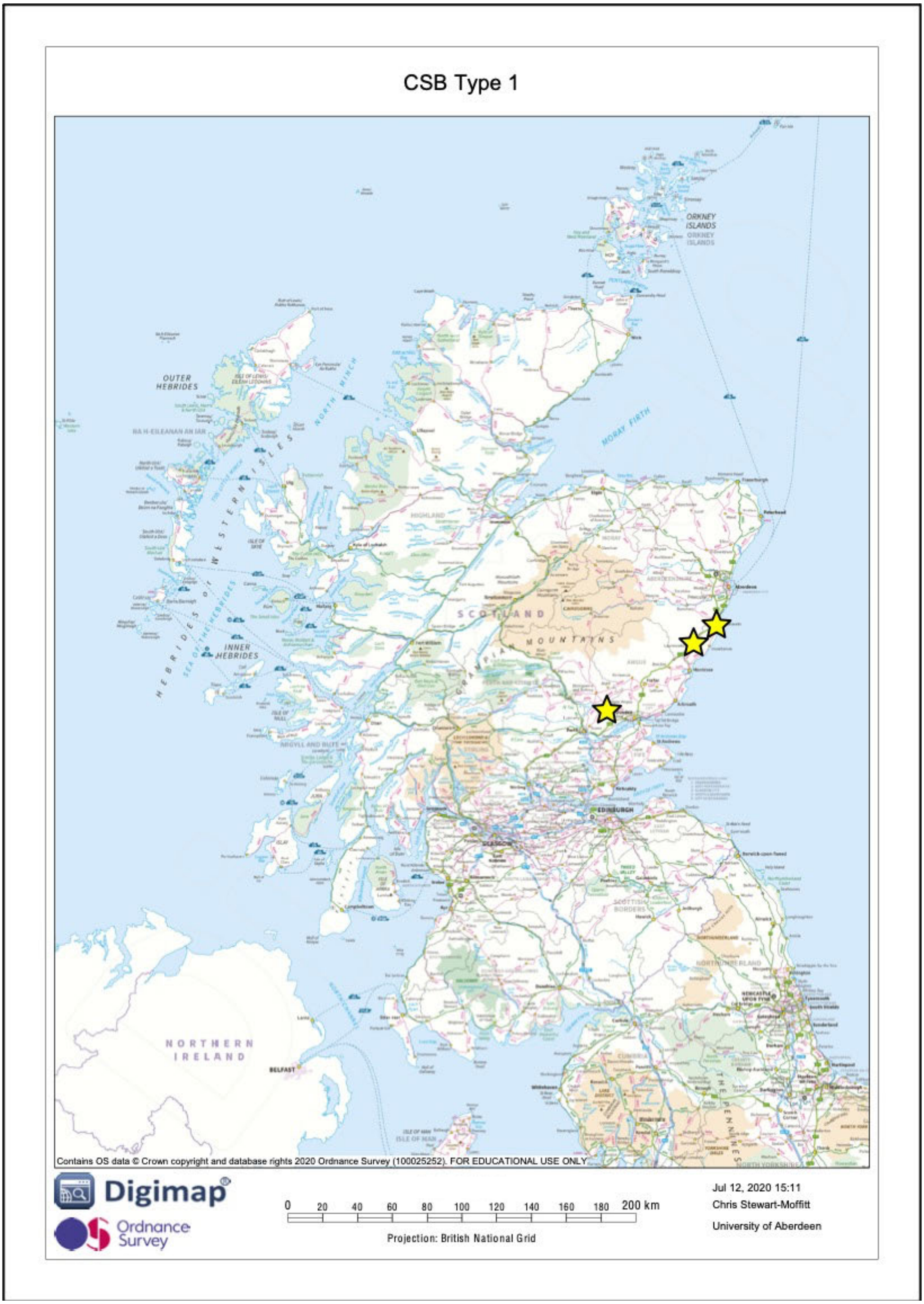
Of the three CSBs in this type, Table 7.4, all have approximate findspots, Map 7.1. Marshall's classification/typology lists six three knob CSBs in this type. Of these NMA BG 138 from Swallowhouse in Forfar has not been included in this revision as it is a separate artefact type, being a flat three-winged device with a central perforation which is visually similar to a contemporary stress reliever or 'fidget spinner'. That from Dunrobin is a modern copy made from local material and another which Marshall lists as 'Info Mr. Milne, Aberdeen' has not been traced.

These three CSBs were found within 78km of one another approximately following the line of the modern A90 trunk road in a line between Stonehaven in Aberdeenshire (**CSB 410**), Marykirk by Montrose in Kincardineshire (**CSB 229**) and Kettins in Perthshire (**CSB 075**). While **CSBs 229 and 075** are spherical in form, **CSB 410** has a very different flat/triangular profile with rounded knobs.

Three knob CSBs are comparatively rare and as these were all found to the south of Aberdeen it is possible this type may have been produced 'regionally' by a single craftsperson. Two plain stone balls found just twelve kilometres south-southwest at Rossie Muir or Moor near Marykirk-by-Montrose may suggest manufacture in this area.

Table 7.4: Type 1 CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
075	Ford of Pitcur Farm, Kettins, Perthshire	Possibly Chert	67.59 mm	53.2 mm	1.27
229	Tullo of Garvock, Marykirk by Montrose, Kincardineshire	Possibly Granite	77.32 mm	55.38 mm	1.40
410	Stonehaven, Aberdeenshire	Biotite Granite	51.5 x 67.8 x 80.2 mm	50.53 mm	N/C



Map 7.1: Type 1 CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 2a CSBs

Diagnostic Attributes: A carved stone ball with ***'four shallow discs'*** defines this type. (Marshall's Type 2a 'four knobs with worked interspaces' redefined).

CSB diameters (AvB/D): between **60.44** and **69.52**mm.

Knob diameters (AvK/D): between **42.47** and **53.55**mm.

Ratio of AvK/D to AvB/D: between **1.26** and **1.42**.

Type Image:

Figure 7.1: CSB 112, Glass, Huntly, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the thirteen CSBs in this type, Table 7.5, and Chart 7.1, nine have approximate findspots, Map 7.2, and four have no findspots. **LM CSB 017**, currently lost/missing, is thought to be in private hands. Based on currently known findspots the main concentration of this type lies in an approximately 9km wide band extending north-northwest from Dyce to Turriff for a distance of approximately 48km. Outliers have been found in the west of the country in the Western Isles and Argyll.

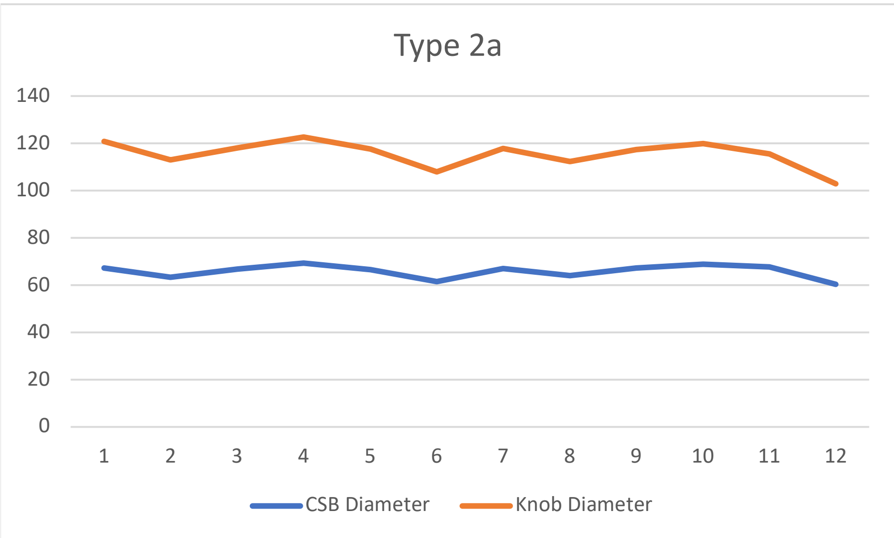


Chart 7.1: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2a. C. Stewart-Moffitt 2020.

Table 7.5: Type 2a CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
112	Glass, Huntly, Aberdeenshire	Diorite	67.36 mm	53.55 mm	1.26
176	Kichoan, Oban, Argyll	Greenstone	63.45 mm	49.57 mm	1.28
251	Hill of Aultmore, Deskford Parish, Morayshire	Unknown	66.91 mm	51.27 mm	1.30
006	Menie Muir, Balmedie, Aberdeenshire	Metamorphosed Greywacke	69.52 mm	53.22 mm	1.31
138	Unknown	2-Mica Granite	66.73 mm	50.95 mm	1.31
436	Lochboisdale, South Uist	Garnet Metabasite	61.60 mm	46.37 mm	1.32
418	Premnay Parish, Aberdeenshire	Hornfels	67.06 mm	50.90 mm	1.32
173	Turriff, Aberdeenshire	Amphibolite	64.21 mm	48.27 mm	1.33
352	Unknown	Sandstone	67.32 mm	50.17 mm	1.34
226	Unknown	Granite	68.87 mm	51.10 mm	1.35
LM CSB 017	Kingussie, Inverness-shire	Unknown	~64.50 mm	Unknown	N/K
342	Unknown	Sandstone	67.80 mm	47.87 mm	1.41
139	Udny, Aberdeenshire	Granite	60.44 mm	42.47 mm	1.42

Map 7.2: Type 2a CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 2b CSBs

Diagnostic Attributes: A carved stone ball with ***'four slightly domed knobs and interspaces with convex surfaces'*** defines this type. (No Type 2b in Marshall).

CSB diameters (AvB/D): between **62.70** and **78.86**mm.

Knob diameters (AvK/D): between **42.35** and **58.85**mm.

Ratio of AvK/D to AvB/D: between **1.34** and **1.46**.

Type Image:

Of the ten CSBs in this type, Table 7.6, and Chart 7.2, five have approximate findspots, Map 7.3, and five have no findspots. Three were found north of Inverurie, one was found in the northwest in Sutherland, and another was found in Benbecula in the Western Isles; this latter CSB may have been made in the Western Isles from locally available material. Based on currently known findspots the majority may have originated in the vicinity of Fyvie. **CSBs 326, 409, 353**, and **417** (highlighted pink) in Table 7.6 are visually very similar with a ratio of between **1.36** and **1.39**. **CSBs 431** and **012** while similar to the previous four have a ratio of between **1.45** and **1.48.** Their morphology suggests it is possible that all may have been made by one skilled craftsperson.

Figure 7.2: CSB 326, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

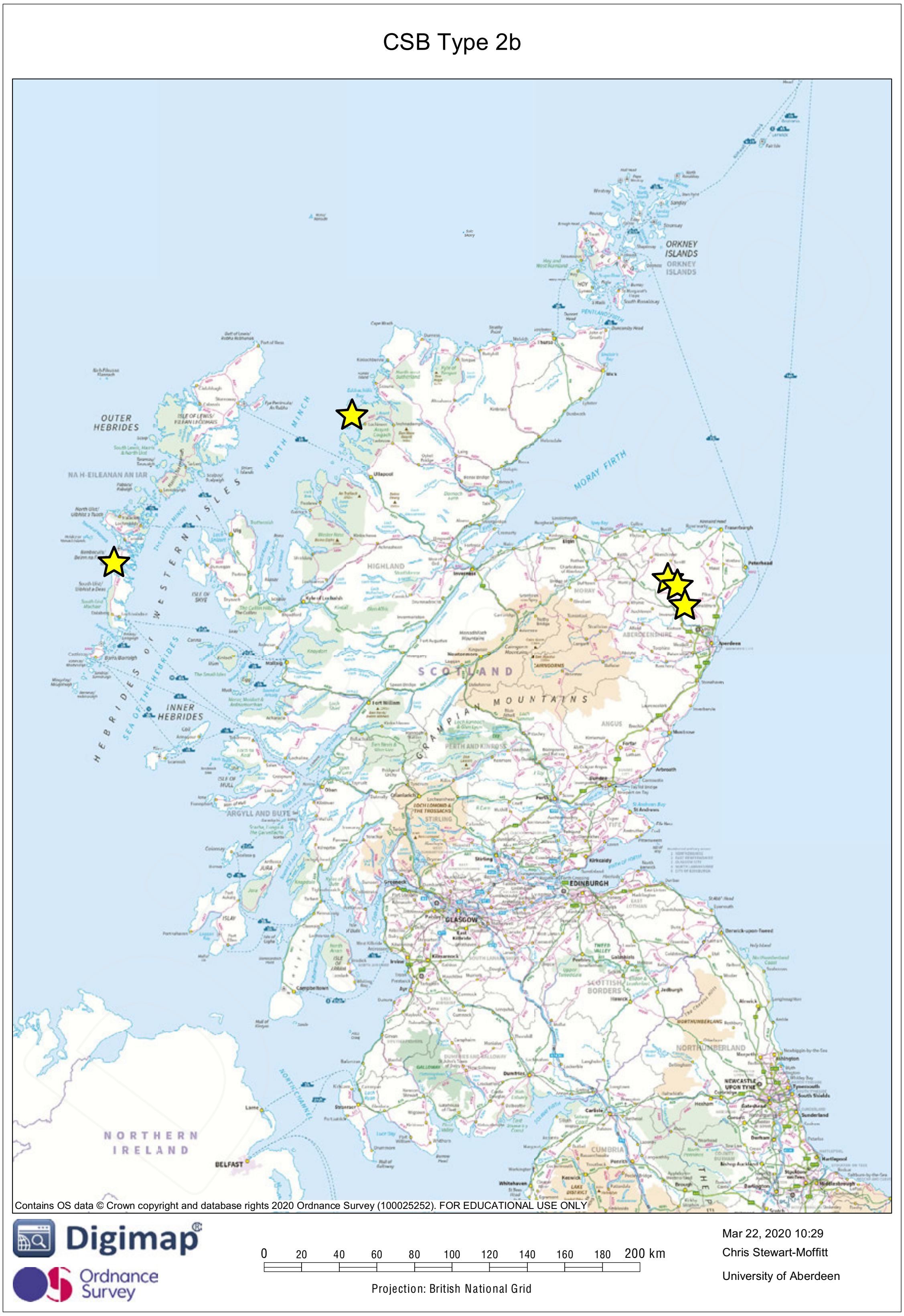
Figure 7.3: CSB 409, Stoer, Sutherland. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.4: CSB 353, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.5: CSB 417, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.

Figure 7.6: CSB 431, Benbecula, Western Isles. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.7: CSB 012, Auchterless, Aberdeenshire. Courtesy of Ashmolean Museum, University of Oxford. C. Stewart-Moffitt 2015.



Map 7.3: Type 2b CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.6: Type 2b CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
443	Old Meldrum, Aberdeenshire	Unknown	78.86 mm	58.85 mm	1.34
408	Fyvie, Aberdeenshire	2-Mica Granite	62.70 mm	46.45 mm	1.35
326 **Fig 7.2**	Unknown	Microgranite	66.30 mm	48.82 mm	1.36
409 **Fig 7.3**	Stoer, Sutherland	Gabbro/Norite	67.92 mm	49.67 mm	1.37
353 **Fig 7.4**	Unknown	Gritty/Coarse Sandstone	65.40 mm	47.77 mm	1.37
417 **Fig 7.5**	Unknown	Amphibolite	71.24 mm	51.27 mm	1.39
345	Unknown	Sandstone	67.92 mm	48.17 mm	1.41
431 **Fig 7.6**	Benbecula	Hornblendite	70.13 mm	48.20 mm	1.45
347	Deeside, Aberdeenshire	Sandstone	67.00 mm	45.72 mm	1.46
012 **Fig 7.7**	Auchterless, Aberdeenshire	Sandstone	62.83 mm	42.35 mm	1.48

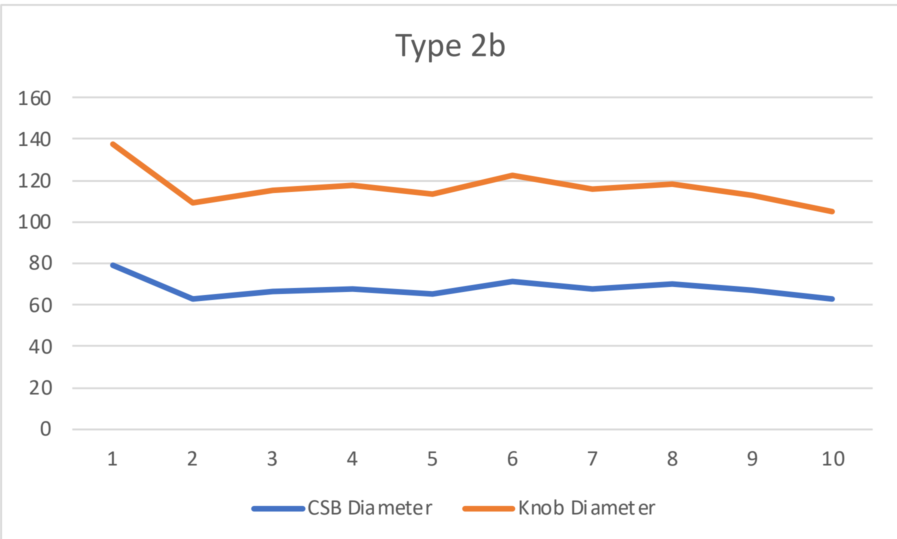


Chart 7.2: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2b. C. Stewart-Moffitt 2020.

Type 2c CSBs

Diagnostic Attributes: A carved stone ball with ***'four very slightly domed and undercut discs with large triangular interspaces'*** defines this type. (No Type 2c in Marshall).

CSB diameters (AvB/D): between **62.53** and **73.77**mm.

Knob diameters (AvK/D): between **40.02** and **60.06**mm.

Ratio of AvK/D to AvB/D: between **1.16** and **1.56**.

Type Image:

Figure 7.8: CSB 233, Armathwaite, Cumbria. From the collections at Tullie House Museum. C. Stewart-Moffitt 2014

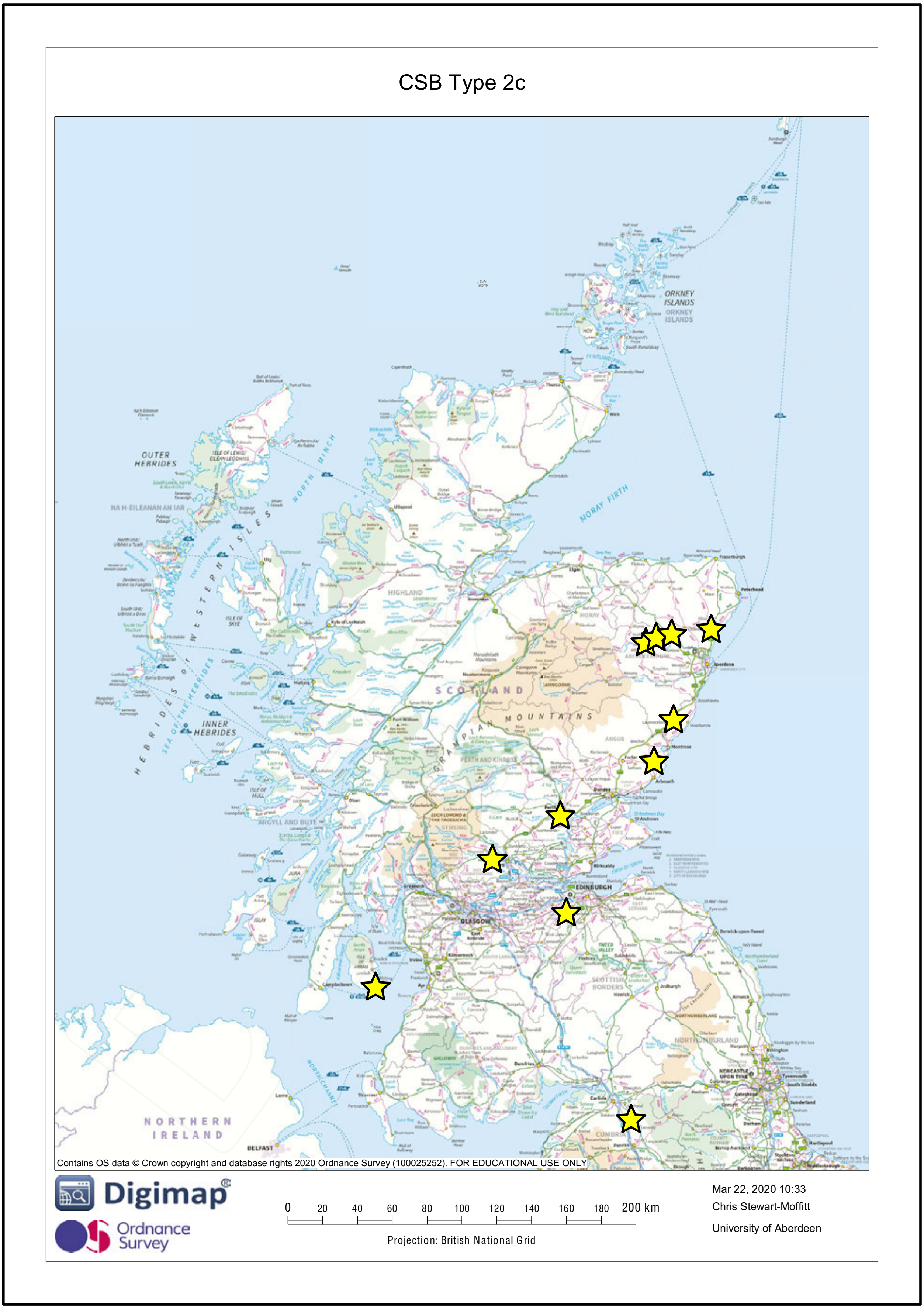
Of the thirteen CSBs in this type, Table 7.7, and Chart 7.3 eleven have approximate findspots, Map 7.4, and two have no findspots. Based on their currently known locations a concentration exists slightly north of a line between Inverurie and Alford; two have been made from Hornfels, a major source of which can be found approximately 20km west of Inverurie. **CSBs 330, 230** and **382** were found south of Aberdeenshire in a line trending southwest towards the Firth of Clyde, **CSB 101** was found in the far west of Scotland on the Isle of Arran and **CSB 233** was found as far south as the Eden Valley in Cumbria. **CSB 290**, found near Edinburgh may have been made locally as fine-grained, dark pink Felsite is found near the source of the Water of Leith. **CSB 233** is made from very similar material. **CSBs 258, 491** and **117** (highlighted pink) in Table 7.7 are visually very similar and have a ratio of between **1.21** and **1.25. CSBs 290, 233, 330 and 375**, while similar to the previous four have a ratio of between **1.33** and **1.38.** It is possible that these may have been made by one or two skilled craftspeople.

Figure 7.9: CSB 258, Inveramsay, Aberdeenshire. Courtesy of Aberdeenshire Council Museums Service. C. Stewart-Moffitt. 2015.

Figure 7.10: CSB 491, New Keig, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.

Figure 7.11: CSB 117, Tipperty Logie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt. 2015.

Figure 7.12: CSB 290, Water of Leith, Edinburgh. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.



Map 7.4: Type 2c CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.7: Type 2c CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
101	Dippen, Isle of Arran	Possibly Diorite	69.41 mm	60.06 mm	1.16
258 **Fig 7.9**	Harlaw Farm, Inveramsay, Aberdeenshire	Unknown	67.02 mm	50.55 mm	1.21
491 **Fig 7.10**	New Keig, Aberdeenshire	Quartzite	66.00 mm	53.58 mm	1.23
117 **Fig 7.11**	Tipperty, Logie Buchan, Aberdeenshire	Hornfels	65.25 mm	52.00 mm	1.25
087	West Craig, Bennachie	Unknown	64.50 mm	51.12 mm	1.26
382	Gargunnock, Stirlingshire	Amphibolite	73.77 mm	56.25 mm	1.31
290 **Fig 7.12**	Water of Leith, Edinburgh	Felsite	64.22 mm	48.27 mm	1.33
230	Braike Farm, Easter Brakie, By Montrose	Greywacke	68.00 mm	50.60 mm	1.34
233 **Fig 7.8**	Armathwaite, Eden Valley, Cumbria	Red Micro-Granite or Acid Porphrite (Felsite)	64.64 mm	47.50 mm	1.36
330 **Fig 7.13**	Fordoun Parish, Aberdeenshire	Unknown	65.90 mm	48.45 mm	1.36
375 **Fig 7.14**	Unknown	Chert	65.82 mm	47.62 mm	1.38
072	The bed of the River Tay (while dredging)	Felsite or Basalt	62.53 mm	40.02 mm	1.56
152	Unknown	Hornfels	70.70 x 63.20 mm	52.65 mm	N/C

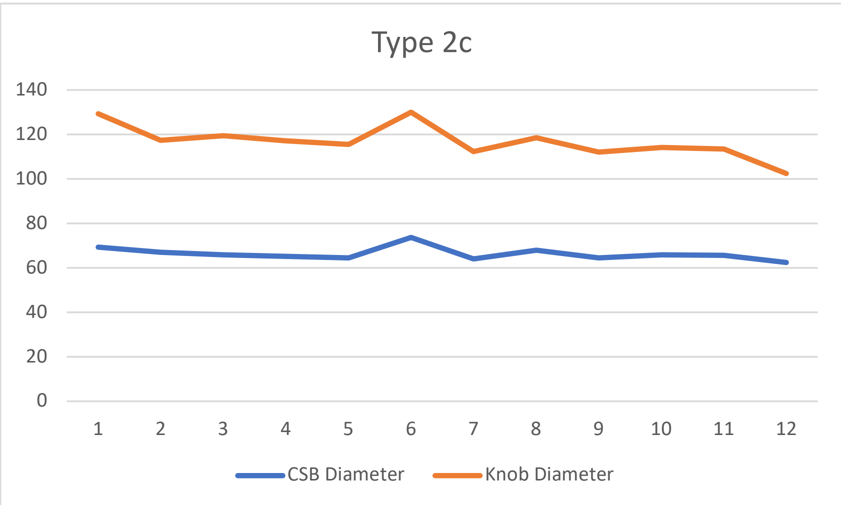


Chart 7.3: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2c. C. Stewart-Moffitt 2020.

Figure 7.13: CSB 330, Fordoun, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.

Figure 7.14: CSB 375, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.

Type 2d CSBs

Diagnostic Attributes: A carved stone ball with ***'four slightly domed knobs and prominent raised knobs in the interspaces'*** defines this type. (No type 2d in Marshall).

CSB diameters (AvB/D): between **60.96** and **75.17**mm.

Knob diameters (large) (AvK/D): between **40.82** and **54.30**mm.

Knob diameters (small) (AvK/D): between **15.00** and **21.16**mm.

Ratio of Large knobs AvK/D to AvB/D: between **1.30** and **1.49**.

Ratio of Small knobs AvK/D to AvB/D: between **3.31** and **4.56**.

Type Image:

Figure 7.15: CSB 162, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the seven CSBs in this type, Table 7.8, and Chart 7.4, four have approximate findspots, Map 7.5, and three have no findspots. **CSB 013, CSB 395** and **CSB 412** were found to the north of Aberdeen and **CSB 413** further to the west at Huntly. All seven have small, raised knobs in their interspaces which were probably formed during the process of pecking and grinding the knobs or discs. It could be argued that these are simply a stage or sequence in the manufacturing process or chaîne opératoire, however the fact that these CSBs are so well finished overall suggests that this may have been a deliberate manufacturing strategy, either by the craftsperson in their own idiosyncratic style, as a more personal and distinctive object for those demanding something more unique, or perhaps even as a means of identifying an individual group. **CSBs 412, 413, 162, 486** and **395** (highlighted pink) in Table 7.8 are visually very similar and have a ratio of between **1.30** and **1.49.** It is possible that these may have been made by a single craftsperson and with their relatively tight grouping suggests they may have been deliberately made in a 'local' style.

Figure 7.16: CSB 412, Methlick, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.17: CSB 395, Udny, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.18: CSB 486, Location Unknown. Copyright Pitt Rivers Museum, University of Oxford 2017.

Figure 7.19: CSB 413, Huntly, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

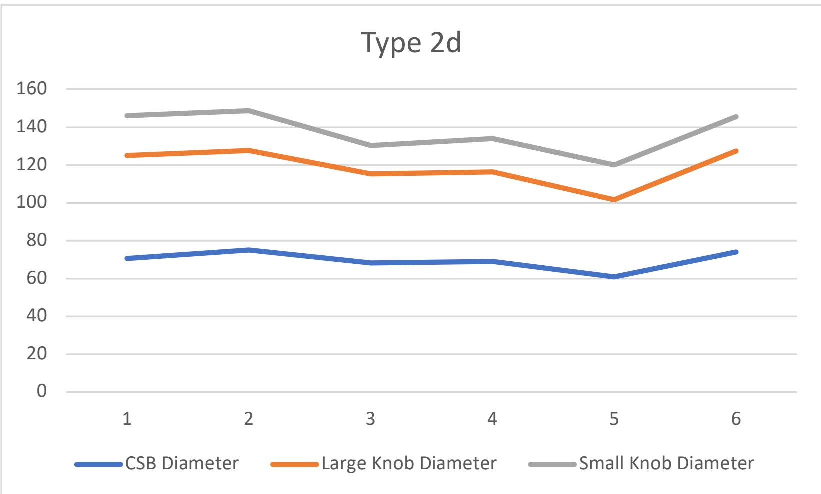


Chart 7.4: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2d. C. Stewart-Moffitt 2020.

Map 7.5: Type 2d CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.8: Type 2d CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
413 **Fig 7.19**	Huntly, Aberdeenshire	Meladiorite	70.65 mm	L.54.30 mm S.21.16 mm	1.30 3.34
412 **Fig 7.16**	Methlick, Aberdeenshire	Sandstone	75.17 mm	L.52.40 mm S.21.10 mm	1.43 3.56
486 **Fig 7.18**	Unknown	Unknown	68.33 mm	L.47.00 mm S.15.00 mm	1.45 4.56
162 **Fig 7.15**	Unknown	Sandstone	69.03 mm	L.47.42 mm S.17.40 mm	1.46 3.96
395 **Fig 7.17**	Udny, Aberdeenshire	Sandstone	60.96 mm	L.40.82 mm S.18.40 mm	1.49 3.31
013	Aberdeen, Aberdeenshire	Sandstone	72.43 mm	L. 45.01 mm S.Various mm	N/C
344	Unknown	Biotite Granite	74.12 mm	L.53.32 mm S.~18.00 mm	N/C

Type 2e CSBs

Diagnostic Attributes: A carved stone ball with ***'prominent, round, domed and undercut knobs'*** defines this type. (No type 2e in Marshall).

CSB diameters (AvB/D): between **69.82** and **73.23**mm.

Knob diameters (AvK/D): between **50.60** and **53.67**mm.

Ratio of AvK/D to AvB/D: between **1.30** and **1.50**.

Type Image:

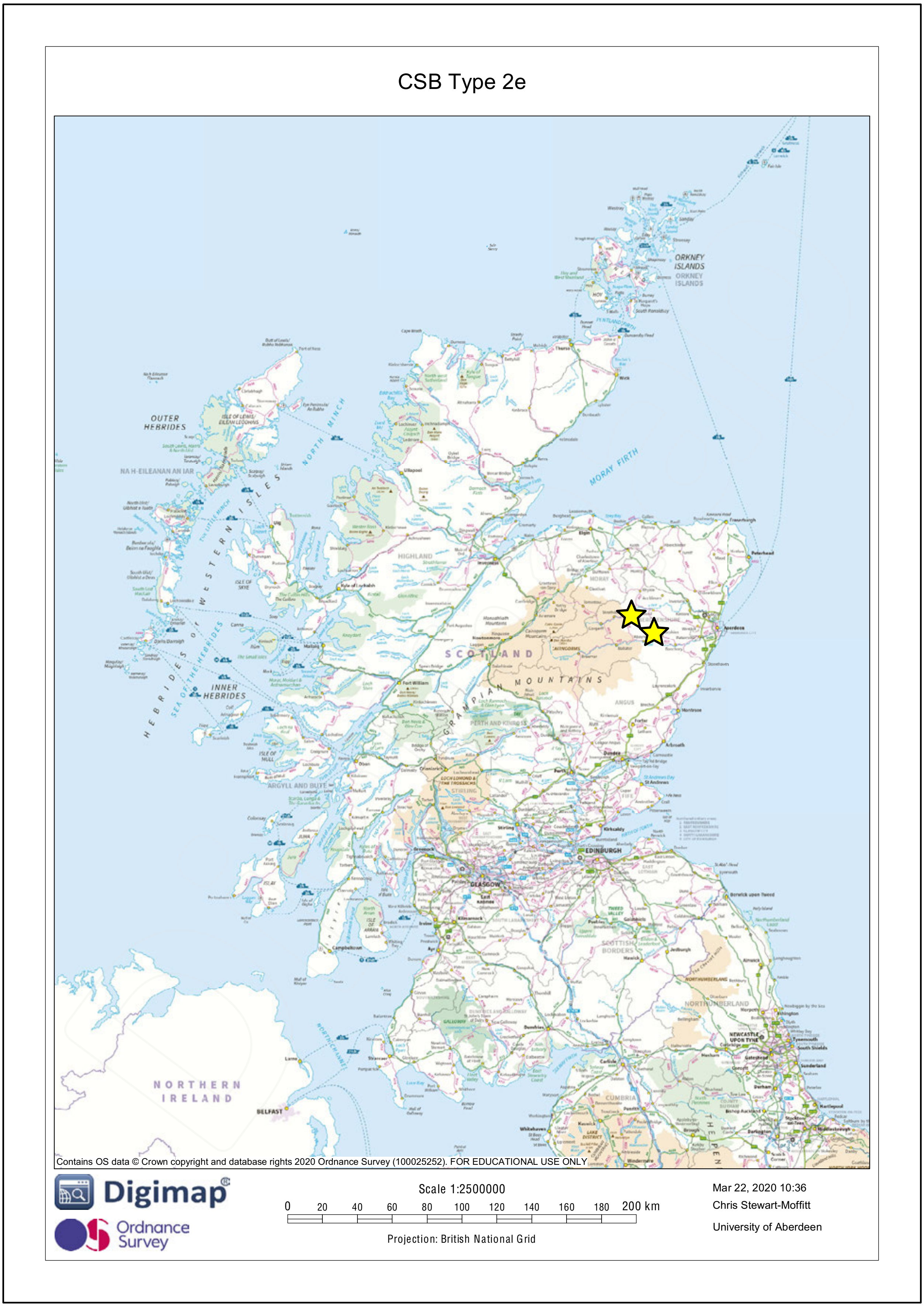
Figure 7.20: CSB 104, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the four CSBs in this type, Table 7.9, and Chart 7.5, two have approximate findspots, Map 7.6, and two have no findspots. **CSB 452**, otherwise known as the Towie Ball, which is renowned for its decoration, was found at Glaschul Hill, Towie while the morphologically and decoratively similar **CSB 453** was found approximately 17.5km away at Lumphanan. The two remaining CSBs in this Type **CSB 356** and **CSB 104** are also morphologically and decoratively similar but have no findspots. **CSB 104** was originally housed in the Aboyne Castle Museum, which is only 7.5km away from Lumphanan and 16.7km away from Towie; as many estate and museum collections were originally comprised of locally found artefacts it is possible that these may have been found nearby. Although the materiality of **CSB 453** has not yet been characterized, it is similar to that of **CSBs 104** and **356.** Additionally, their decoration and morphology are strikingly similar suggesting that all those (highlighted pink) in Table 7.9 may have been made by a single craftsperson. The similarity between their morphology and decoration will be discussed further in chapter eight.

Figure 7.21: CSB 356, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.22: CSB 452, Towie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt. 2015.

Figure 7.23: CSB 453, Lumphanan, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.



Map 7.6: Type 2e CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.9: Type 2e CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
356 **Fig 7.21**	Unknown	Biotite Granite	69.82 mm	53.67 mm	1.30
452 **Fig 7.22**	Glaschul Hill, Towie, Aberdeenshire	Probably a fine- grained Siltstone	73.23 mm	52.85 mm	1.39
453 **Fig 7.23**	Lumphanan, Aberdeenshire	Unknown	73.90 mm	51.85 mm	1.43
104 **Fig 7.20**	Unknown	2-Mica Granite	75.86 mm	50.60 mm	1.50

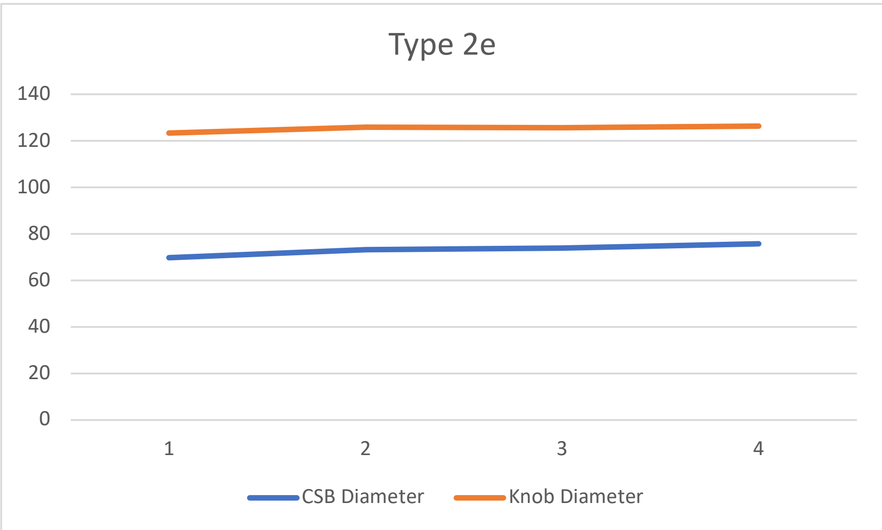


Chart 7.5: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2e. C. Stewart-Moffitt 2020.

Type 2f CSBs

Diagnostic Attributes: A carved stone ball with ***'four knobs with wide convex grooves and interspaces'*** defines this type. (No type 2f in Marshall).

CSB diameters (AvB/D): between **64.76** and **67.00**mm.

Knob diameters (AvK/D): between **37.13** and **45.72**mm.

Ratio of AvK/D to AvB/D: between **1.47** and **1.74**.

Type Image:

Figure 7.24: CSB 392, Ben Tharson, Ardross, Easter Ross. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

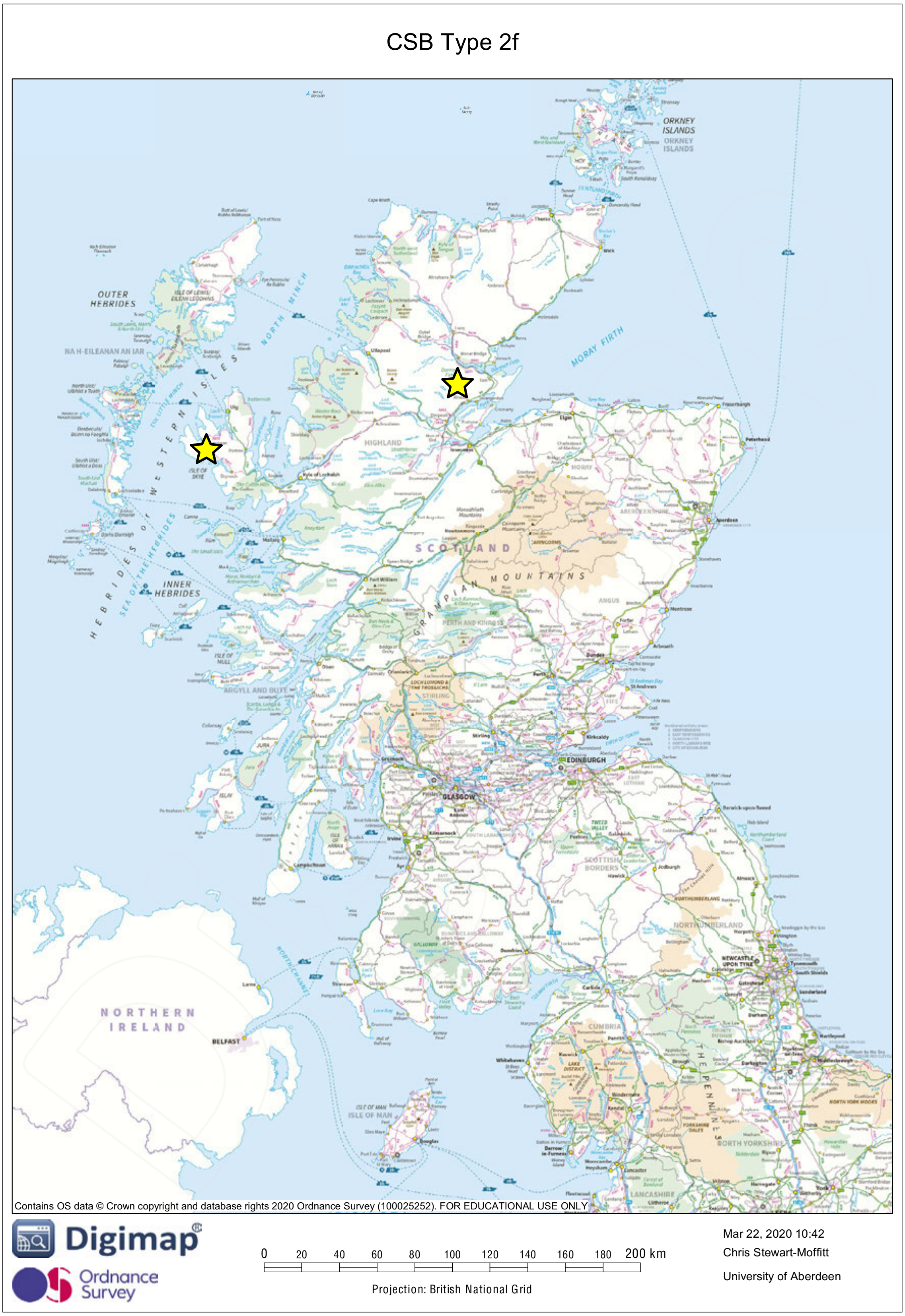
Of the three CSBs in this type, Table 7.10, two have approximate findspots, Map 7.7, and one has a non-specific findspot attributed to Deeside; no point of origin can be defined due to their widespread scatter. The most noticeable and defining attribute of these CSBs is the morphology of their interspaces and the grooves between their knobs. Rather than being concave or flat like the majority of CSBs, these are to a greater or lesser extent convex and are defined by carefully incised knobs. Although **CSB 347** has raised button like knobs and **CSB 214 and 392** have flattish discs it is the interspaces and grooves that are diagnostically important and define this type. It is possible that despite the difference between their ratios all those (highlighted pink) in Table 7.10 may have been made by a single craftsperson.

Figure 7.25: CSB 347, Deeside, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.26: CSB 214 Roag, Isle of Skye. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Table 7.10: Type 2f CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
347 **Fig 7.25**	Deeside, Aberdeenshire	Sandstone	67.00 mm	45.72 mm	1.47
392 **Fig 7.24**	Ben Tharson, Ardross, Ross-shire	Sandstone	64.76 mm	37.13 mm	1.74
214 **Fig 7.26**	Roag, Isle of Skye	Local Reina Lava	66.25 mm	Between 41.76 and 19.23 mm	N/C



Map 7.7: Type 2f CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 2g CSBs

Diagnostic Attributes: A carved stone ball with **'*four rounded or globular knobs and deep interspaces*'** defines this type. (No type 2g in Marshall).

CSB diameters (AvB/D): between **65.00** and **73.37**mm.

Knob diameters (AvK/D): between **40.40** and **52.92**mm.

Ratio of AvK/D to AvB/D: between **1.32** and **2.91**.

Type Image:

Of the six CSBs in this type, Table 7.11, and Chart 7.6, five have approximate findspots, Map 7.8, and one has no findspot. Although scattered quite widely across Scotland the morphology of this type is very distinctive with its domed and globular knobs and deep interspaces. The CSBs (highlighted pink) in Table 7.11 suggest that either two craftspeople were making very similar types of CSBs or that two were simply unfinished. While the ratio of **CSBs 026**, **307** and **388** is between **1.32** and **1.39** the ratio of **CSBs 085** and **351** is somewhat greater at **1.63** and **2.91.** There is insufficient information to include **Auctioned CSB 10**, also found in Dyce, despite it being visually similar.

Figure 7.27: CSB 026, Stanwix, Carlisle. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 7.28: CSB 307, Dyce, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.29: CSB 388, Elgin, Morayshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.30: CSB 085, Location Unknown. Courtesy of Aberdeen City Council, (Art Gallery & Museum Collections). C. Stewart-Moffitt 2015.

Figure 7.31: CSB 351, Olrig, Caithness. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.11: Type 2g CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
026 **Fig 7.27**	Stanwix, Carlisle, Cumbria	Unknown	65.55 mm	49.77 mm	1.32
307 **Fig 7.28**	Dyce, Aberdeenshire	Quartzite	69.42 mm	50.50 mm	1.37
388 **Fig 7.29**	Nr Elgin, Morayshire	Hornfels	73.37 mm	52.92 mm	1.39
085 **Fig 7.30**	Unknown	Unknown	65.80 mm	40.40 mm	1.63
351 **Fig 7.31**	Olrig, Nr. Castletown, Caithness	Hornfels	70.10 mm	24.12 mm	2.91
Auctioned CSB 10	Lochgreens Farm, Dyce, Aberdeenshire	Probably Basalt or fine-grained Gabbro	71.30 mm	~52.33 mm	N/C

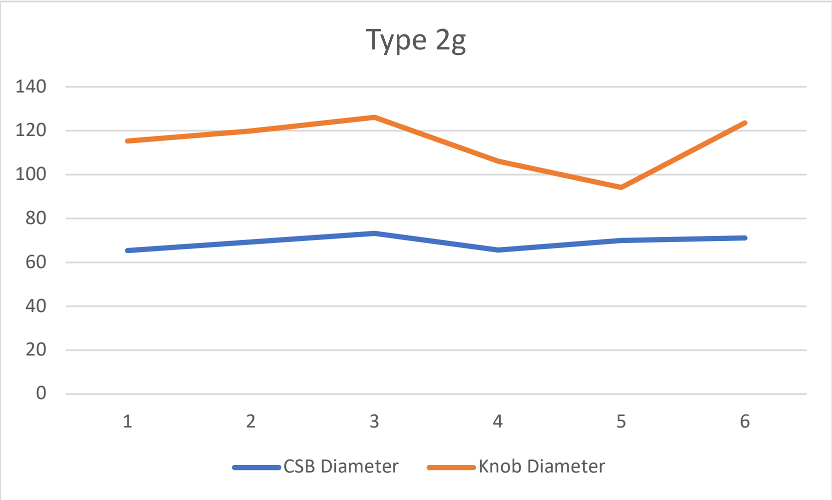
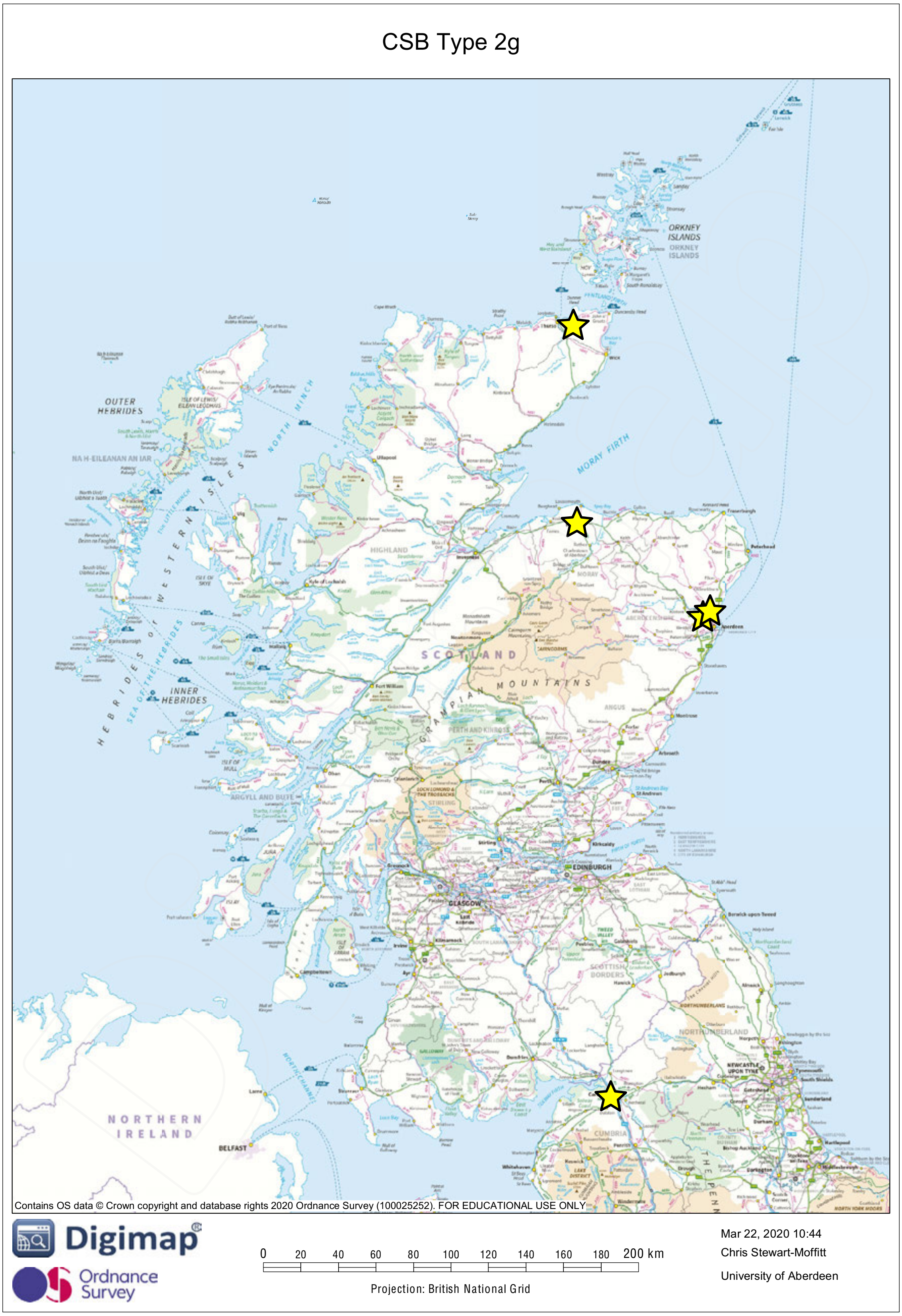


Chart 7.6: Comparison between Overall Diameter and Knob/Disc Diameter, Type 2g. C. Stewart-Moffitt 2020.



Map 7.8: Type 2g CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 3 CSBs

Diagnostic Attributes: A carved stone ball with ***'five knobs or discs'*** defines this type. (No change to Marshall).

CSB diameters (AvB/D): between **65.02** and **71.96**mm.

Knob diameters (AvK/D): between **42.42** and **52.12**mm.

Ratio of AvK/D to AvB/D: between **1.25** and **1.70**.

Type Image: None, as all four are morphologically different. Of the four CSBs in this type, Table 7.12, two have approximate findspots, Map 7.9, while two have no findspots. None are alike or appear to have any parallels with one another other than the number of knobs or discs, and may simply be one-off designs, perhaps created to express the individuality of their maker or owner/holder.

Table 7.12: Type 3 CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
343	Buchromb, Morayshire	Unknown	68.23 mm	3 x Round 55.50 mm 1 x Triangular 44.9 x 42.4 x 38.5 mm 1 x Triangular 46.1 x 48.8 x 43.1 mm	N/C
054	Unknown	Dolerite	65.02 mm	52.12 mm	1.25
312	Newhills, Aberdeenshire	Biotite Granite	73.10 mm	49.48 mm	1.48
361	Unknown	Sandstone	71.96 mm	L. 42.42 mm S.18.18 mm	1.70 N/C

CSB Type 3

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Chris Stewart-Moffitt
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Map 7.9: Type 3 CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4a CSBs

Diagnostic Attributes: A carved stone ball with ***'six slightly domed, round or sub-round knobs with smoothly rounded edges equally spaced in opposing pairs around the surface'*** defines this type. (Marshall's Type 4a 'six knobs low cut' redefined).

CSB diameters (AvB/D): between **63.66** and **75.63**mm.

Knob diameters (AvK/D): between **39.71** and **48.55**mm.

Ratio of AvK/D to AvB/D: between **1.54** and **1.72.**

Type Image:

Figure 7.32: CSB 070, Croir, Great Bernera, Western Isles. Courtesy of Great Bernera Museum. C. Stewart-Moffitt 2014.

Of the twenty-three CSBs in this type, Table 7.13, and Chart 7.7, thirteen have approximate findspots, Map 7.10, while the remaining ten have no findspots. They vary in size overall, as do the size and shapes of their knobs. Based on current approximate findspots, the most likely origin of this type is centred approximately 10km north of Inverurie. It is possible that individual craftspeople might be identified among those CSBs listed in Table 7.13, if an additional and more detailed study were undertaken to further define any subtle attributes.

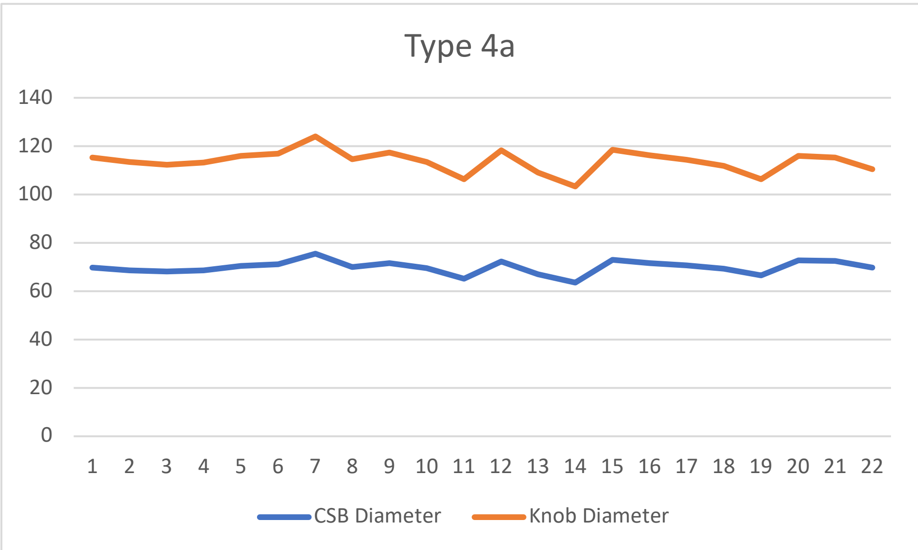
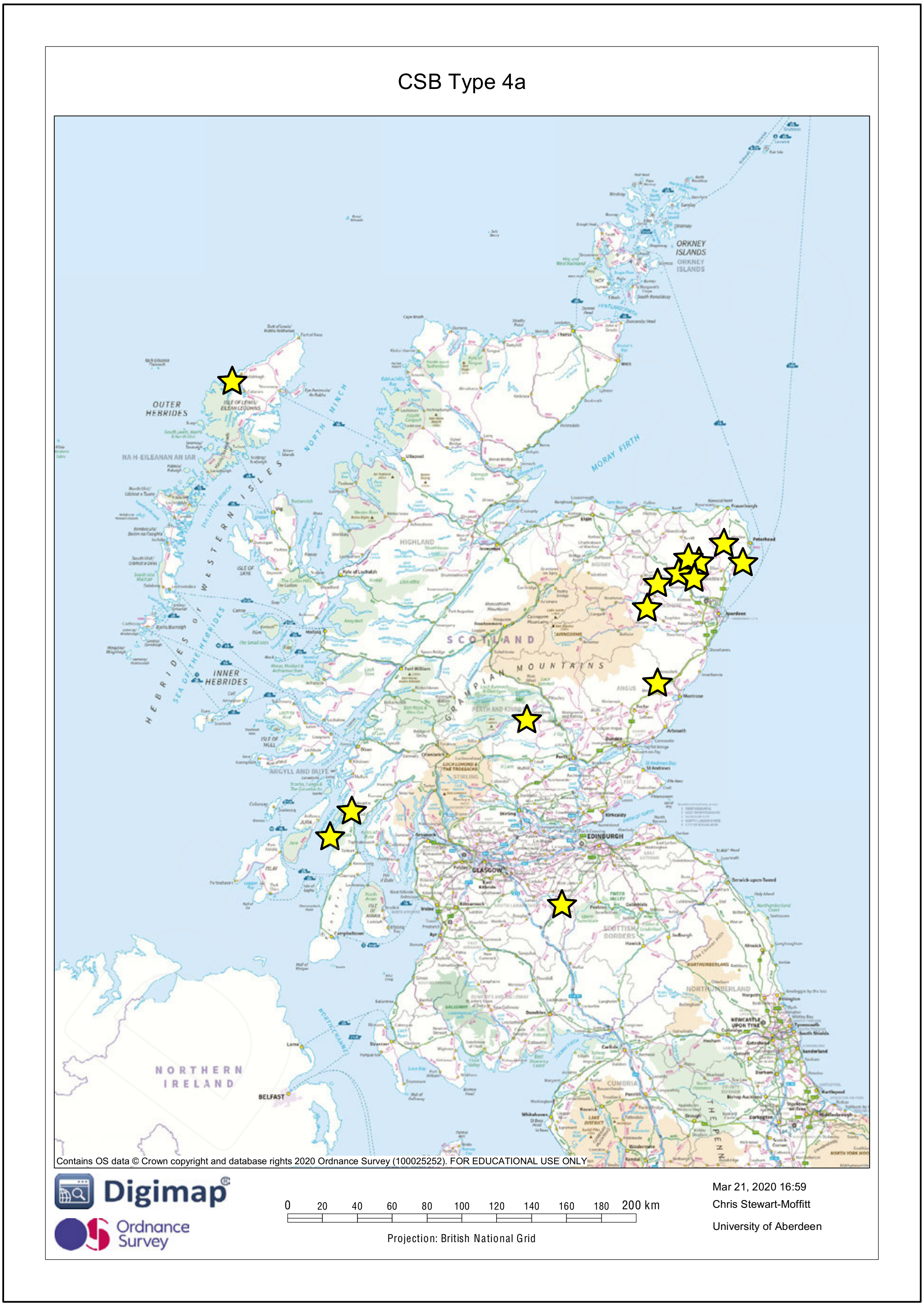


Chart 7.7: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4a. C. Stewart-Moffitt 2020.

Table 7.13: Type 4a CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
390	Dunadd Fort, Argyll	Probably Greenstone	69.92 mm	45.51 mm	1.54
113	Unknown	Biotite Granite	68.80 mm	44.66 mm	1.54
144	Leslie, Aberdeenshire	Dolerite	68.26 mm	44.15 mm	1.55
062	Unknown	Gabbro	68.78 mm	44.46 mm	1.55
119	South Auchnavaird, Elrick, Old Deer, Aberdeenshire	Amphibolite	70.66 mm	45.43 mm	1.56
063	Unknown	Unknown	71.30 mm	45.73 mm	1.56
182	Unknown	Quartzite	75.63 mm	48.55 mm	1.56
115	Fyvie, Aberdeenshire	Diorite	70.16 mm	44.55 mm	1.57
123	Unknown	2-Mica Granite	71.70 mm	45.75 mm	1.57
141	Reidhall Farm, Nr. Brechin, Angus	Metabasite	69.53 mm	44.03 mm	1.58
060	Cruden, Aberdeenshire	Sandstone	65.16 mm	41.20 mm	1.58
110	Unknown	Hornfels	72.43 mm	45.88 mm	1.58
172	Cushieston, Rayne, Aberdeenshire	Biotite Granite	67.13 mm	42.15 mm	1.59
055	Unknown	Probably Biotite Granite	63.66 mm	39.71 mm	1.60
203	Unknown	Unknown	73.13 mm	45.41 mm	1.61
358	Unknown	Biotite Granite	71.73 mm	44.55 mm	1.61
070	Croir, Great Bernera, Western Isles	Unknown	70.83 mm	43.55 mm	1.63
394	Braicklay, Nr. Methlick, Aberdeenshire	2-Mica Granite	69.43 mm	42.45 mm	1.64
303	Biggar Shield, Biggar, South Lanarkshire	2-Mica Granite	66.63 mm	39.85 mm	1.67
192	Unknown	Hornfels	72.90 mm	43.18 mm	1.69
389	Castle Sween, Argyll	Unknown	72.53 mm	42.75 mm	1.70
442	Oldmeldrum, Aberdeenshire	Sandstone	69.86 mm	40.60 mm	1.72
129	Banffshire	Porphyritic Felsite	81.2 x 76.6 x 69.2 mm	Vary Between 48.20 mm	N/C



Map 7.10: Type 4a CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4b CSBs

Diagnostic Attributes: A carved stone ball with ***'smoothly rounded edges equally spaced in opposing pairs around the surface'*** defines this type. (Marshall's Type 4b 'six knobs prominent' redefined).

CSB diameters (AvB/D): between **61.50** and **93.13**mm.

Knob diameters (AvK/D): between **34.30** and **47.98**mm.

Ratio of AvK/D to AvB/D: between **1.51** and **1.99**.

Type Image:

Figure 7.33: CSB 130, Croy Wood, Inverness-shire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the thirty-five CSBs in this type, Table 7.14, and Chart 7.8, nineteen have approximate findspots, Map 7.11, while the remaining sixteen have no accurate findspots. Like Type 4a CSBs they vary in size overall, as do the size and shape of their knobs; based on current findspots the most likely origin of this type is similar to that of Type 4a and is centred approximately 8km north-northeast of Inverurie. When the approximate findspot data of Types 4a and 4b are merged they centre on an area approximately 9km north-northeast of Inverurie. Again, it is possible that individual craftspeople might be identified among those CSBs listed in Table 7.14, if a further and more detailed study were undertaken.

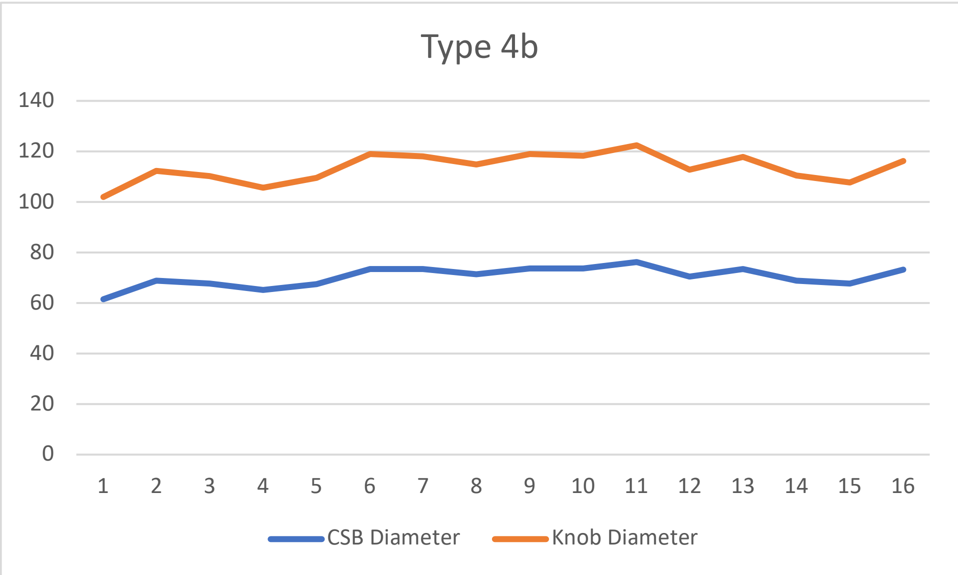
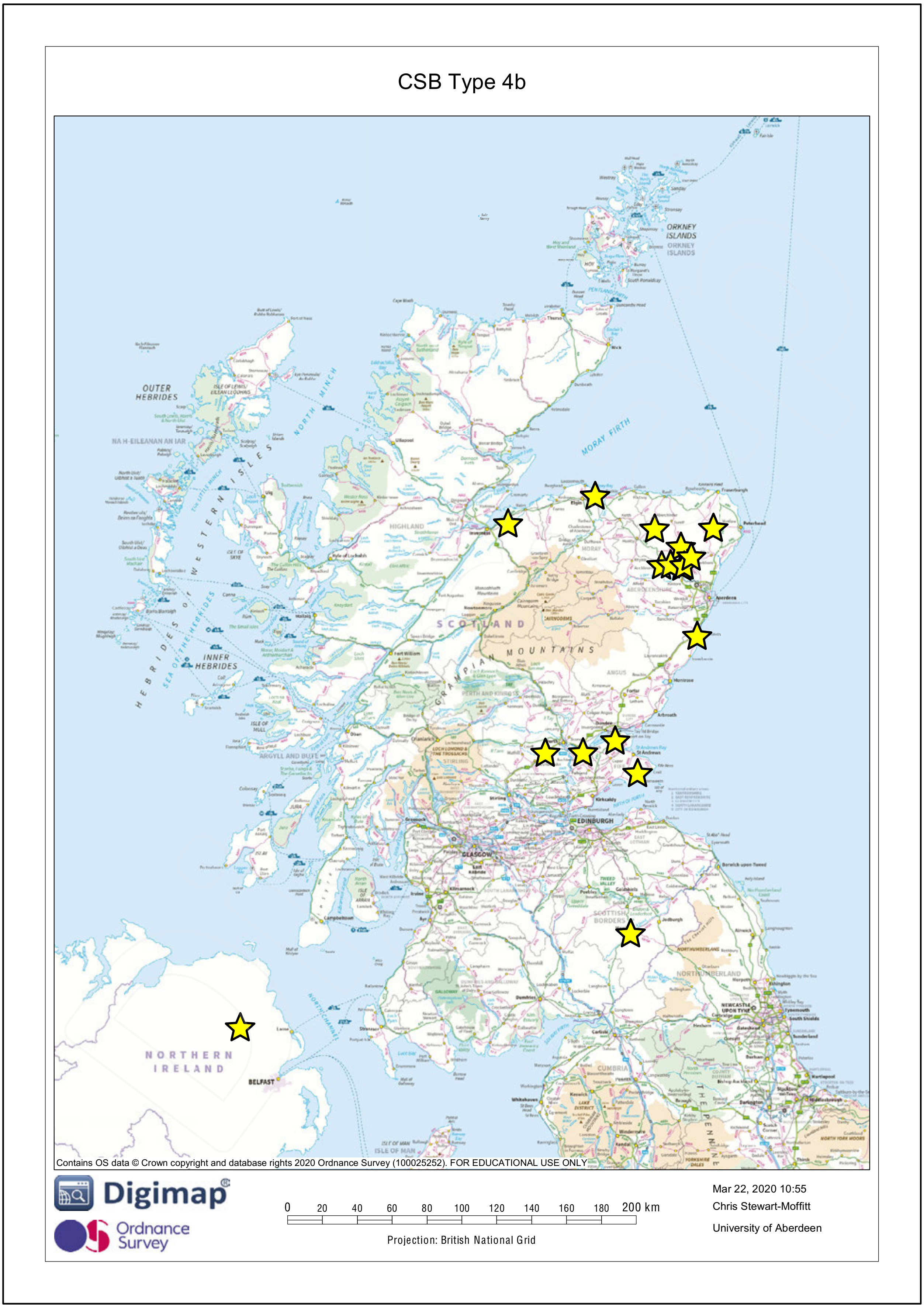


Chart 7.8: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4b. C. Stewart-Moffitt 2020.

Table 7.14: Type 4b CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
349	Oyne, Aberdeenshire	Sandstone	61.50 mm	40.60 mm	1.51
249	Carnbee, Pittenweem, Fife	Unknown	69.03 mm	43.30 mm	1.59
145	Unknown	Porphyritic Felsite	67.76 mm	42.54 mm	1.59
091	The Clisham, Chapel Brae, Pitcapel, Aberdeenshire	Unknown	65.23 mm	40.60 mm	1.61
001	Wilton Lodge, Hawick, Roxburghshire	Unknown	67.60 mm	42.00 mm	1.61
004	St Fort Quarry, Wormit, Fife	Diorite	73.63 mm	45.53 mm	1.62
050	Andrewsford, Fyvie, Aberdeenshire	Coarse Sandstone or Conglomerate	73.43 mm	44.83 mm	1.64
405	Bridge of Dalreoch, Perthshire	Hornfels	71.36 mm	43.51 mm	1.64
157	Unknown	Biotite Granite	73.86 mm	45.13 mm	1.64
243	Unknown	Unknown	73.73 mm	44.75 mm	1.65
259	Unknown	Granite	76.36 mm	46.08 mm	1.66
377	Unknown	Basalt	70.46 mm	42.51 mm	1.66
384	Unknown	Meladiorite	73.46 mm	44.36 mm	1.66
380	Braes of Biffie, Buchan, Aberdeenshire	Dolerite	69.03 mm	41.45 mm	1.67
130	Croy Wood, Inverness-shire	Microdiorite	70.63 mm	41.74 mm	1.69
022	Unknown	Pink Granite	67.80 mm	39.91 mm	1.70
477	Unknown	Unknown	73.26 mm	43.10 mm	1.70

017	River Thurso, Caithness	Unknown	70.90 mm	41.51 mm	1.71
036	Boggartyhead, Dunottar, Aberdeenshire	Amphibolite	69.86 mm	40. 53 mm	1.72
269	Shadowside of Bourtie, Aberdeenshire	Amphibolite/Hornblend	73.03 mm	42.18 mm	1.73
478	Hill of Barra, Aberdeenshire	Biotite Granite	77.53 mm	44.76 mm	1.73
034	Ballymena, County Antrim, Northern Ireland	Possibly Hornblend or Amphibolite	69.46 mm	39.95 mm	1.74
077	Possibly Comrie, Perthshire	Possibly Chert	75.63 mm	43.38 mm	1.74
378	Buchan	Biotite Granite	77.63 mm	44.68 mm	1.74
446	Possibly Fife	Metabasite	77.73 mm	44.53 mm	1.75
427	Unknown	Biotite Granite	79.60 mm	45.43 mm	1.75
098	Unknown	Granite	62.46 mm	34.30 mm	1.82
381	Unknown	Biotite Granite	93.13 mm	47.60 mm	1.96
080	Unknown	Sandstone	79.73 mm	40.03 mm	1.99
195	Unknown	Unknown	81.7 mm x 72.3 mm	45.60 mm	N/C
137	Unknown	2-Mica Granite	78.60 x 73.50 mm	47.98 mm	N/C
LM CSB 014	Craigdam, Tarves, Aberdeenshire	Granite	63.07 mm	Unknown	N/C
LM CSB 020	Urquhart, Morayshire	Possibly Syenite or fine-grained Hornblende and Feldspar	~76.00 mm	~38.00 mm	N/C
488	Unknown	Granite	~89.00 mm	~50.00 mm	N/C
LM CSB 029	Unknown	Possibly a Pink Granite	~75.00 mm	~42.75 mm	N/C



Map 7.11: Type 4b CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4c CSBs

Diagnostic Attributes: A carved stone ball with ***'with six flattish round or sub-round discs with rounded tops, each slightly undercut with flattened interspaces and gutters equally spaced in opposing pairs around the surface'*** defines this type. (Marshall's Type 4b 'six knobs with worked interspaces' redefined).

CSB diameters (AvB/D): between **66.90** and **72.80**mm.

Knob diameters (AvK/D): between **43.48** and **46.93**mm.

Ratio of AvK/D to AvB/D: between **1.49** and **1.55**.

Type Image:

Figure 7.34: CSB 009, Buckie, Banffshire. Courtesy of the University of Manchester Museum. C. Stewart-Moffitt 2015.

Of the four CSBs in this type, Table 7.15, and Chart 7.9, all have approximate findspots, Map 7.12. Based on current findspots, the most likely origin of this type may be somewhere to the south of Inverurie. The well-cut flat interspaces and gutters of those (highlighted pink) in Table 7.15, suggest they may have been made by a single craftsperson; CSB 211 is something of an anomaly and will be discussed in chapter eight.

Figure 7.36: CSB 433, Crieff Farm, Kirriemuir. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.35: CSB 147, Kemnay, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

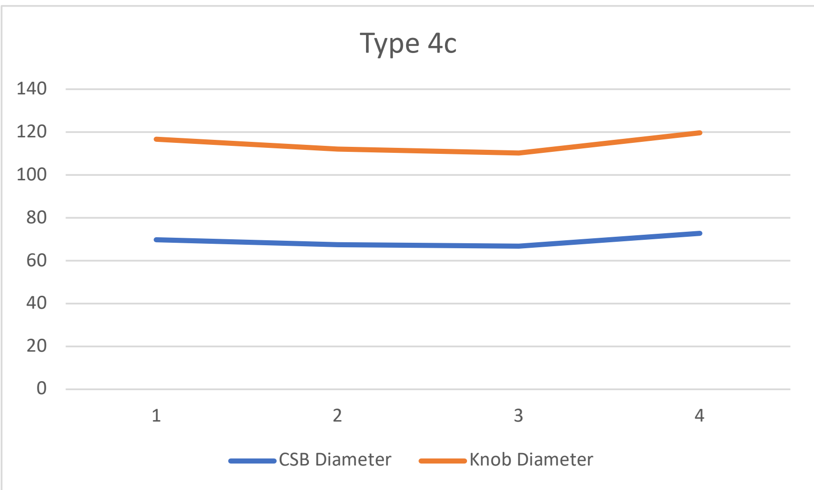


Chart 7.9: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4c. C. Stewart-Moffitt 2020.

Map 7.12: Type 4c CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.15: Type 4c CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
147 **Fig 7.35**	Kemnay, Aberdeenshire	Gabbro	69.83 mm	46.93 mm	1.49
433 **Fig 7.36**	Crieff Farm, Kirriemuir, Angus	Psammite	67.63 mm	44.56 mm	1.52
211	Alford, Aberdeenshire	Unknown	66.90 mm	43.48 mm	1.54
009 **Fig 7.34**	Buckie, Banffshire	Unknown	72.80 mm	46.90 mm	1.55

Type 4d CSBs

Diagnostic Attributes: A carved stone ball with **'*six low discs or knobs with low to medium raised triangular interspaces that are equally spaced around the surface in opposing pairs'*** defines this type. (No type 4d in Marshall).

CSB diameters (AvB/D): between **59.23** and **71.66**mm.

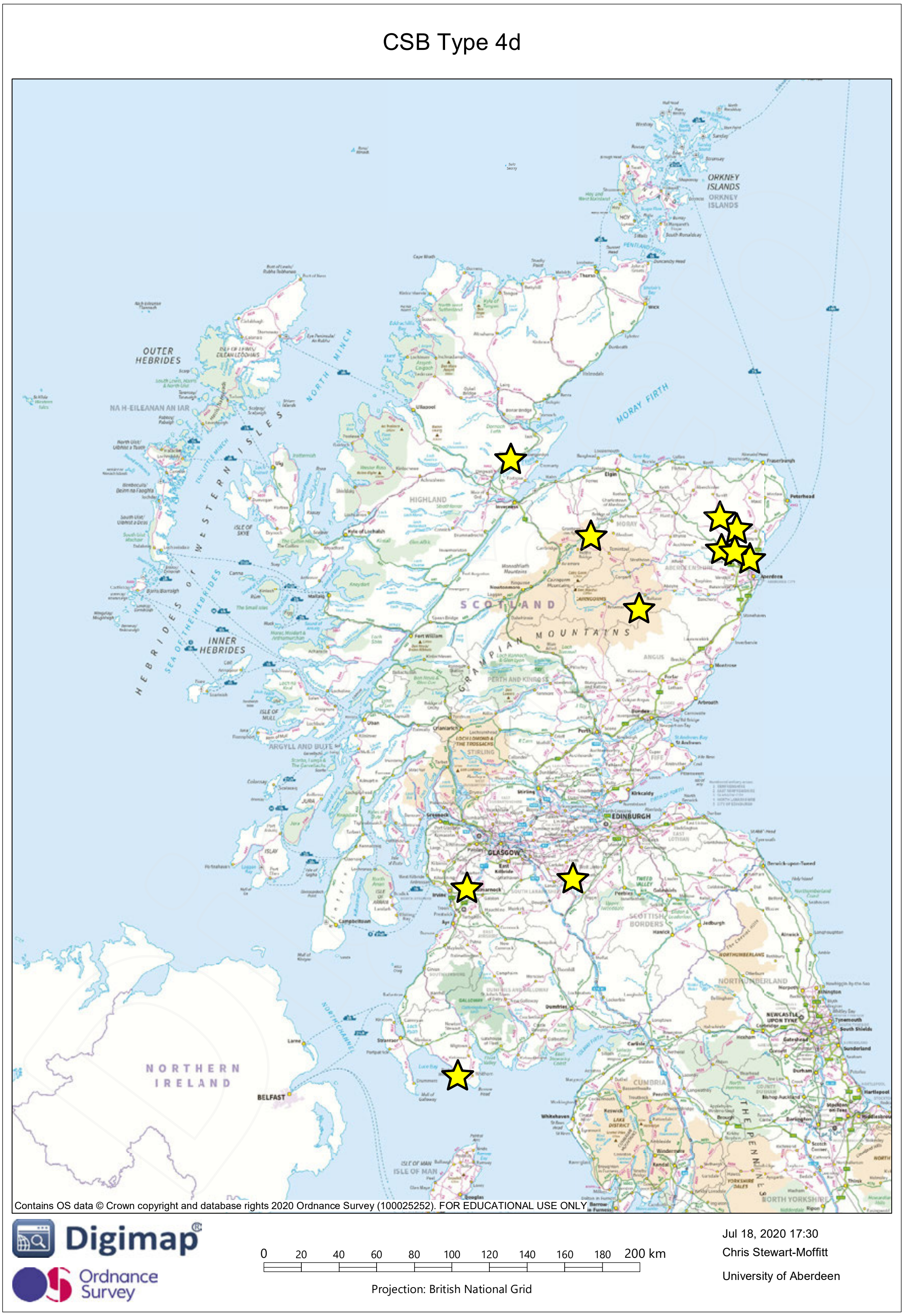
Knob diameters (AvK/D): between **37.68** and **52.95**mm.

Ratio of AvK/D to AvB/D: between **1.24** and **1.67**.

Type Image:

Figure 7.37: CSB 047, Red Moss, Belhelvie, Aberdeenshire. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Of the thirteen CSBs in this type, Table 7.16, and Chart 7.10, twelve have approximate findspots, Map 7.13, and one has no findspot. The raised triangular interspaces allow easy identification of this type. Apart from outliers **CSB 219, CSB 327** and **CSB 068**, the majority were found to the north-northwest of Aberdeen and based on current findspots the origin of this type may be somewhere within an approximate 14km radius of Oldmeldrum. **CSBs 118** and **328**, although similar in style are less well made and may have been either local attempts at copying or are simply unfinished. When a visual comparison of those CSBs (highlighted pink) in Table 7.16 is made, **CSBs 047, 426** and **327** show that despite being made of different materials a similar morphology and ratio exists between them as do **CSBs 479** and **068** (highlighted light pink) and **CSBs 014** and **339** (highlighted rose) suggesting that three craftspeople may have been involved in their manufacture.



Map 7.13: Type 4d CSB approximate findspots. C. Stewart-Moffitt 2020.

Figure 7.38: CSB 479, Linn of Muick, Aberdeenshire. Private Hands. C. Stewart-Moffitt 2018.

Figure 7.39: CSB 068, Jockthorn Farm, Ayrshire. By permission of East Ayrshire Council / East Ayrshire Leisure. C. Stewart-Moffitt 2016.

Figure 7.40: CSB 014, Fyvie, Aberdeenshire. Courtesy of Ashmolean Museum, University of Oxford. C. Stewart-Moffitt 2015.

Figure 7.41: CSB 339, Tarves, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.42: CSB 426, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.43: CSB 327, Mill of Cromdale, Morayshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.16: Type 4d CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
118	The Blair, Fintray, Aberdeenshire	Sandstone	65.65 mm	52.95 mm	1.24
328	Stellock Farm, Stellock, Dumfies and Galloway	Probably Tuff	70.65 mm	52.90 mm	1.34
221	Inverurie, Aberdeenshire	Granite	71.66 mm	49.08 mm	1.46
479 **Fig 7.38**	Linn of Muick, Buckhall, Aberdeenshire	Probably Amphibolite	69.36 mm	47.21 mm	1.47
068 **Fig 7.39**	Jock Thorns Farm, Ayrshire	Sandstone	62.60 mm	41.88 mm	1.49
014 **Fig 7.40**	Fyvie, Aberdeenshire	Sandstone	59.23 mm	38.63 mm	1.53
339 **Fig 7.41**	Tarves, Aberdeenshire	2-Mica Granite	71.63 mm	46.88 mm	1.53
426 **Fig 7.42**	Unknown	Hornfels	71.13 mm	45.81 mm	1.55
327 **Fig 7.43**	Mill of Cromdale, Morayshire	Amphibolite	67.13 mm	42.90 mm	1.56
047 **Fig 7.37**	Red Moss, Belhelvie, Aberdeenshire	Gabbro	65.50 mm	41.98 mm	1.56
219	Carnwath, South Lanarkshire	Unknown	66.86 mm	41.70 mm	1.60
368	Alness, Ross-shire	Dolerite	62.85 mm	37.68 mm	1.67
Auctioned CSB 03	Unknown	Unknown	Unknown	Unknown	N/C

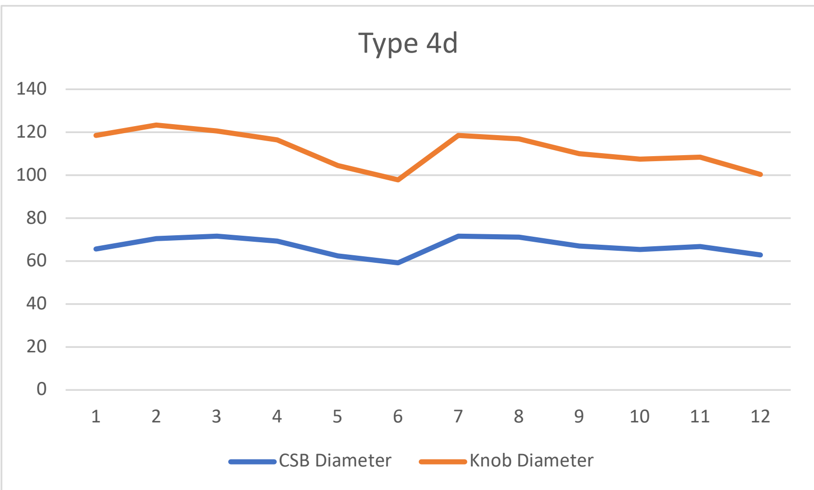


Chart 7.10: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4d. C. Stewart-Moffitt 2020.

Type 4e CSBs

Diagnostic Attributes: A carved stone ball with ***'six shallow but clear-cut round discs with flat interspaces that are equally spaced around the surface in opposing pairs'*** defines this type. (No type 4e in Marshall).

CSB diameters (AvB/D): between **64.35** and **70.70**mm.

Knob diameters (AvK/D): between **43.03** and **48.20**mm.

Ratio of AvK/D to AvB/D: between **1.41** and **1.59**.

Type Image:

Figure 7.44: CSB 424, Greenlonachs, Culbokie, Ross-shire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Of the eighteen CSBs in this type, Table 7.17, and Chart 7.11, thirteen have approximate findspots, Map 7.14, and five have no findspots. **CSBs 424, 470, 287** and **288** (highlighted pink) in Table 7.17 are similar enough to have been made by the same craftsperson. Based on current findspots it is possible that this type originated around 6km north of Inverurie where **CSBs 093, 476**, and **032** were found, with outliers **CSB 424** and **396** travelling north to Easter Ross and **CSB 470** to Caithness. In the south **CSB 299** was found in Fife near the River Tay, **CSB 288** was found near Biggar and **LM CSB 011** near the coast in Northumberland.

Figure 7.45: CSB 470 Ben-a-Chielt, Caithness. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2019.

Figure 7.46: CSB 287 Inverawe, Argyll. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.47: CSB 288 Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

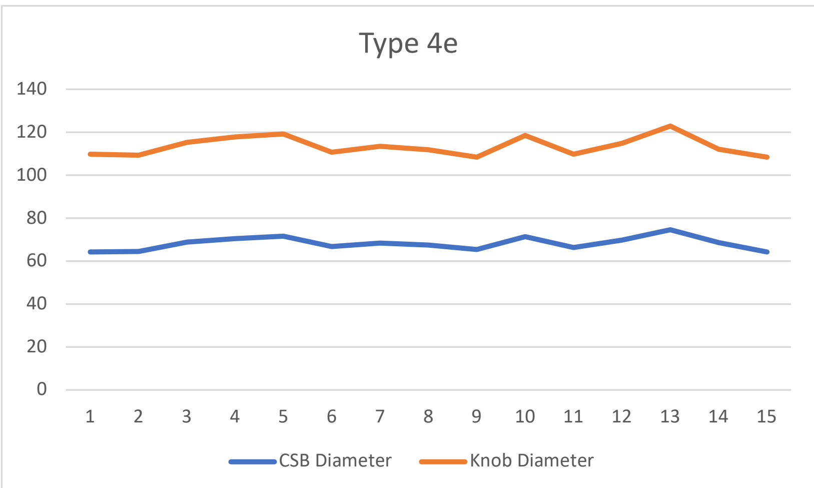


Chart 7.11: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4e. C. Stewart-Moffitt 2020.

Map 7.14: Type 4e CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.17: Type 4e CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AKv/D to AvB/D
481	Believed to be Essie, Aberdeenshire	Unknown	64.35 mm	45.55 mm	1.41
287 **Fig 7.46**	Vicinity of Inverawe House, Argyll	Meladiorite-Appinite	64.66 mm	44.78 mm	1.44
470 **Fig 7.45**	Ben-a Chielt, Caithness	Sandstone	68.93 mm	46.38 mm	1.49
093	Loanhead of Pitinnan, Aberdeenshire	Unknown	70.46 mm	47.41 mm	1.49
061	Unknown	Hornfels	71.75 mm	47.64 mm	1.51
424 **Fig 7.44**	Greenlonachs, Culbokie, Black Isle, Ross-shire	Diorite	66.76 mm	43.95 mm	1.52
288 **Fig 7.47**	In the vicinity of Biggar	Amphibolite	68.46 mm	45.01 mm	1.52
406	Perthshire	Hornfels	67.50 mm	44.38 mm	1.52
274	Unknown	Unknown	65.50 mm	43.03 mm	1.52
355	Unknown	Sandstone	71.46 mm	47.08 mm	1.52
434	Unknown	Amphibolite	66.46 mm	43.48 mm	1.53
299	Grange, Lindores, Fife	Quartzite	69.86 mm	45.18 mm	1.55
032	Bourtie, Hill of Barra, Aberdeenshire	Unknown	74.70 mm	48.20 mm	1.55
396	Contullich, Alness, Ross-shire	Metabasite	68.80 mm	43.35 mm	1.59
476	Keith Hall, Kinkell, Inverurie, Aberdeenshire	Possibly Siltstone or Serpentine	64.45 mm	~43.95 mm	N/C
Auctioned CSB 12	Stonehaven, Aberdeenshire	Greenschist	~74.00 mm	~ 49.15 mm	N/C
LM CSB 011	Hatton North Farm, Lowick, Northumberland	Unknown	Unknown	Unknown	N/C
Auctioned CSB 06	Unknown	Possibly Basalt	~75.10 mm	~44.65 mm	N/C

Type 4f CSBs

Diagnostic Attributes: A carved stone ball with ***'six slightly domed knobs that run one into another with a lack of channels or interspaces between them equally spaced around the surface in opposing pairs'*** defines this type. (No type 4f in Marshall).

CSB diameters (AvB/D): between **59.04** and **82.60**mm.

Knob diameters (AvK/D): between **32.58** and **51.48**mm.

Ratio of AvK/D to AvB/D: between **1.51** and **1.85**.

Type Image:

Figure 7.48: CSB 015, Laxdale, Stornaway, Isle of Lewis. From the collections of Museum nan Eilean. C. Stewart-Moffitt 2015.

Of the twenty-three CSBs in this type, Table 7.18, and Chart 7.12, fourteen have approximate findspots, Map 7.15, and nine have no findspots. Although many of the CSBs in this group look dissimilar they all have the basic attributes that define the type style. Several are quite distinctive having knobs with flattish tops while others are more rounded. **CSB 003** is a west coast outlier made from Hydrothermal Quartzite and was found in the Moss of Cree in Dumfriesshire. As this type of material is not found locally it appears to have travelled to this location. Another west coast outlier, **CSB 015,** was found in Laxdale which is located a few kilometres north of the town of Stornoway on the Isle of Lewis. This has been identified as Hornblend Gneiss, a material only found on the west coast of mainland Scotland and in the Western Isles and may have therefore been made here. None of the current findspots of these CSBs give a clear enough picture to suggest a point of manufacture. It is possible that three craftspeople could have been involved in making this type of CSB, each interpreting the lack of interspaces and gutters in their own individual way; **CSBs 015** and **003** (highlighted pink) in Table 7.18, are very similar, with related ratios, while **CSBs 357, 372** and **127** (highlighted light pink) have flat topped knobs and are made from Granite. **CSBs 423, 092, 498, 002** and **371** (highlighted rose) also follow in the same style with related ratios and a lack of distinct interspaces or gutters.

Figure 7.49: CSB 003, Cree Moss, Penninghame. Courtesy of Dumfries Museum. C. Stewart-Moffitt 2014.

Figure 7.50: CSB 372, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Map 7.15: Type 4f CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.18: Type 4f CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
180	Longriggend, North Lanarkshire	Unknown	67.16 mm	44.55 mm	1.51
003 **Fig 7.49**	Cree Moss, Penninghame, Wigtownshire	Quartzite	70.00 mm	45.00 mm	1.56
015 **Fig 7.48**	Laxdale, Nr. Stornaway, Isle of Lewis	Hornblend Gneiss	71.26 mm	45.43 mm	1.57
499	Cabrach, Aberdeenshire	Micro Granite	73.80 mm	46.98 mm	1.57
475	Vicinity of Bridlington, Yorkshire	Old Red Sandstone	66.36 mm	41.96 mm	1.58
369	Abernethy, Perthshire	Unknown	70.16 mm	44.15 mm	1.59
372 **Fig 7.50**	Unknown	Biotite Granite	82.60 mm	51.48 mm	1.60
423 **Fig 7.53**	Unknown	Hornblendite	73.46 mm	45.90 mm	1.60
092 **Fig 7.54**	Milton of Byth Farm, New Byth, Aberdeenshire	Unknown	69.58 mm	43.16 mm	1.61
498 **Fig 7.55**	Skara Brae, Orkney	Dolerite	71.86 mm	44.76 mm	1.61
002 **Fig 7.56**	Kilbryde, Nr. Dunblane, Stirlingshire	Unknown	69.60 mm	43.08 mm	1.62
371 **Fig 7.57**	Unknown	Porphyritic Felsite	72.33 mm	44.61 mm	1.62
127 **Fig 7.51**	Kinkell, Inverurie, Aberdeenshire	Granite	68.53 mm	40.55 mm	1.69
357 **Fig 7.52**	**Unknown**	Biotite Granite	75.73 mm	44.60 mm	1.70
225	Netherton, Perthshire	Unknown	78.30 mm	45.50 mm	1.72
429	Unknown	Whinstone	72.36 mm	42.00 mm	1.72
279	Wester Kinsleith, Luthrie, Fife	Unknown	70.06 mm	40.46 mm	1.73
393	Methlick, Aberdeenshire	Biotite Granite	77.13 mm	44.35 mm	1.74
337	Kirriemuir, Forfarshire	Sandstone	77.26 mm	43.30 mm	1.78
067	Unknown	Unknown	59.04 mm	32.58 mm	1.81
007	Unknown	Red Sandstone	77.73 mm	42.08 mm	1.85
097	Unknown	Granite	105.86 mm	54.41 mm	N/C
161	Unknown	Diorite	~86.95 mm	51.63 mm	N/C

Figure 7.51: CSB 127, Kinkell, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.52: CSB 357, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.53: CSB 423, Location Unknown. Courtesy of National Museums Scotland. C Stewart-Moffitt 2015.

Figure 7.54: CSB 092, New Byth, Aberdeenshire. Courtesy of Aberdeen City Council. (Art Gallery & Museum Collections). C. Stewart-Moffitt 2015.

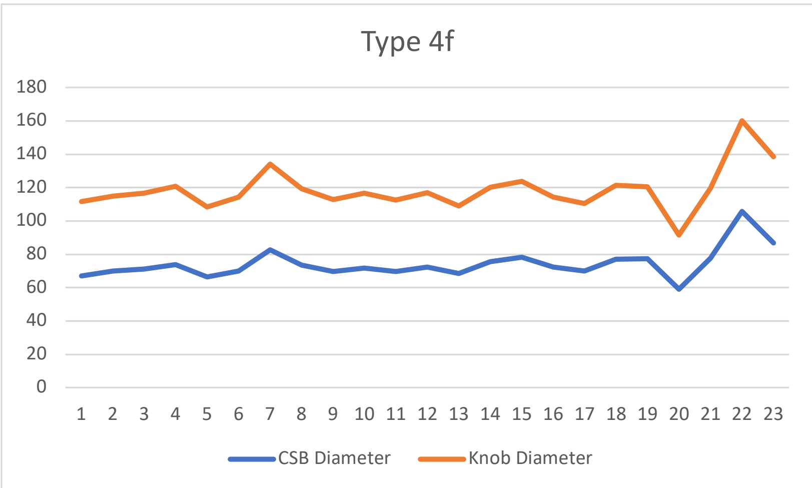


Chart 7.12: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4f. C. Stewart-Moffitt 2020.

Figure 7.55: CSB 498, Skara Brae, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.56: CSB 002, Kilbryde, Nr. Dunblane. Now missing (Stolen). Courtesy of Dunblane Museum. C. Stewart-Moffitt 2015.

Figure 7.57: CSB 371, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Type 4g CSBs

Diagnostic Attributes: A carved stone ball with ***'six very prominent rounded and domed knobs with flattish tops, some of which may be slightly undercut, equally spaced around the surface in opposing pairs'*** defines this type. (No Type 4g in Marshall).

CSB diameters (AvB/D): between **65.36** and **80.26**mm.

Knob diameters (AvK/D): between **34.78** and **44.46**mm.

Ratio of AvK/D to AvB/D: between **1.70** and **2.11**.

Type Image:

Figure 7.58: CSB 136, from Methlick, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the sixteen CSBs in this type, Table 7.19, and Chart 7.13, ten have approximate findspots, Map 7.16, and six have no findspots. Based on current findspots, the most likely origin of Type 4g CSBs is in the vicinity of Methlick approximately 18km north-northeast of Inverurie. Many of these particularly well made and distinctive CSBs are outliers. **CSB 029** and **CSB 471** were found within 1 and 5kms of the northeast coast in Ross-shire and Sutherland respectively and **CSB 469** from Caithness is made from Quartzite and is morphologically similar to **CSB 136** from Methlick. Other outliers are **CSB 461** from Sherrifmuir in Perthshire, **CSB 440** from Balallan on the Isle of Lewis and **CSB 078** which was apparently found on Rannoch Moor: this CSB was made from Oolitic Ironstone which only outcrops on the Isle of Rassay on the west coast. The CSBs in Table 7.19 appear to fall into two groups and suggest two separate craftspeople may have been involved in their manufacture, **CSBs 335, 156, 169, 461, 150** and **252** (highlighted light pink) suggest one craftsperson and **CSBs 373, 049, 029, 136, 440, 240, 218, 471, 078** and **469** (highlighted pink) suggest the second craftsperson. The location of more unusual raw materials such as Quartzite and Andalusite Schist from Morayshire and Banffshire, along with Oolitic Ironstone from the Isle of Rassay in the west, suggest that the craftsperson who made the CSBs highlighted pink may have travelled the country in search of distinctive materials and that these CSBs were probably made near to the source of the raw material.

Figure 7.59: CSB 335, Methven Wood, Perthshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.60: CSB 156, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.61: CSB 169 Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.62: CSB 461 Sherriffmuir, Perthshire. ©Stirling Smith Museum. C. Stewart-Moffitt 2017.

Figure 7.63: CSB 150, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.64: CSB 252, Location Unknown. Courtesy of Aberdeenshire Council Museums Service and Banff Museum. C. Stewart-Moffitt 2015.

Figure 7.65: CSB 373, Methlick, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.66: CSB 049, Location Unknown. Courtesy of The Hunterian, University of Glasgow Museum. C. Stewart-Moffitt 2015.

Figure 7.67: CSB 029, Alness, Ross-shire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 7.68: CSB 440, Ballan, Isle of Lewis. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.69: CSB 240, Location Unknown. Private Hands. C. Stewart-Moffitt 2018.

Figure 7.70: CSB 218, Possibly Turriff, Aberdeenshire. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 7.71: CSB 471, Kilphedair, Sutherland. Courtesy of The Sutherland Dunrobin Trust. C. Stewart-Moffitt 2016.

Figure 7.72: CSB 078, Rannoch Moor. ©Perth Museum. C. Stewart-Moffitt 2015.

Figure 7.73: CSB 469, Watten, Caithness. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

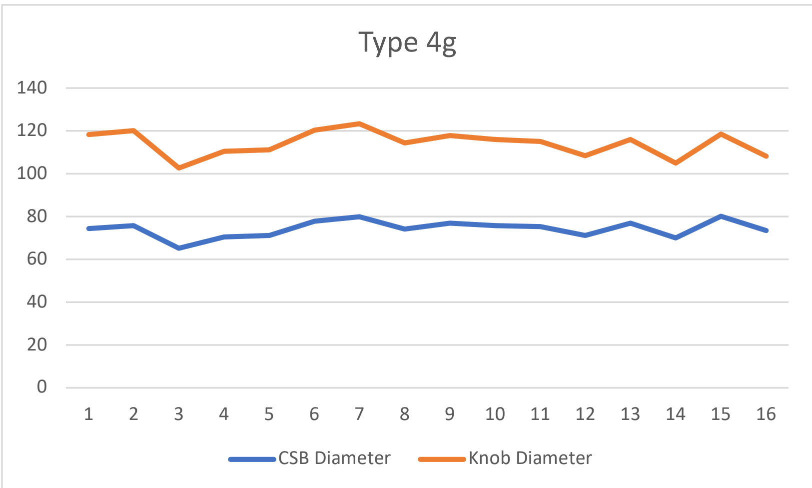
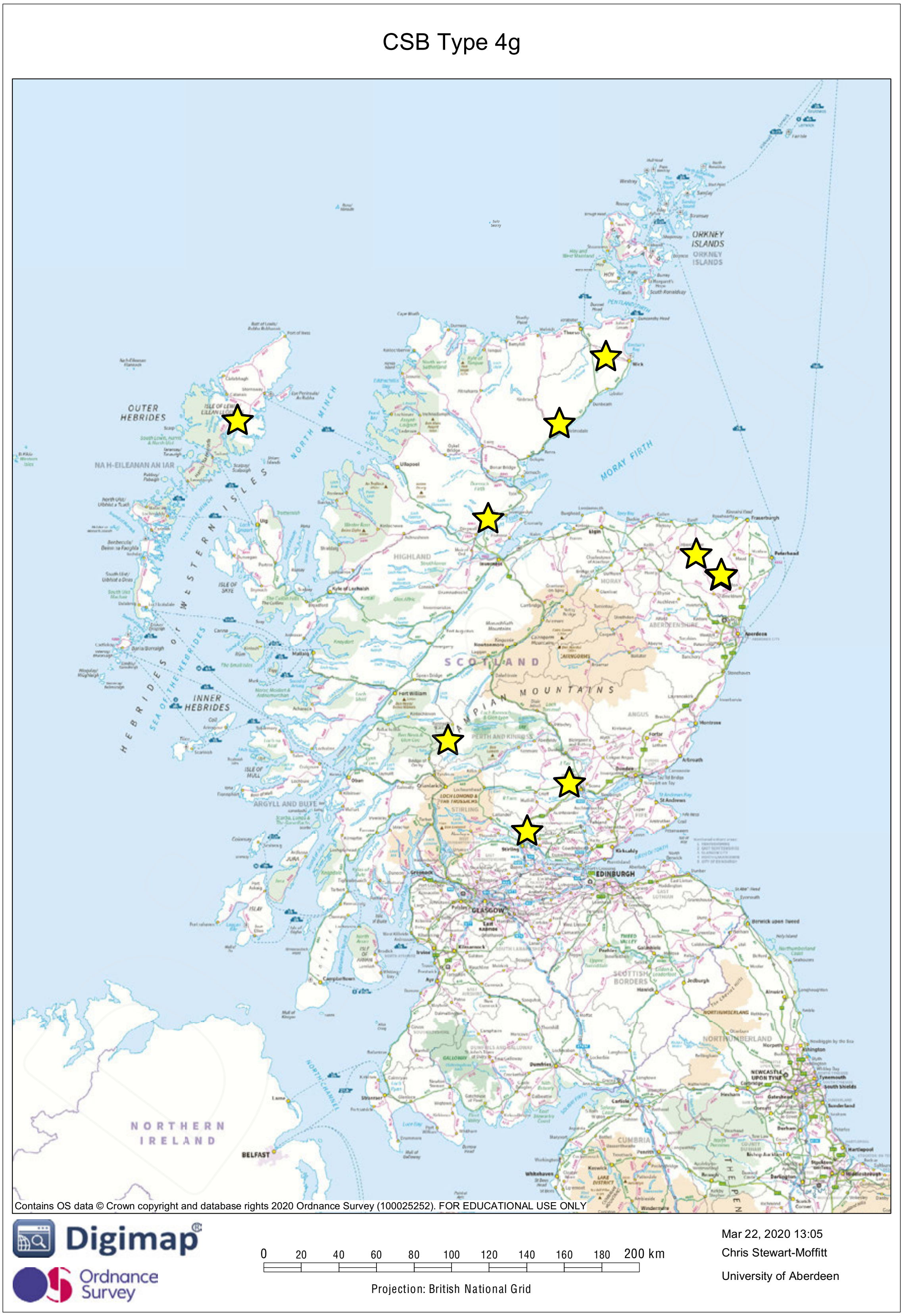


Chart 7.13: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4g. C. Stewart-Moffitt 2020.



Map 7.16: Type 4g CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.19: Type 4g CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
335 **Fig 7.59**	Methven Wood, Perthshire	Sandstone	74.50 mm	43.81 mm	1.70
156 **Fig 7.60**	Unknown	Unknown	75.83 mm	44.46 mm	1.71
169 **Fig 7.61**	Unknown	Hornfels	65.36 mm	37.35 mm	1.75
461 **Fig 7.62**	Sherriffmuir, Perthshire	Unknown	70.53 mm	40.08 mm	1.76
150 **Fig 7.63**	Unknown	Hornfels	71.26 mm	39.91 mm	1.79
252 **Fig 7.64**	Unknown	Unknown	78.00 mm	42.55 mm	1.83
373 **Fig 7.65**	Methlick, Aberdeenshire	Sandstone	79.90 mm	43.50 mm	1.84
049 **Fig 7.66**	Unknown	Amphibolite	74.23 mm	40.30 mm	1.84
029 **Fig 7.67**	Novar House, Alness, Ross-shire	Andalusite Schist	76.90 mm	41.06 mm	1.87
136 **Fig 7.58**	Methlick, Aberdeenshire	Quartzite	75.86 mm	40.23 mm	1.89
440 **Fig 7.68**	Balallan, Isle of Lewis	Unknown	75.43 mm	39.73 mm	1.90
240 **Fig 7.69**	Unknown	Unknown	71.35 mm	37.19 mm	1.92
218 **Fig 7.70**	Possibly Turriff, Aberdeenshire	Unknown	76.90 mm	39.25 mm	1.96
471 **Fig 7.71**	Kilphedar, Kildonan, Sutherland	Sandstone	70.13 mm	34.93 mm	2.01
078 **Fig 7.72**	Rannoch Moor, Perthshire	Oolitic Ironstone	80.26 mm	38.40 mm	2.09
469 **Fig 7.73**	Watten, Caithness	Quartzite	73.43 mm	34.78 mm	2.11

Type 4h CSBs

Diagnostic Attributes: A carved stone ball with ***'six low to medium height round or sub-round knobs with a sharply defined top edge on each knob equally spaced around the surface in opposing pairs'*** defines this type. (No Type 4h in Marshall).

CSB diameters (AvB/D): between **70.03** and **76.30**mm.

Knob diameters (AvK/D): between **38.98** and **46.21**mm.

Ratio of AvK/D to AvB/D: between **1.55** and **1.84**.

Type Image:

Figure 7.74: CSB 383, The Villa, Lonmay, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.76: CSB 333, Auchterless, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.78: CSB 441, Mountblairy, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Of the twelve CSBs in this type, Table 7.20, and Chart 7.14, eight have approximate findspots, Map 7.17, and four have no findspots. Each of these CSBs have been carefully made and the tops their knobs have a distinctive sharp edge. Based on current findspots this group is centred on Turriff, approximately 46km north northwest of Aberdeen. Here **CSB 441, 333** and **177** form a tight group within the north-eastern corner of Aberdeenshire and Banffshire: there are currently no known outliers. It is possible that two separate craftspeople may have been involved in their manufacture; **CSBs 383, 232** and **441** (highlighted pink) in Table 7.20, have larger more distinctive knobs, while the knobs of **CSBs 184, 333** and **177** (highlighted light pink) are lower, but still have the same distinctive sharp top edges and a tight knob to diameter ratio.

Figure 7.75: CSB 177, Cuminestown, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2016.

Figure 7.77: CSB 184, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.79: CSB 232, Possibly Glen Isla, Angus. Courtesy of ANGUSalive Museums. C. Stewart-Moffitt 2015.

Table 7.20: Type 4h CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
363	Unknown	Biotite Granite	70.76 mm	45.65 mm	1.55
362	Unknown	Basalt	71.23 mm	45.16 mm	1.58
177 **Fig 7.75**	Cuminestown, Aberdeenshire	Andesite	65.60 mm	40.30 mm	1.63
333 **Fig 7.76**	Kirkton of Auchterless, Aberdeenshire	2-Mica Granite	75.70 mm	46.21 mm	1.64
184 **Fig 7.77**	Unknown	Sandstone	65.13 mm	39.68 mm	1.64
134	Keith, Banffshire	Gabbro	70.05 mm	42.40 mm	1.65
151	Kemnay, Aberdeenshire	Biotite Granite	72.03 mm	43.51 mm	1.66
163	Haddo, Methlick, Aberdeenshire	Unknown	70.03 mm	41.58 mm	1.68
441 **Fig 7.78**	Mountblairy, Aberdeenshire	Unknown	75.86 mm	44.60 mm	1.70
232 **Fig 7.79**	Possibly Glen Isla, Angus	Sandstone	76.30 mm	44.63 mm	1.71
056	Unknown	Biotite-Muscovite Granite	70.06 mm	39.80 mm	1.76
383 **Fig 7.74**	The Villa, Lonmay, Aberdeenshire	Psammite	71.83 mm	38.98 mm	1.84

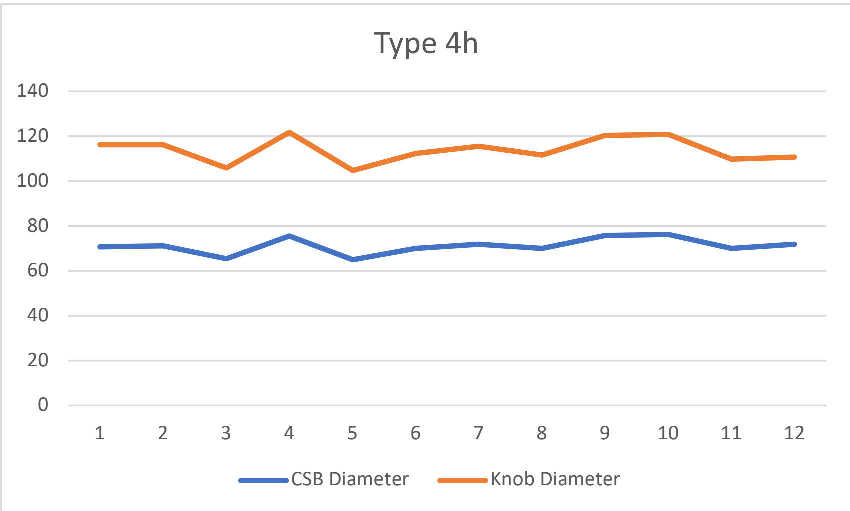


Chart 7.14: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4h. C. Stewart-Moffitt 2020.

Map 7.17: Type 4h CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4i CSBs

Diagnostic Attributes: A carved stone ball with **'*six low to medium height round or oval knobs evenly spaced around the surface in opposing pairs*'** defines this type. (No Type 4i in Marshall).

CSB diameters (AvB/D): Not calculated due to variation in morphology.

Knob diameters (AvK/D): Not calculated due to variation in morphology.

Ratio of AvK/D to AvB/D: Not calculated due to variation in morphology.

Type Image:

Figure 7.80: CSB 136, Kinmundy, Aberdeenshire. Courtesy of Highland Folk Museum, High Life Highland. C. Stewart-Moffitt 2017.

Table 7.21: Type 4i CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
196	Kinmundy, Aberdeenshire	Granite	106 x 78.8 x 75.4 mm	From 62.3 x 54.1 mm to 47.3 x 29.7 mm	N/C
467	Chapelton Farm, Leslie, Insch, Aberdeenshire	Insch Gabbro	~63.40 mm	From 44.70 x 37.50 mm to 32.70 x 37.50 mm	N/C
200	Aberdeen, Aberdeenshire	Granite	59.80 x 57.2 mm	From 37.70 x 32.30 to 30.10 x 35.04 mm	N/C
236	Kinmundy, Aberdeenshire	Granite	~77.10 mm	From 57.70 x 44.40 mm to 31.00 x 28.55 mm	N/C
042	Unknown	Quartzite	60.60 x 53.00 mm	~37.98 mm	N/C
107	Unknown	Sandstone	85.10 x 77.40 x 76.90 mm	~50.65 mm	N/C
430	Unknown	Quartzite	67.90 x 73.70 x 84.00 mm	20.13 mm	N/C

Of the seven CSBs in this type, Table 7.21, four have approximate findspots, Map 7.18, and three have no findspots. What makes all seven of these CSBs so distinctive is their oval shape. **CSB 196** and **CSB 200** are different in size but are well made from similar material, while **CSB 200** and **CSB 042** are similar in size and morphology but not proportion. Additionally, in comparison with the others **CSB 467** is crudely finished. Insufficient numbers of artefacts mean it is not possible to suggest an approximate location for their origin, although at present an area around 10km to the west northwest of Aberdeen appears to be most likely. It is probable that **CSB 467** was made locally as its findspot is located very near to the main source of Insch Gabbro.

Map 7.18: Type 4i CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4j CSBs

Diagnostic Attributes: A carved stone ball with ***'six well-crafted and proportioned round domed knobs of various heights equally spaced around the surface in opposing pairs'*** defines this type. (No Type 4j in Marshall).

CSB diameters (AvB/D): between **64.13** and **80.45**mm.

Knob diameters (AvK/D): between **39.68** and **45.81**mm.

Ratio of AvK/D to AvB/D: between **1.53** and **1.91**.

Type Image:

Figure 7.81: CSB 064, Balnaguisich, Ross-shire. Courtesy of Inverness Museum & Art Gallery, High Life Highland. C. Stewart-Moffitt 2017.

Of the twenty-four CSBs in this type, Table 7.22, and Chart 7.15, twenty have approximate findspots, Map 7.19, and four have no findspots. These all have distinctive shallow to prominent round domed knobs carefully crafted to avoid sharp edges, the majority showing considerable skill and attention to detail. **CSBs 212, 234, 281, 425,** and **374** (highlighted light pink) in Table 7.22 may have either been early attempts at achieving more aesthetically pleasing examples, or the work of a single craftsperson. Likewise, **CSBs 264, 460, 025, 250, 231, 064, 028,** and **336** (highlighted pink) are by far the most visually appealing with higher rounded knobs and softer more graceful lines and once again may have been the work of a single craftsperson. **CSBs 210, 324** and **125** (highlighted rose) have exceptionally prominent and stylized knobs, again suggesting the work of a single craftsperson. The ratio of knobs to overall diameter in the first group are between **1.57** and **1.60**; in the second group they are between **1.64** and **1.78** and in the third group between **1.82** and **1.91**. Although scattered throughout Scotland, the greatest concentration occurs in the northeast and was probably the origin of this type; secondary concentrations can be seen to the south and west of Perth and to the north and west of the Cromarty Firth. An alternative explanation is that instead of seeing three individual craftspeople it might be that these CSBs are the work of one prolific individual, progressing from shallow to prominent knobs and using similar attributes in each case.

Figure 7.82: CSB 212, Lochearnhead, Stirlingshire. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 7.83: CSB 374, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.84: CSB 234, Bruchaig, Kinlochewe. Courtesy of Gairloch Heritage Museum. C. Stewart-Moffitt 2014.

Figure 7.85: CSB 281, Migvie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.86: CSB 425, Rusky Burn, Stirlingshire. Courtesy National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.87: CSB 021, Gyratsmyre Farm, Glenbervie. Private Hands. C. Stewart-Moffitt 2018.

Figure 7.88: CSB 264, Chapel of Gairoch, Aberdeenshire. Courtesy of Aberdeenshire Council Museums Service. C. Stewart-Moffitt 2015.

Figure 7.89: CSB 248, Pitmilly Law, Fife. Courtesy of Fife Cultural Trust on behalf of Fife Council. C. Stewart-Moffitt 2015.

Figure 7.90: CSB 460, Possibly Forres, Morayshire. Courtesy of The Falconer Museum. C. Stewart-Moffitt 2016.

Figure 7.91: CSB 319, Banff, Banffshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.92: CSB 025, Kemnay, Aberdeenshire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 7.93: CSB 250, Springfield Asylum, Fife. Courtesy of Fife Cultural Trust on behalf of Fife Council. C. Stewart-Moffitt 2015.

Figure 7.94: CSB 231, Garvock, Aberdeenshire. Courtesy of ANGUSalive Museums. C. Stewart-Moffitt 2015.

Figure 7.95: CSB 028, Old Deer, Aberdeenshire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 7.96: CSB 336, West Ferry, Dundee. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.97: CSB 125, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.98: CSB 210, Golspie, Sutherland. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 7.99: CSB 324, Turriff, Aberdeenshire. Courtesy of National Museums Scotland.C. Stewart-Moffitt 2015.

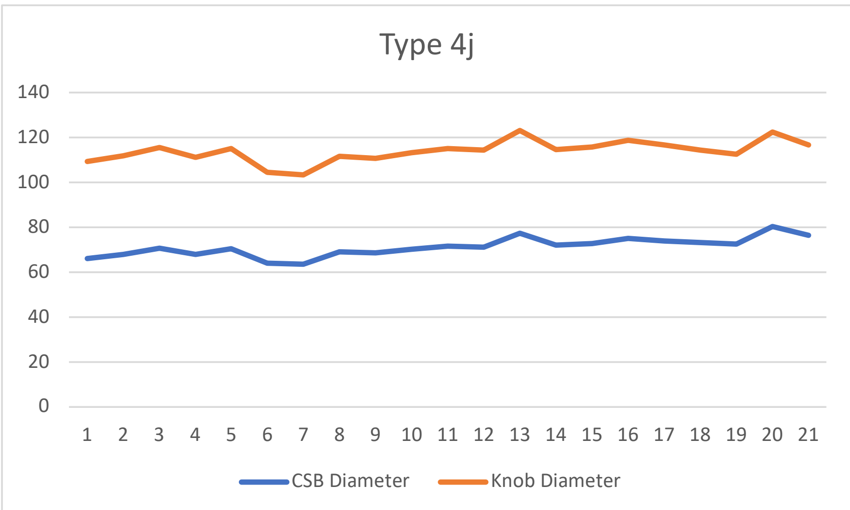


Chart 7.15: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4j. C. Stewart-Moffitt 2020.

Map 7.19: Type 4j CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.22: Type 4j CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
074	Frankley Den Farm, Perthshire	Fine-grained Felsite	66.23 mm	43.28 mm	1.53
143	Unknown	Hornfels	67.93 mm	44.06 mm	1.54
212 **Fig 7.82**	Lochearnhead, Stirling	Unknown	70.73 mm	44.91 mm	1.57
374 **Fig 7.83**	Unknown	Hornfels	68.00 mm	43.36 mm	1.57
234 **Fig 7.84**	Bruchaig, East of Kinochewe, Wester Ross	Possibly a Peridoite	70.53 mm	44.73 mm	1.58
281 **Fig 7.85**	Migvie, Tarland, Aberdeenshire	Gabbro/Norite	64.13 mm	40.38 mm	1.59
425 **Fig 7.86**	Rusky Burn, Rusky, Port of Monteith, Stirlingshire	Psammite	63.66 mm	39.68 mm	1.60
021 **Fig 7.87**	Gyratsmyre Farm, Nr. Glenbervie, Kincardineshire	Unknown	69.10 mm	42.57 mm	1.62
264 **Fig 7.88**	Maiden Stone, Chapel of Gairoch, Aberdeenshire	Possibly Dolerite	68.80 mm	41.98 mm	1.64
248 **Fig 7.89**	Pitmilly Law, Boarhills, Fife	Yellow Sandstone	70.36 mm	43.00 mm	1.64
460 **Fig 7.90**	Possibly Forres, Morayshire	Yellow Sandstone	71.80 mm	43.43 mm	1.65
319 **Fig 7.91**	Banffshire	Hornfels	71.26 mm	43.10 mm	1.65
025 **Fig 7.92**	Fetternear House, Kemnay, Aberdeenshire	Unknown	77.36 mm	45.81 mm	1.69
250 **Fig 7.93**	Springfield Asylum, Cupar, Fife	Unknown	72.16 mm	42.43 mm	1.70
231 **Fig 7.94**	Garvock, Marykirk by Montrose, Kincardineshire	Unknown	72.96 mm	42.85 mm	1.70
064 **Fig 7.81**	The Croft, Balnaguisich, Ross-shire	Possibly Diorite	75.06 mm	43.73 mm	1.72
028 **Fig 7.95**	Old Deer, Aberdeenshire	Amphibolite	74.10 mm	42.62 mm	1.74
336 **Fig 7.96**	West Ferry, Dundee	Granite	73.30 mm	41.28 mm	1.78
125 **Fig 7.97**	Unknown	2-Mica Granite	72.70 mm	40.01 mm	1.82
210 **Fig 7.98**	Golspie Tower Farm, Golspie, Sutherland	Porphry	80.45 mm	42.03 mm	1.91
324 **Fig 7.99**	Turriff, Aberdeenshire	Microgranite	76.63 mm	40.08 mm	1.91
Auctioned CSB 05	Unknown	Unknown	Unknown	Unknown	N/C
Auctioned CSB 01	Nr. Crawford Priory, Cupar, Fife	Unknown	~80.00 mm	Unknown	N/C
LM CSB 030	The Manse Park, Aboyne, Aberdeenshire	Probably a Dolerite	75.90 mm	Between ~47.50 and ~39.50 mm	N/C

Type 4k CSBs

Diagnostic Attributes: A carved stone ball *with* ***'six low round or sub-round knobs equally spaced around the surface in opposing pairs with prominent raised and joined interspaces'*** defines this type. (No Type 4k in Marshall).

CSB diameters (AvB/D): between **69.30** and **72.90**mm.

Knob diameters (AvK/D): between **40.45** and **45.21**mm.

Ratio of AvK/D to AvB/D: between **1.60** and **1.76.**

Type Image:

Of the three CSBs in this type, Table 7.23, and Chart 7.16, none have accurately known findspots, and are located to county only so no map is available for them. However, they all have similar and particularly distinctive attributes. **CSB 455** from Aberdeenshire has very prominent joining ridges and interspaces which give the ball the illusion of being a cube with protruding knobs. **CSB 346** and **CSB 348** have narrower and less prominent joining ridges and interspaces and while prominent, are lower and more rounded. Highlighted pink, their similarity suggests that they may all have been made by a single craftsperson and could have been used as a group or family signifier; unfortunately, without more accurate locations it is impossible to be specific about where these may have originated.

Figure 7.100: CSB 346, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.101: CSB 348, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.102: CSB 455, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.23: Type 4k CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
348 **Fig 7.101**	Unknown	Biotite Granite	72.23 mm	45.21 mm	1.60
346 **Fig 7.100**	Unknown	Dolerite	69.30 mm	40.45 mm	1.71
455 **Fig 7.102**	Unknown	Unknown	72.90 mm	41.33 mm	1.76

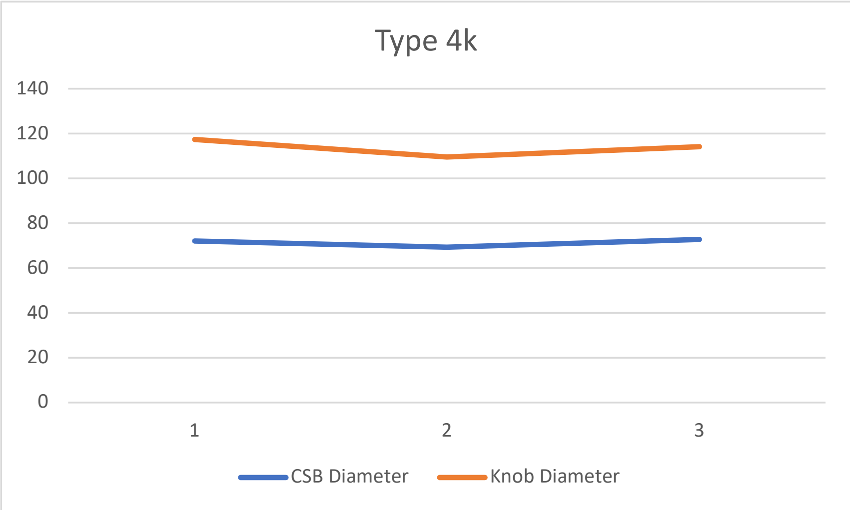


Chart 7.16: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4k. C. Stewart-Moffitt 2020.

Type 4l CSBs

Diagnostic Attributes: *'An oval/elongated or asymmetrical carved stone ball with six round or sub-round knobs with slight undercutting giving them the impression of being 'caps' which are equally spaced around the surface in opposing pairs'* defines this type. (No Type 4l in Marshall).

CSB diameters (AvB/D): between **71.30** and **76.76**mm.

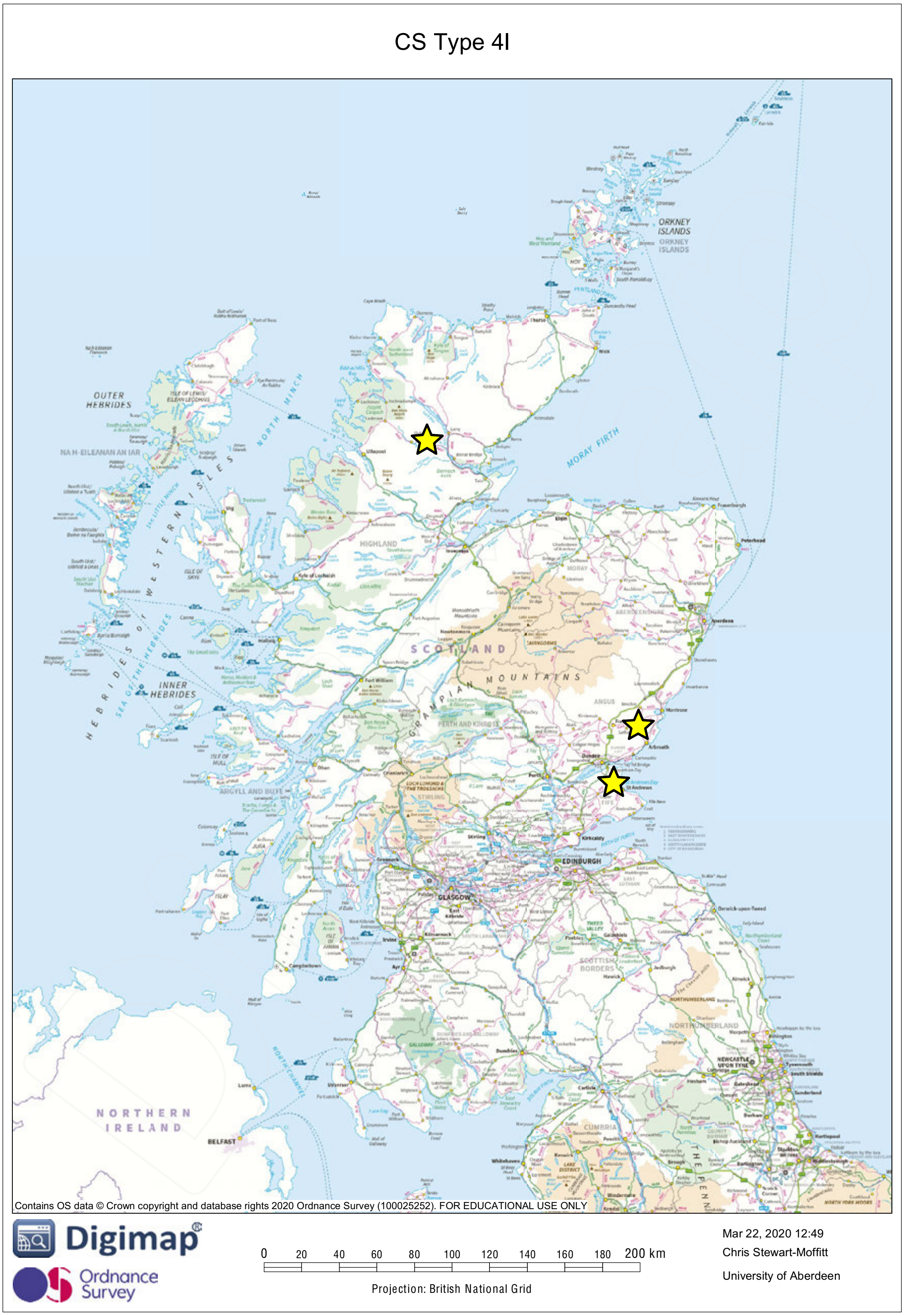
Knob diameters (AvK/D): between **36.35** and **41.31**mm.

Ratio of AvK/D to AvB/D: between **1.78** and **2.05**.

Type Image:

Figure 7.103: CSB 246, Leuchars, Fife. Courtesy of Fife Cultural Trust on behalf of Fife Council. C. Stewart-Moffitt 2015.

The three CSBs in this type, Table 7.24, and Chart 7.17 all have approximate findspots, Map 7.20. **CSB 246** and **228** both appear to be made from similar material, are asymmetrically shaped and the knobs of both CSBs have all been outlined, giving the knobs the appearance of caps. They were found some 33km apart, one either side of the River Tay. **CSB 367** is similarly asymmetric and again has the appearance of having 'caps' rather than knobs. However in this instance it was found over 200km further north.



Map 7.20: Type 4l CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.24: Type 4l CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
246	Leuchars, Fife	Unknown	73.36 mm	41.31 mm	1.78
228	Freelands, Glasterlaw by Friockheim, Angus	Unknown	71.30 mm	36.35 mm	1.96
367	Achness Churchyard, Creich, Sutherland	Unknown	76.76 mm	37.38 mm	2.05

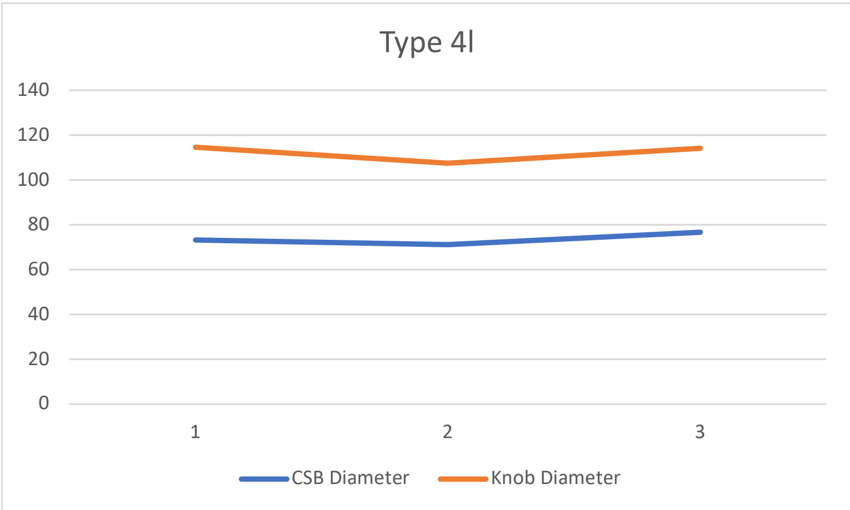


Chart 7.17: Comparison between Overall Diameter and Knob/Disc Diameter, type 4l. C. Stewart-Moffitt 2020

Type 4m CSBs

Diagnostic Attributes: A carved stone ball with **'*six knobs or discs unequally spaced around the surface with one knob/disc offset at an oblique angle to the other five*'** defines this type. (No Type 4m in Marshall).

CSB diameters (AvB/D): between **70.86** and **74.33**mm.

Knob diameters (AvK/D): between **41.58** and **43.26**mm.

Ratio of AvK/D to AvB/D: between **1.64** and **1.78**.

Type Image:

Figure 7.104: CSB 035, Old Deer, Aberdeenshire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 7.105: CSB 059, Hillhead, St Ola, Orkney. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 7.106: CSB 140, Kildrummy, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.107: CSB 428, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.108: LM CSB 013, Dale Moss, Caithness. Private Hands.

Table 7.25: Type 4m CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
059 **Fig 7.105**	Hillhead, St Ola, Orkney	Dolerite	68.50 mm	41.85 mm	1.64
140 **Fig 7.106**	Kildrummy, Aberdeenshire	Sandstone	70.86 mm	43.26 mm	1.64
035 **Fig 7.104**	Old Deer, Aberdeenshire	Unknown	74.33 mm	41.98 mm	1.77
428 **Fig 7.107**	Unknown	Metabasite	73.86 mm	41.58 mm	1.78
LM CSB 013 **Fig 7.108**	Dale Moss, Westerdale, Caithness	Unknown	Unknown	Unknown	N/C

Map 7.21: Type 4m CSB approximate findspots. C. Stewart-Moffitt 2020.

Of the five CSBs in this type, Table 7.25, and Chart 7.18, four have approximate findspots, Map 7.21, and one has no findspot. The CSBs in this type are particularly distinctive as they all have one knob or disc set at an oblique angle to the other five. While several other CSBs have asymmetrical knob configurations none are as obvious or seemingly contrived as these. The configuration of the others perhaps being due to a lack of attention while laying out or carving.

These appear to have been made deliberately with the oblique knob at a very similar angle in each case. **CSBs 059** and **140** both have a ratio of **1.64** and **CSBs 035** and **428** have a ratio of between **1.77** and **1.78**: unfortunately, no dimensions exist for LM CSB 013. **CSB 035** and **LM CSB 013** have also been decorated with incised and hatched lines respectively. The fact that they all appear to have been made from different materials and in a slightly different style suggests they may have been made to order, perhaps as a symbol of individuality or status, or were simply made due to the idiosyncrasy of a single craftsperson. As they are scattered from Kildrummy to Orkney it is not possible to suggest a place of origin but, if the above suggestion of their use is accepted, it is conceivable that they may have been made near to their final resting place, from local materials, by an itinerant craftsperson.

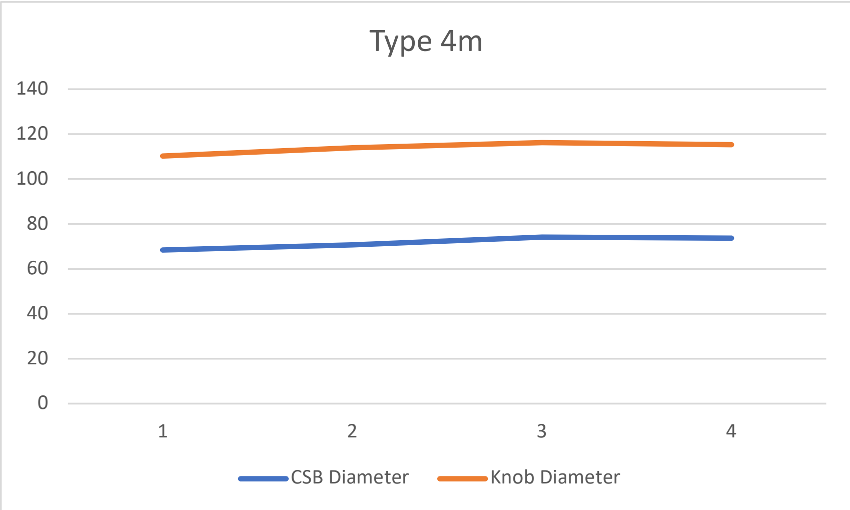


Chart 7.18: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4m. C. Stewart-Moffitt 2020.

Type 4n CSBs

Diagnostic Attributes: A carved stone ball with ***'six low, round or sub-round and slightly domed 'button' like knobs equally spaced in opposing pairs around the surface'*** defines this type. (No Type 4n in Marshall).

CSB diameters (AvB/D): between **59.06** and **78.53**mm.

Knob diameters (AvK/D): between **36.73** and **49.03**mm.

Ratio of AvK/D to AvB/D: between **1.57** and **1.87**.

Type Image:

Figure 7.109: CSB 178, Ardtannies Farm, Inverurie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the twenty-one CSBs in this type, Table 7.26, and Chart 7.19, fifteen have approximate findspots, Map 7.22, and six have no findspots. The majority of the CSBs in Table 7.26 have been made from very similar light buff-grey or violet-grey stone called Hornfels the source of which is almost certainly the Hill of Foudland in Aberdeenshire. **CSB 114** (a Type 8e), found at Bog at the foot of the Hill of Foudland, was also made from the same material. The colour variations of this material are all available within a kilometre of one another at this location. Although there is some variation in the morphology of Type 4n CSBs the majority conform to the general description given above. **CSBs 165, 166, 168** and **178** were all made from violet-grey material and current findspots show that these were found relatively near to the Foudland Hills source. **CSBs 286, 306, 376** and **404** were found much further to the south and west of Aberdeenshire in Fife, Inverness-shire, and the Isle of Islay.

There seem to be signs of at least two craftspeople at work here as suggested by the two slightly different styles of knobs. While **CSBs 271, 404, 168, 099, 286, 178, 376, 332, 438, 306** and **160** (highlighted rose) in Table 7.26 are clearly dome shaped buttons **CSBs 254, 154, 165** and **088** (highlighted pink) are considerably flatter. Five Type 4n CSBs were also decorated; the decoration on **CSBs 404, 286** and **438** consists of vertical, horizontal, and diagonal incised lines with some cross hatching; **CSBs 306** and **376** are decorated with incised lines while **CSB 306** was decorated with incised lines, peck marks and nested triangles. It is clear that this source of Hornfels was exploited by other craftspeople as this material can be seen in other types of CSB.

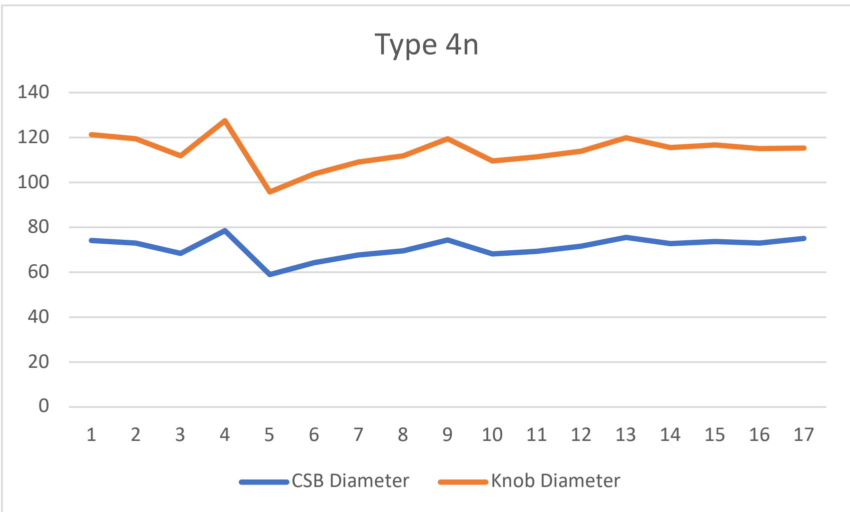


Chart 7.19: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4n. C. Stewart-Moffitt 2020.

Figure 7.110: CSB 271, Location Unknown. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.111: CSB 404, Nocharie, Fife. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.112: CSB 168, Gaucyhillock, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.113: CSB 099, Location Unknown. Private Hands. C. Stewart-Moffitt 2017.

Figure 7.114: CSB 286, Loch Lochy, Inverness-shire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.115: CSB 376, Keills Farm, Isle of Islay. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.116: CSB 332, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.117: CSB 438, Dalraich Farm, Cromdale. Courtesy National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.118: CSB 306, Newburgh, Fife. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.119: CSB 160, New Deer, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.120: CSB 254, Location Unknown. Courtesy of Aberdeenshire Council Museums Service & Banff Museum. C. Stewart-Moffitt 2015.

Figure 7.121: CSB 154, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

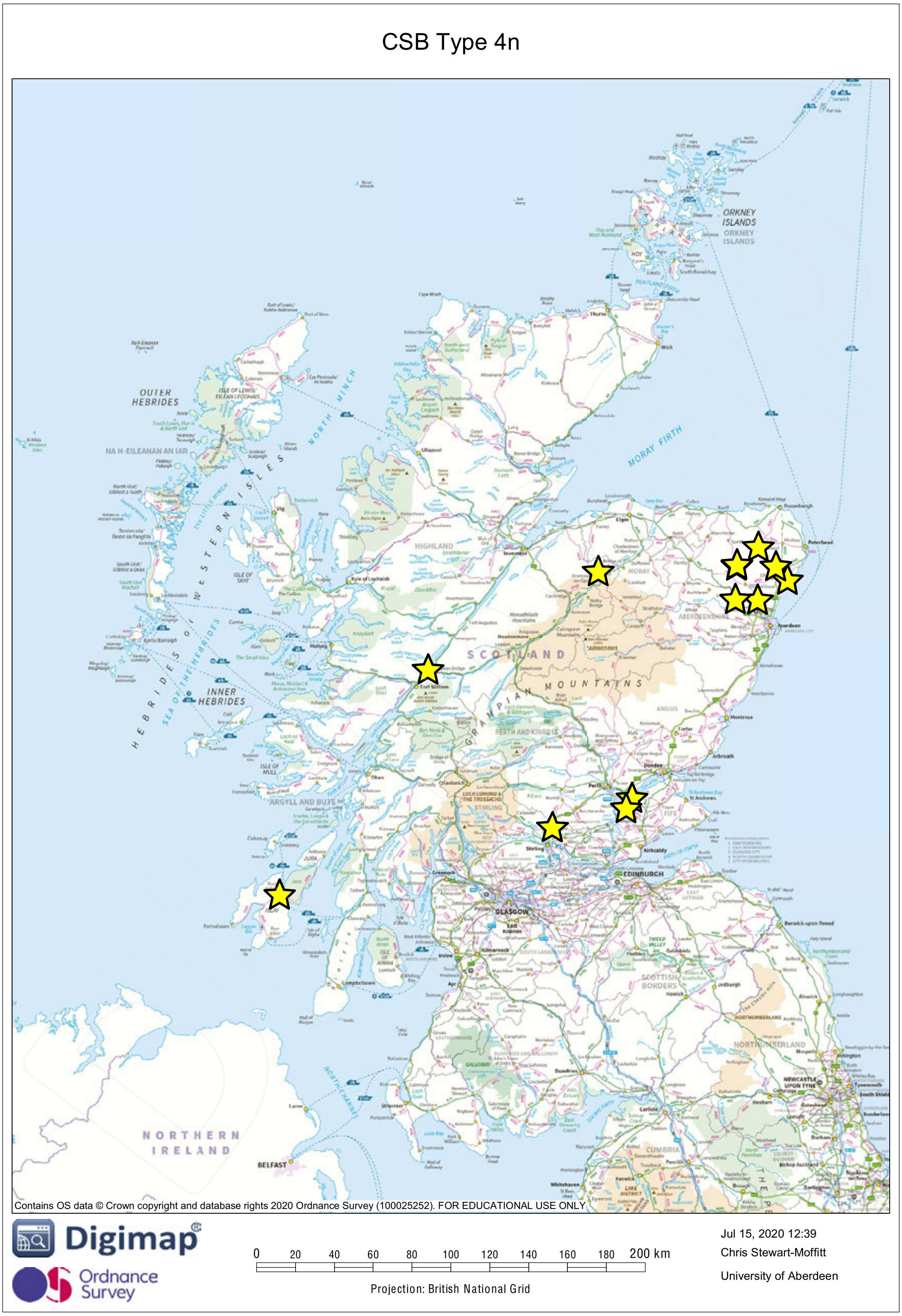
Figure 7.122: CSB 165, Fyvie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.123: CSB 088, Location Unknown. Courtesy of Aberdeen City Council (Art Gallery and Museum Collections). C. Stewart-Moffitt 2015.

Table 7.26: Type 4n CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
254 **Fig 7.120**	Inverurie, Aberdeenshire	Diorite	74.20 mm	47.25 mm	1.57
271 **Fig 7.110**	Unknown	Sandstone	73.16 mm	46.36 mm	1.58
154 **Fig 7.121**	Unknown	Hornfels	68.50 mm	43.43 mm	1.58
165 **Fig 7.122**	Fyvie, Aberdeenshire	Hornfels	78.53 mm	49.03 mm	1.60
088 **Fig 7.123**	Unknown	Granite	59.06 mm	36.73 mm	1.61
404 **Fig 7.111**	Nocharie, Strathmiglo, Fife	Hornfels	64.40 mm	39.54 mm	1.63
168 **Fig 7.112**	Gaucyhillock, New Machar, Aberdeenshire	Hornfels	67.80 mm	41.33 mm	1.64
099 **Fig 7.113**	Unknown	Andesite	69.56 mm	42.48 mm	1.64
286 **Fig 7.114**	Loch Lochy, Inverness-shire	Hornfels	74.46 mm	45.18 mm	1.65
178 **Fig 7.109**	Ardtannies Farm, Inverurie, Aberdeenshire	Hornfels	68.30 mm	41.43 mm	1.65
376 **Fig 7.115**	Keills Farm, Isle of Islay	Hornfels	69.46 mm	41.93 mm	1.66
332 **Fig 7.116**	Unknown	Hornfels	71.63 mm	42.33 mm	1.69

208	Slains, Aberdeenshire	Unknown	75.55 mm	44.34 mm	1.70
500	Sherriffmuir, Perthshire	Sandstone	72.83 mm	42.85 mm	1.70
438 **Fig 7.117**	Dalriach Farm, Cromdale, Grantown on Spey, Morayshire	Hornfels	73.80 mm	42.86 mm	1.72
306 **Fig 7.118**	Newburgh, Fife	Hornfels	73.13 mm	42.08 mm	1.74
160 **Fig 7.119**	New Deer, Aberdeenshire	Hornfels	75.10 mm	40.20 mm	1.87
166	Fyvie, Aberdeenshire	Hornfels	76.20 x 71.10 mm	47.86 mm	N/C
121	Unknown	Hornfels	74.00 x 67.70 mm	43.45 mm	N/C
LM CSB 019	Dudwick Estate, Aberdeenshire	Greenstone or Fine Dark Granite	~76.00 mm	Unknown	N/C
148	Banffshire	Hornfels	75.00 x 64.50 mm	Between 47.20 x 43.80 mm & 45.70 x 44.30 mm	N/C



Map 7.22: Type 4n CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4o CSBs

Diagnostic Attributes: A carved stone ball with ***'six smooth slightly domed knobs equally spaced in opposing pairs around the surface'*** defines this type. (No Type 4o in Marshall).

CSB diameters (AvB/D): between **69.40** and **71.16**mm.

Knob diameters (AvK/D): between **42.83** and **44.16**mm.

Ratio of AvK/D to AvB/D: between **1.57** and **1.66.**

Type Image:

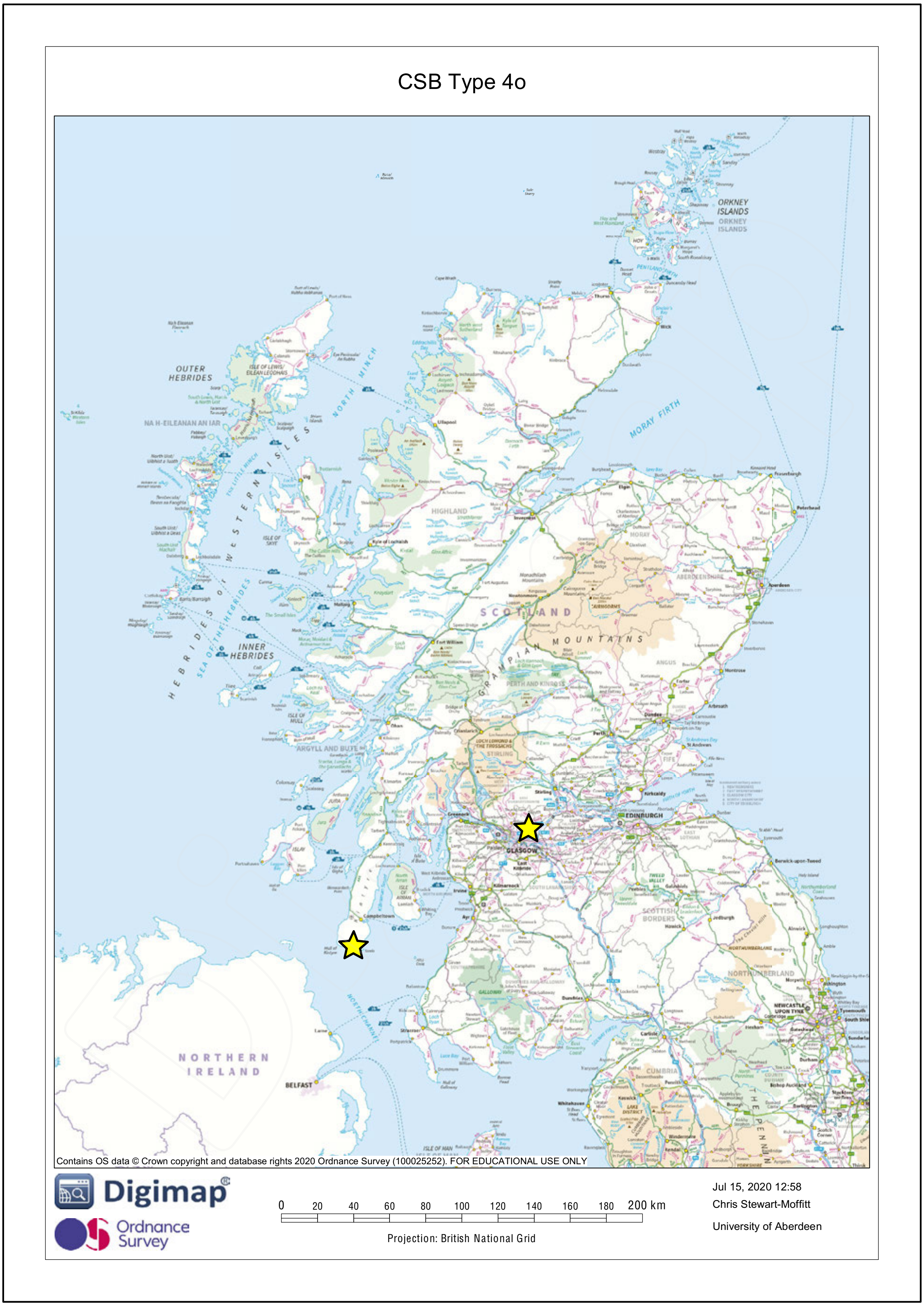
Figure 7.124: CSB 235, Dunaverty Bay, Nr. Campbeltown Argyll. Courtesy Campbeltown Museum Company Ltd. C. Stewart-Moffitt 2015.

Both CSBs in this type, Table 7.27, have approximate findspots, Map 7.23. These two balls are very similar and appear, from visual inspection, to have been made from the same material. **CSB 018** was found in Scotland's central belt to the northeast of Glasgow, and the material used has been identified as originating from the Green Beds of the Southwest Highlands around Callander and northeast Argyll. **CSB 235** was found on the beach at Dunaverty Bay, which is the closest crossing point between the Scottish mainland and Ireland suggesting it could have been lost on the beach while in transit.

Figure 7.125: CSB 018, Lenzie, Dumbartonshire. Courtesy of Auld Kirk Museum, East Dunbartonshire Leisure and Culture Trust (purchased with assistance from the National Fund for Acquisitions). C. Stewart-Moffitt 2014.

Table 7.27: Type 4o CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AV/D)	Average Knob Diameter (AK/D)	Ratio of AK/D to AV/D
018 **Fig 7.125**	Lenzie, N.Kirkintilloch, Dumbartonshire	Greenstone (from the West of Scotland Greenstone Beds)	69.40 mm	44.16 mm	1.57
235 **Fig 7.124**	Dunaverty Bay, Southend, Nr. Campbeltown, Argyll	Unknown (but very similar material to 018)	71.16 mm	42.83 mm	1.66



Map 7.23: Type 4o CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4p CSBs

Diagnostic Attributes: A carved stone ball with **'*six poorly defined cube-like knobs equally spaced in opposing pairs around the surface'*** defines this type. (No Type 4p in Marshall).

CSB diameters (AvB/D): between **63.58** and **81.30**mm.

Knob diameters (AvK/D): between **35.12** and **48.53**mm.

Ratio of AvK/D to AvB/D: between **1.68** and **2.00**.

Of the three CSBs in this type, Table 7.28, two have approximate findspots, Map 7.24, and one has no findspot. Although these CSBs look unfinished and could be mistaken for a work in progress, the fact that **CSB 083** has been decorated with two incised spirals and another similarly shaped CSB was found nearby strongly suggests that they were finished artefacts. The similarity in shape between **CSB 083**, **CSBs 031** and **058** suggests they may have been made by the same craftsperson. Based on current findspots, the most likely origin of this type is some 18 to 30km northwest of Aberdeen between Inverurie and Methlick.

Type Image:

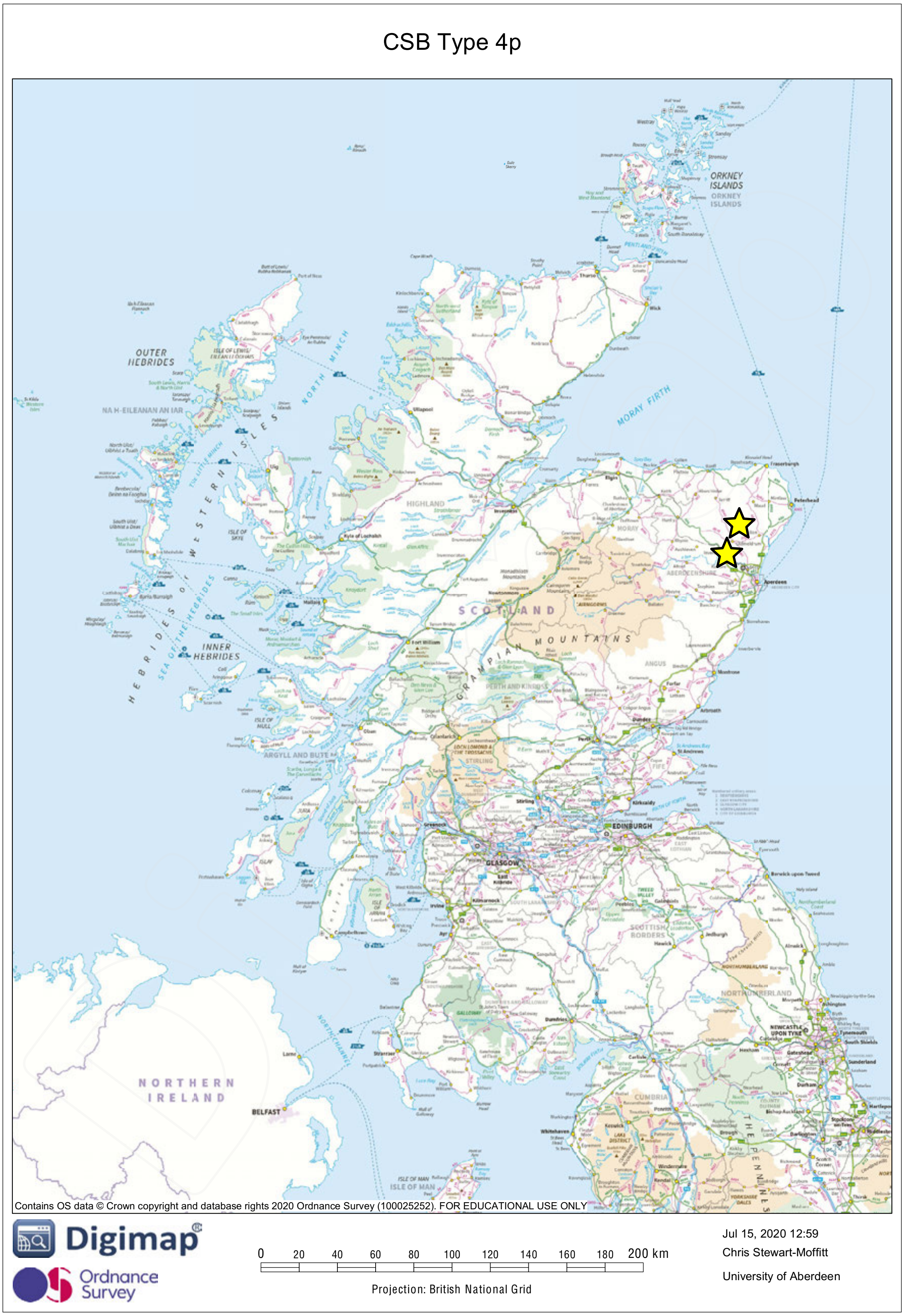
Figure 7.126: CSB 083, Methlick, Aberdeenshire. Courtesy of Aberdeen City Council (Art Gallery and Museums Collections). C. Stewart-Moffitt 2015.

Figure 7.127: CSB 058, Location Unknown. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 7.128: CSB 031, Keith Hall, Aberdeenshire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Table 7.28: Type 4p CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
058 **Fig 7.127**	Unknown	Quartz Diorite	81.30 mm	48.53 mm	1.68
031 **Fig 7.128**	Keith Hall, Aberdeenshire	Unknown	63.58 mm	35.12 mm	1.81
083 **Fig 7.126**	Methlick, Aberdeenshire	Unknown	71.80 mm	35.90 mm	2.00



Map 7.24: Type 4p CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 4 Misc CSBs

Diagnostic Attributes: None: This Type is comprised of miscellaneous six knob CSBs falling outwith the descriptions given for Types 4a to 4p. (No Type 4 Misc in Marshall).

CSB diameters (AvB/D): Not calculated due to variation in morphology.

Knob diameters (AvK/D): Not calculated due to variation in morphology.

Ratio of AvK/D to AvB/D: Not calculated due to variation in morphology.

Type Image: No type image due to variable morphology.

Of the twenty-one CSBs in this type, Table 7.29, and Chart 7.20, nineteen have approximate findspots, Map 7.25, and two have no findspots. Their varied morphology makes it impossible to compare one with another or suggest a point of origin.

Table 7.29: Type 4 Misc CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
483	New Keig, Aberdeenshire	Serpentinite	51.41 mm	35.50 mm	1.45
439	Glenfarquhar, Nr. Auchinblae, Kincardineshire	Amphibolite	64.88 mm	42.50 mm	1.53
263	Unknown	Dolerite	62.80 mm	38.66 mm	1.62
Auctioned CSB 11	Porthlethen, Aberdeenshire	Granite	78.50 mm	48.50 mm	1.63
457	Believed to be Perthshire	Unknown	65.63 mm	40.10 mm	1.64
202	Glenalmond, Perthshire	Pink Granite	75.16 mm	44.64 mm	1.68
245	Blair Hill Estate, Dollar, Clackmannanshire	Andesite or Diorite	73.66 mm	43.78 mm	1.68
224	Lindas, Aure Municipality, Norway	Sandstone or Metasandstone	70.67 mm	41.00 mm	1.72
242	Ness of Brodgar, Orkney	Camptonite	65.58 mm	36.46 mm	1.80

244	Dere Street, Houghton-le-Side, Durham	Old Red Sandstone	66.65 mm	33.96 mm	1.96
489	Hill of Uisneach, Rathnew, Co. Westmeath, Ireland	Sandstone	51.00 mm	Unknown	N/C
181	Reportedly Bourtie, Aberdeenshire	Unknown	71.10 mm	Unknown	N/C
490	Bogmill, Premnay, Aberdeenshire	Unknown	67.90 mm	Various sizes	N/C
Auctioned CSB 02	Nr. Crawford Priory, Cupar, Fife	Unknown	~80.00 mm	Unknown	N/C
Auctioned CSB 08	Towie, Aberdeenshire	Unknown	Unknown	Unknown	N/C
LM CSB 009	Brigs of Criggie, Stonehaven, Aberdeenshire	Unknown	~86.00 mm	Unknown	N/C
LM CSB 012	Little Meldrum Farm, Tarves, Aberdeenshire	Unknown	Unknown	Unknown	N/C
LM CSB 015	Cloisterseat, Udny, Aberdeenshire	Unknown	Unknown	Unknown	N/C
LM CSB 016	The Hewke, Lockerbie, Dumfriess-shire	Unknown	Unknown	Unknown	N/C
LM CSB 021	Muckle Geddes, Nairnshire	Quartzite	~63.00 mm	Unknown	N/C
432	Unknown	Basalt	81.76 mm	Various	N/C

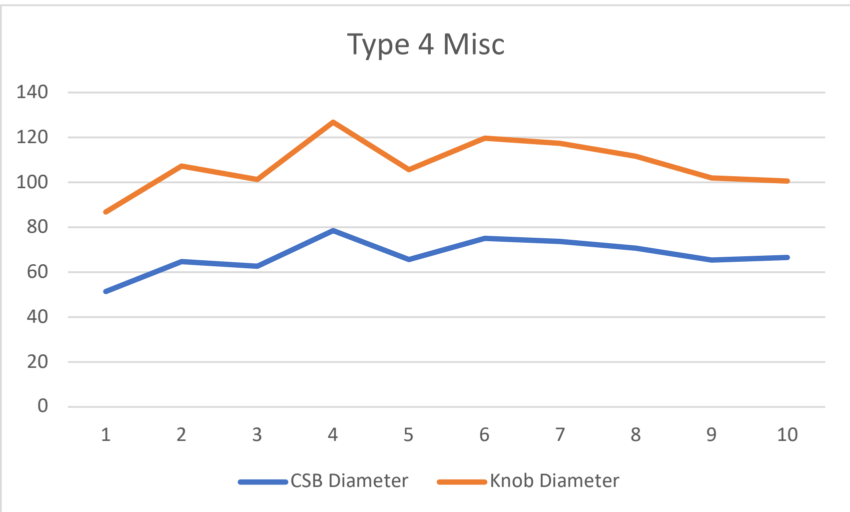
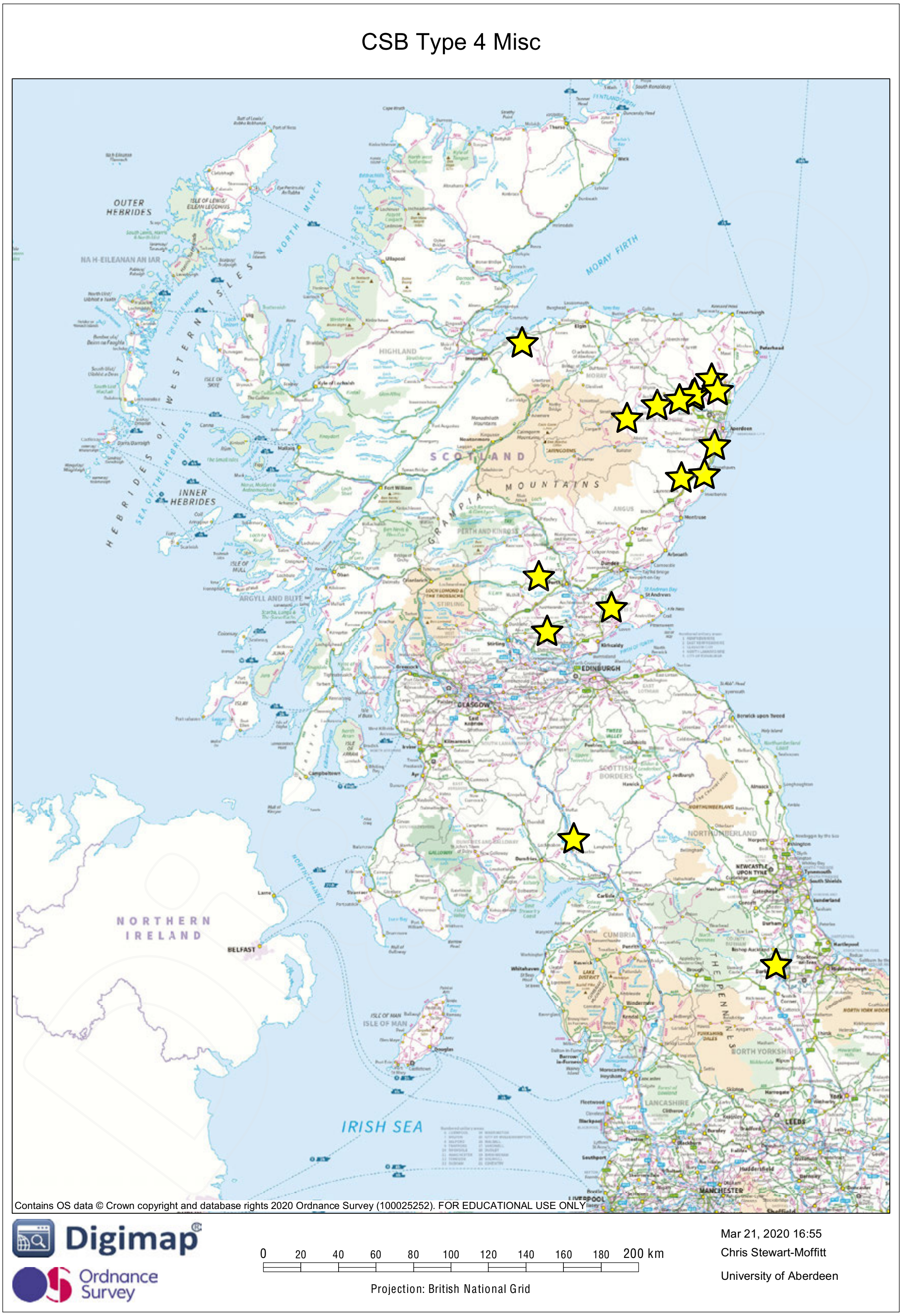


Chart 7.20: Comparison between Overall Diameter and Knob/Disc Diameter, Type 4 Misc. C. Stewart-Moffitt 2020.



Map 7.25: Type 4 Misc CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 5 CSBs.

Diagnostic Attributes: A carved stone ball with **'*seven smooth slightly domed knobs*'**
defines this type. (Marshall Type 5 'seven knobs').

CSB diameters (AvB/D): between **68.16** and **78.18**mm.

Knob diameters (AvK/D): between **37.41** and **45.17**mm.

Ratio of AvK/D to AvB/D: between **1.66** and **1.27**.

Type Image: No type image due to variable morphology

Of the six CSBs in this type, Table 7.30, and Chart 7.21, one has an approximate findspot, Map 7.26, and five have no findspots. The majority of CSBs that form this type have a variable morphology and may have been an attempt to produce a variation of Type 4 balls. They have similar attributes to other Type 4 CSBs, **CSB 069** (similar to Type 4d), **CSB 359** (similar to Type 7), **CSB 449** (similar to Type 4f), **CSB 459** (similar to Type 4a) and **CSB 419** (similar to Type 4l) and were it not for the additional knob in each case they would have been included in the individual types noted above. It is entirely possible that we are witnessing the failure of a design variation that was not as visually pleasing or satisfying to hold as Type 4 balls due to poor symmetry. A lack of findspots precludes suggesting a point of origin.

Table 7.30: Type 5 CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to AvB/D
419	Nr. Watchmans Cairn, West of Clova, Aberdeenshire	Hornfels	68.16 mm	41.11 mm	1.66
459	Unknown	Dark pink Granite	78.18 mm	45.17 mm	1.73
359	Unknown	Biotite Granite	71.17 mm	39.42 mm	1.81
069	Unknown	Unknown	69.73 mm	37.41 mm	1.86
449	Unknown	Unknown	68.52 mm	L.39.66 mm S.16.90 mm	N/C
LM CSB 026	Unknown	Unknown	Unknown	Unknown	N/C

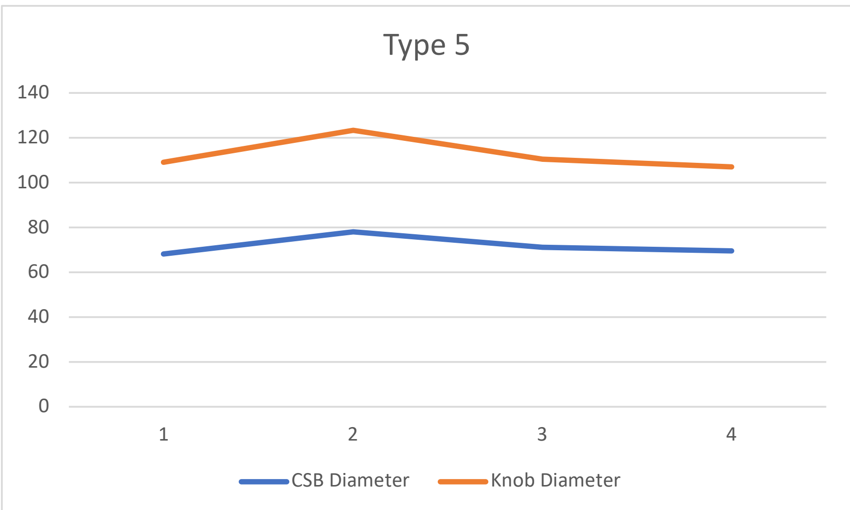


Chart 7.21: Comparison between Overall Diameter and Knob/Disc Diameter, Type 5. C. Stewart-Moffitt 2020.

Map 7.26: Type 5 CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 5a CSBs

Diagnostic Attributes: A carved stone ball with ***'six 'equally' spaced knobs plus an additional smaller rectangular/oval or pear-shaped knob between two of the other six'*** defines this type. (No type 5a in Marshall).

CSB diameters (AvB/D): between **68.52** and **72.90**mm.

Knob diameters (Large) (AvK/D): between **38.84** and **40.50**mm.

Knob diameters (Small) (AvK/D): between **16.10** and **21.00**mm.

Ratio of Large knobs AvK/D to AvB/D: between **1.72** and **1.87**.

Ratio of Small knobs AvK/D to AvB/D: between **3.47** and **4.35**.

Of the five CSBs in this type, Table 7.31, three have approximate findspots, Map 7.27, and two have no findspots. All of these CSBs have an additional and particularly distinctive diagnostic attribute. At first glance most are like Type 4 CSBs with six equally spaced knobs, however all Type 5a CSBs have a small additional sub-rectangular, oval, or pear-shaped knob squeezed between two of the main knobs. Hidden in plain sight, its location is almost secretive and at first glance might be missed altogether. ScARF suggests these are design faults (ScARF 5.2.4), however as most are well finished, I believe these were deliberately designed with an extra knob. The fact that they all appear to have been made from different materials and in slightly different styles also suggests that like Type 4m CSBs they were either made to order, perhaps as a symbol of individuality or status, or were made due to the idiosyncrasy of a single craftsperson rather than accident. Their scattered findspots give no indication of where they may have originated.

Type Image:

Figure 7.129: CSB 466, Muggathaw Inn, Leochel Cushnie, Aberdeenshire. Private Hands. C. Stewart-Moffitt 2016.

Figure 7.130: CSB 449, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.31: Type 5a CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AaK/D)	Ratio of AvK/D to AvB/D
449 **Fig 7.130**	Unknown	Unknown	68.52 mm	L.39.66 mm S.**16.90** mm	1.72 4.05
474 **Fig 7.131**	Tarbat Church, Portmahomack, Easter Ross	Probably Amphibolite	70.06 mm	L.40.50 mm S.43.70 x **16.10** mm	1.73 4.35
331 **Fig 7.132**	Unknown	Hornfels	68.58 mm	L.38.84 mm S. **Unknown**	1.77 N/C
466 **Fig 7.129**	Muggathaw Inn, Leochel Cushnie, Aberdeenshire	Unknown	72.90 mm	L.38.93 mm S. 27.00 x **21.00** mm	1.87 3.47
111 **Fig 7.133**	Kintore, Aberdeenshire	Quartzite	76.20 x 71.30 mm	L.42.35 mm S. **Unknown**	N/C

Map 7.27: Type 5a CSB approximate findspots. C. Stewart-Moffitt 2020.

Figure 7.131: CSB 474, Portmahomack, Easter Ross. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.132: CSB 331, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.133: CSB 111, Kintore, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Type 6 CSBs

Diagnostic Attributes: A carved stone ball with ***'eight or nine knobs or discs which may vary in shape, size and positioning'*** defines this type. (Marshall Types 6 (8 knobs) and 6a (9 knobs) now combined into a single type).

CSB diameters (AvB/D): Not calculated due to variation in morphology.

Knob diameters (AvK/D): Not calculated due to variation in morphology.

Ratio of AvK/D to AvB/D: Not calculated due to variation in morphology.

Type Image: No type image due to variable morphology**.**

Of the nine CSBs in this type, Table 7.32, six have an approximate findspot, Map 7.28, and three have no findspots. CSB 414 is unusual in that it is 'quadrangular' with each side having two rounded knobs. None are alike or seem to have any parallel with one another apart from the number of knobs or discs and seem to be one off designs which were perhaps created to express individuality.

Table 7.32: Type 6 CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (AvB/D)	Average Knob Diameter (AvK/D)	Ratio of AvK/D to be AvB/D
019	King Edward, Aberdeenshire	Unknown	65.58 mm	L.32.78 mm S.31.86 mm	2.03
053	Cruden, Aberdeenshire	Quartzite	71.43 mm	39.02 mm	1.83
191	Kilmux Farm, Kennoway, Fife	Unknown	68.21 mm	40.51 mm + 29.90 x 22.30 with concave sides	N/C
257	Newmill, Keith Hall, Aberdeenshire	Basalt	62.46 mm	Various sized triangular segments	N/C
414	Ardkeeling, Strypes, Morayshire	Diorite	55.90 mm	35.40 mm	1.58
LM CSB 001	Ardkeeling, Strypes, Morayshire?	Unknown	Unknown	Unknown	N/C
190	Unknown	Porphyritic Felsite	79.10 mm	38.80 mm	2.04
386	Unknown	Biotite Granite	100.95 mm	L.52.10 mm S.38.90 mm	2.22
365	Unknown	2-Mica Granite	64.77 mm	31.43 mm	2.06

Map 7.28: Type 6 CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 7 CSBs

Diagnostic Attributes: ***'An oblate carved stone ball with central knobs top and bottom surrounded by a varying number of slightly smaller knobs around the periphery in the form of a 'flower' head, forming a very distinctive shape'*** defines this type. (Marshall's Type 7 was 10-55 knobs).

CSB diameters (AvB/D): between **52.47** and **75.00**mm.

Knob diameters (AvK/D): between **27.31** and **44.15**mm.

Ratio of AvK/D to AvB/D: between **1.32** and **2.52**.

Type Image:

Figure 7.134: CSB 041, Location unknown. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Of the twenty-three CSBs in this type, Table 7.33, and Chart 7.22, seventeen have approximate findspots, Map 7.29, and seven have no findspots. The likeness of this type to a flower with five petals is very striking and it seems probable that the inspiration for it came from nature: perhaps from the ubiquitous buttercup. Surprisingly, its distinctive morphology seems to have been missed by Marshall despite being noticed by Coles who, when describing **CSB 282** in 1908, noted that '*the discs are all circular, the two largest opposite each other, five smaller ones being set up on the periphery. This arrangement makes the ball, when looked at with a large disc in front, very much resemble a five-petalled flower with a central boss of stamen*'. This description was typical of how Coles' interest in nature, combined with his artistic eye for detail, served him so well in his archaeological career.

It is possible that **CSBs 011, 041, 338, 366, 052, 008** and **265**, all which have seven knobs were the earliest to be made, (highlighted pink) in Table 7.33; they have the simplest form, and their round flattish knobs are morphologically similar to the majority of Type 4 CSBs; they have a ratio of between **1.32** and **1.92**. Many of these, possibly earlier Type 7 CSBs, were found along the Rivers Ythan, Deveron and Isla which may have been responsible for their distribution. The seemingly tight grouping of this type along these rivers makes it tempting to suggest that they may have originated in this area as a territorial or group marker.

Figure 7.135: CSB 011, Marnoch, Aberdeenshire. Courtesy of Ashmolean Museum, University of Oxford. C. Stewart-Moffitt 2015.

Figure 7.136: CSB 052, Ellon, Aberdeenshire. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 7.137: CSB 338, Turriff, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.138: CSB 366, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.139: CSB 265, Bructor, Aberdeenshire. Courtesy of Aberdeenshire Council Museum Service. C. Stewart-Moffitt 2015.

Figure 7.140: CSB 008, Location Unknown. Courtesy Manchester University Museum. C. Stewart-Moffitt 2015.

Figure 7.141: CSB 020, Kyles Scalpay, Isle of Harris. Courtesy of Renfrewshire Council's collection held by Renfrew Leisure Ltd. C. Stewart-Moffitt 2015.

Figure 7.142: CSB 282, Ular, Perthshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.143: CSB 247, Newburgh, Fife. Courtesy of Fife Cultural Trust on behalf of Fife Council. C. Stewart-Moffitt 2015.

Figure 7.144: CSB 207, Belhelvie, Aberdeenshire. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 7.145: CSB 302, St Vigans Church, Arbroath. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.146: CSB 391, Lawers, Nr Kenmore. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 7.147: CSB 364, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

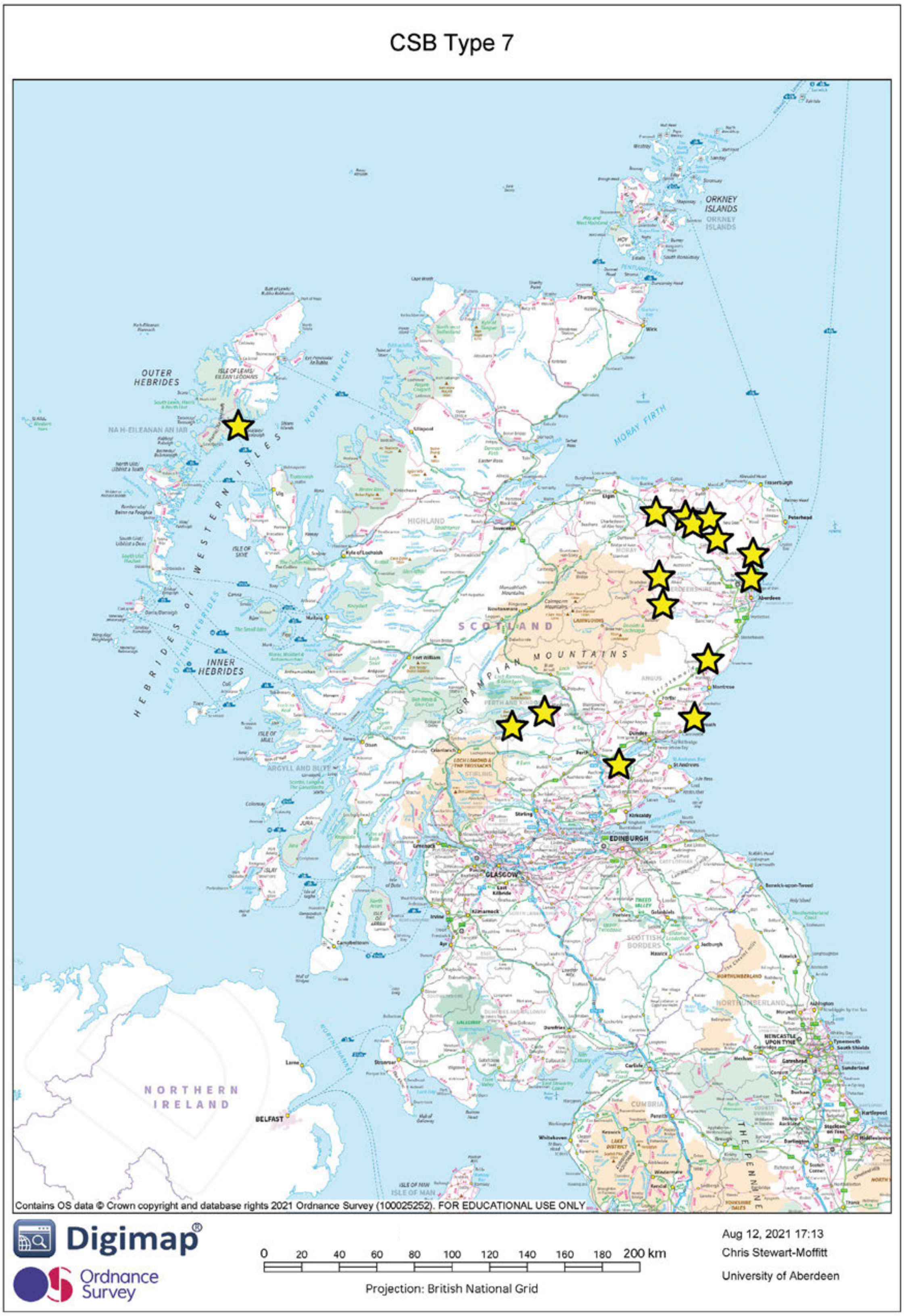
Figure 7.148: CSB 456, Fyvie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.33: Type 7 CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
284	Inverkeithny, Aberdeenshire	Metabasite	52.47 mm	39.88 mm	1.32
011 **Fig 7.135**	Marnoch, Aberdeenshire	Sandstone	68.18 mm	42.20 mm	1.62
052 **Fig 7.136**	Ellon, Aberdeenshire	Unknown	67.22 mm	41.07 mm	1.64
041 **Fig 7.134**	Unknown	Biotite Gneiss	67.66 mm	40.58 mm	1.67
338 **Fig 7.137**	Turriff, Aberdeenshire	2-Mica Granite	71.34 mm	42.67 mm	1.67
366 **Fig 7.138**	Unknown	Greenstone	64.37 mm	37.95 mm	1.70
480	Strathweltie, Aberdeenshire	Unknown	72.21 mm	41.98 mm	1.72
265 **Fig 7.139**	Bructor, Bourtie, Nr. Inverurie, Aberdeenshire	Basalt	71.16 mm	41.41 mm	1.72
020 **Fig 7.141**	Kyles, Tarbet, Isle of Harris	Dolerite?	68.30 mm	37.90 mm	1.80
282 **Fig 7.142**	Ular, Aberfeldy, Perthshire	Semipelite	69.40 mm	38.21 mm	1.82
247 **Fig 7.143**	Barns of Woodside, Newburgh, Fife	Garnet-Mica-Schist	74.51 mm	40.47 mm	1.84
207 **Fig 7.144**	Belhelvie, Aberdeenshire	Unknown	72.10 mm	37.50 mm	1.92
008 **Fig 7.140**	Unknown	Unknown	68.56 mm	35.75 mm	1.92

302 **Fig 7.145**	St Vigeans Church, Arbroath, Forfarshire	Unknown	75.00 mm	35.30 mm	2.12
391 **Fig 7.146**	Balnasume Farm, Lawers, Nr. Kenmore, Perthshire	Quartzite	73.27 mm	33.35 mm	2.20
364 **Fig 7.147**	Unknown	2-Mica Granite	72.76 mm	32.87 mm	2.21
456 **Fig 7.148**	Fyvie, Aberdeenshire	Greenstone	64.05 mm	27.31 mm	2.35
149	Kildrummy, Aberdeenshire	Hornfels	74.40 x 64.40 mm	L.44.10 x 42.90 mm S.33.50 x 29.70 mm	N/C
458	New Mill, Keith, Morayshire	Unknown	69.05 mm	L.44.50 x 35.60 mm	N/C
LM CSB 031	Deeside, Aberdeenshire	Coles thought this was made from Porphyry	Unknown	Unknown	N/C
Auctioned CSB 04	Unknown	Unknown	Unknown	Unknown	N/C
096	Unknown	Granite	110.00 x 106.2 x 97.60 mm	44.15 mm	N/C
128	Unknown	Sandstone	69.47 mm	L.42.30 x 40.30 mm S.40.90 x 35.56 mm	N/C

Other Type 7 CSBs have between eight and fifteen knobs (highlighted rose) which increased their ratio to between **1.80** and **2.35**. This was probably caused by the need to accommodate a greater number of smaller knobs, some of which were also domed or elongated possibly for the same reason. While these changes may have been due to a later stylistic development, they still retained the overall 'petal' morphology. Many of those with a greater number of knobs travelled south to Kincardineshire (**CSB 057** ten knobs**)**, Angus (**CSB 302** eight knobs**)**, west to Loch Tay (**CSB 391** eight knobs**)** and the Isle of Harris (**CSB 456** eight knobs); at least one (**CSB 456** with fifteen knobs) was found near Fyvie on the River Ythan in Aberdeenshire.



Map 7.29: Type 7 CSB approximate findspots. C. Stewart-Moffitt 2020.

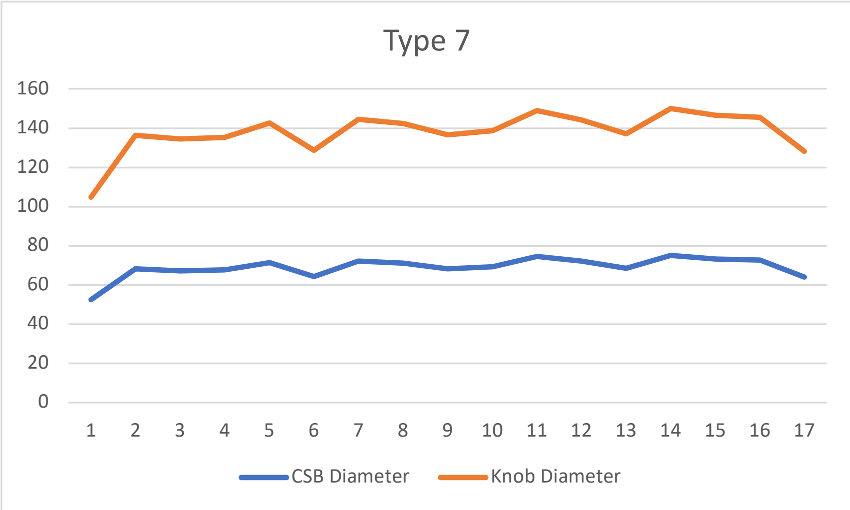


Chart 7.22: Comparison between Overall Diameter and Knob/Disc Diameter, Type 7. C. Stewart-Moffitt 2020.

Type 8a CSBs

Diagnostic Attributes: '*A slightly oblate carved stone ball with relatively small flat 'button' like discs or knobs that usually have sharply cut edges and that are evenly spaced over the surface'* defines this type. (No Type 8a in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): between **71.26** and **79.86**mm.

Knob diameters (AvK/D): between **19.75** and **40.96**mm.

Ratio of AvK/D to AvB/D: between **1.73** and **3.66.**

Type Image:

Figure 7.149: CSB 198, Location Unknown. Courtesy Museum of Archaeology and Anthropology Cambridge. C. Stewart-Moffitt 2015.

Of the fourteen CSBs in this type, Table 7.34, and Chart 7.23, seven have approximate findspots, Map 7.30, and seven have no findspots. These CSBs are very distinctive and while the majority have sharply cut 'button like' discs or knobs, a few have a more rounded appearance which may be due to abrasion. Although the number of discs or knobs vary considerably from eight to twenty-seven, twelve are the most common (highlighted rose) in Table 7.34. **CSBs 360, 241, 090, 198, 135,** and **445** appear to have been more carefully planned and cut which may indicate the work of a single craftsperson. Those with under twelve or over twenty discs or knobs may have been due to stylistic progression or competitive emulation between craftspeople. Based on current findspots their highest concentration is around 13km north-northwest of Inverurie and suggests they may have originated as a territorial or group marker.

CSB 090 from Fyvie was bought from Aberdeen collector George Sim by the celebrated archaeologist Pitt-Rivers while he was in Scotland in 1885 (Thompson 1977: 72). It was in Pitt-Rivers Farnham Museum until 1996, when it was sold at auction. The buyer was subsequently refused an export license and it was acquired by Aberdeen City Art Gallery and Museum in whose collection it is now. Many such transactions are recorded as having taken place between antiquarian collectors during the latter half of the nineteenth century.

Figure 7.150: CSB 360, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2018.

Figure 7.151: CSB 241, Location Unknown. Private Hands. C. Stewart-Moffitt 2015.

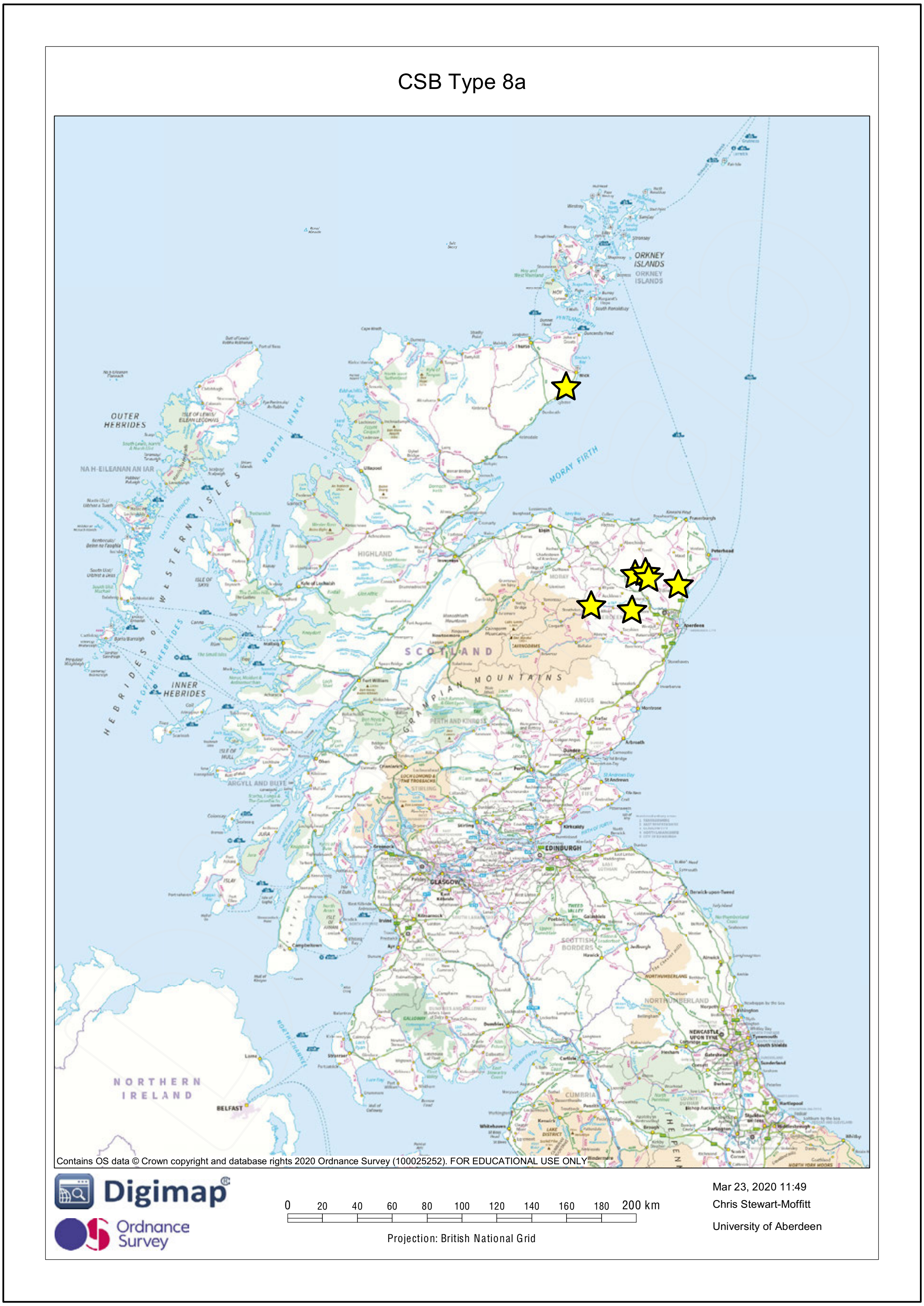
Figure 7.152: CSB 090, Fyvie, Aberdeenshire. Courtesy Aberdeen City Council (Art Gallery & Museum Collections). C. Stewart-Moffitt 2015.

Figure 7.153: CSB 135, Fyvie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.154: CSB 445, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 7.34: Type 8a CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
043	Unknown	Muscovite Granite	70.76 mm	40.96 mm	1.73
146	Kildrummy, Aberdeenshire	Biotite Granite	73.58 mm	37.42 mm	1.97
487	South Yarrows, Nr.Wick, Caithness	Sandstone	67.36 mm	33.35 mm	2.02
089	Unknown	Unknown	72.63 mm	34.82 mm	2.09
360 **Fig 7.150**	Unknown	Sandstone	71.26 mm	33.01 mm	2.16
241 **Fig 7.151**	Unknown	Unknown	75.48 mm	33.65 mm	2.24
038	Blackford House, Rothienorman, Aberdeenshire	Biotite Granite	78.40 mm	34.90 mm	2.25
090 **Fig 7.152**	Fyvie, Aberdeenshire	Sandstone	79.86 mm	32.81 mm	2.43
198 **Fig 7.149**	Unknown	Unknown	69.08 mm	26.65 mm	2.59
155	Unknown	Sandstone	76.50 mm	23.91 mm	3.20
116	Old Schoolhouse, Monymusk, Aberdeenshire	Hornfels	72.28 mm	19.75 mm	3.66
135 **Fig 7.153**	Lambhill Farm, Fyvie, Aberdeenshire	Hornfels	74.80 mm	L.35.75 mm M.19.80 x 13.20 mm S.14.60 x 10.90 mm	N/C
199	Ellon, Aberdeenshire	Sandstone or Quartzite	71.10 x 73.30 mm	L. 37.40 mm S.31.13 mm	N/C
445 **Fig 7.154**	Possibly Fife	Gabbro	74.86 mm	L.36.08 mm S.14.90 x 21.90 mm	N/C



Map 7.30: Type 8a CSB approximate findspots. C. Stewart-Moffitt 2020.

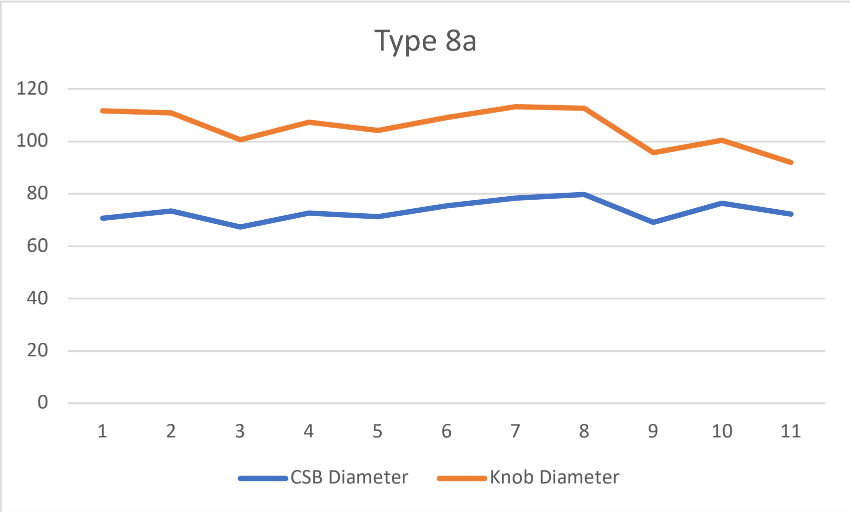


Chart 7.23: Comparison between Overall Diameter and Knob/Disc Diameter, Type 8a. C. Stewart-Moffitt 2020.

Type 8b CSBs

Diagnostic Attributes: A carved stone ball with ***'twelve to fourteen knobs that are evenly spaced over the surface, none of which are sharply cut or defined and have no interspaces between them'*** defines this type. (No Type 8b in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): between **64.70** and **85.10**mm.

Knob diameters (AvK/D): between **27.61** and **31.55**mm.

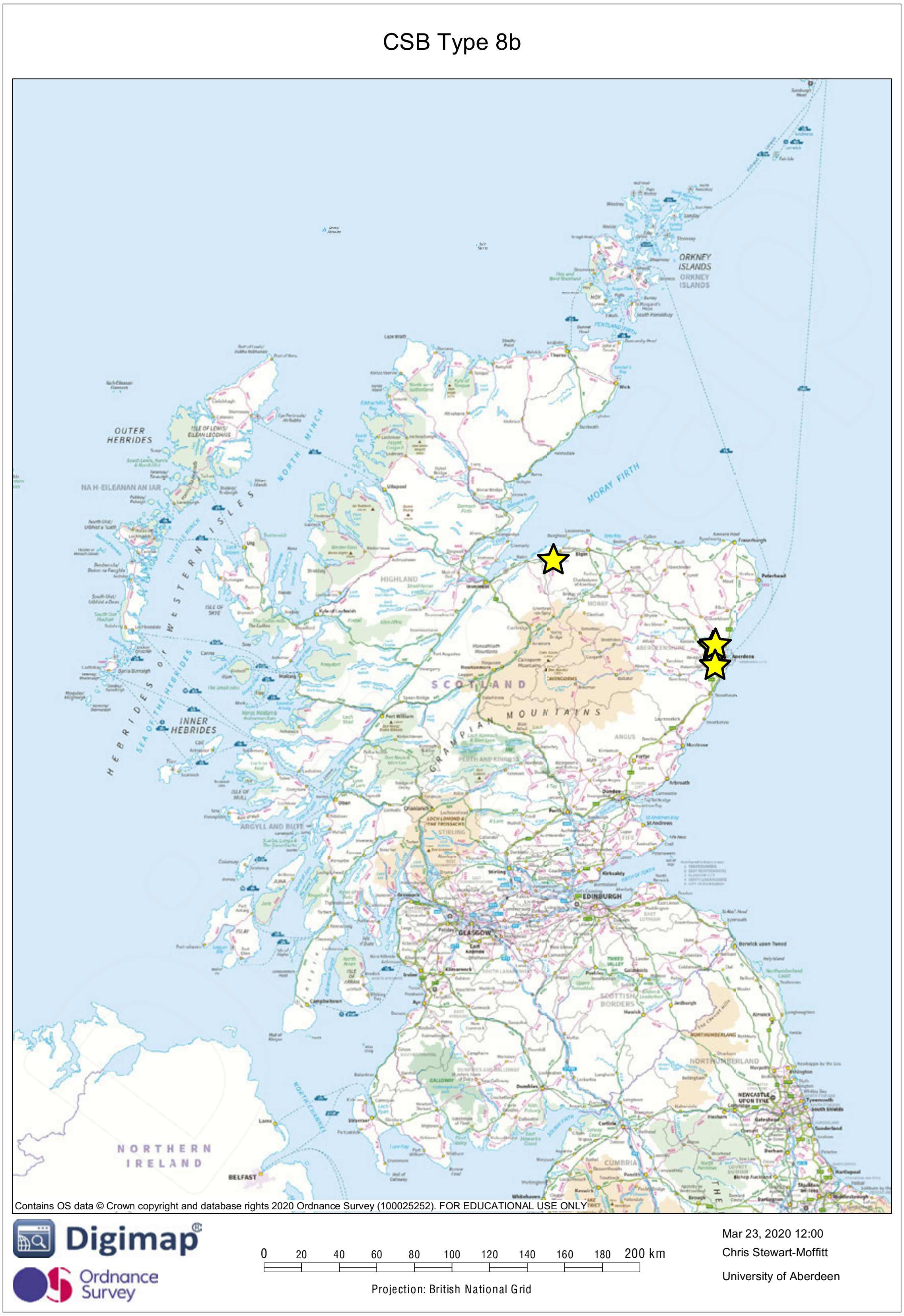
Ratio of AvK/D to AvB/D: between **2.19** and **2.57**.

Of the five CSBs in this type, Table 7.35, four have approximate findspots, Map 7.31, and one has no findspot. **CSB 189** may have been a precursor to **CSB 005** which was found in the same locality and although it is considerably smaller and the knobs are less well defined, it still readily fits within the same type. **CSB 108** was found at Cults which is around 10km from Dyce. Current findspot evidence suggests that these may have been made in the Dyce area which is some 15km southeast of Inverurie and from their overall similarity those highlighted pink in Table 7.35 may have been made by the same craftsperson.

Type Image:

Figure 7.155: CSB 005, Dyce, Aberdeenshire. Courtesy of Dundee Art Galleries and Museums. C. Stewart-Moffitt 2015.

Figure 7.156: CSB 189, Dyce, Aberdeenshire. Courtesy of Dundee Art Galleries and Museums. C. Stewart-Moffitt 2015.



Map 7.31: Type 8b CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.35: Type 8b CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
189 **Fig 7.156**	Dyce, Aberdeenshire	Granite	64.70 mm	29.48 mm	2.19
108 **Figs 7.157**	Cults, Peterculter, Aberdeenshire	2-Mica Granite	80.90 mm	31.55 mm	2.56
005 **Fig 7.155**	Dyce, Aberdeenshire	Gniess	71.01 mm	27.61 mm	2.57
217	Unknown	Pink Granite	85.10 mm	Unknown	N/C
Auctioned CSB 07	Forres, Morayshire	Unknown	Unknown	Unknown	N/C

Figure 7.157: CSB 108, Cults, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.158: CSB 044, Location Unknown. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Type 8c CSBs

Diagnostic Attributes: A carved stone ball with ***'with ten to twenty-five multi sized and shaped knobs over the surface'*** defines this type. (No Type 8c in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): between **54.00** and **94.92**mm.

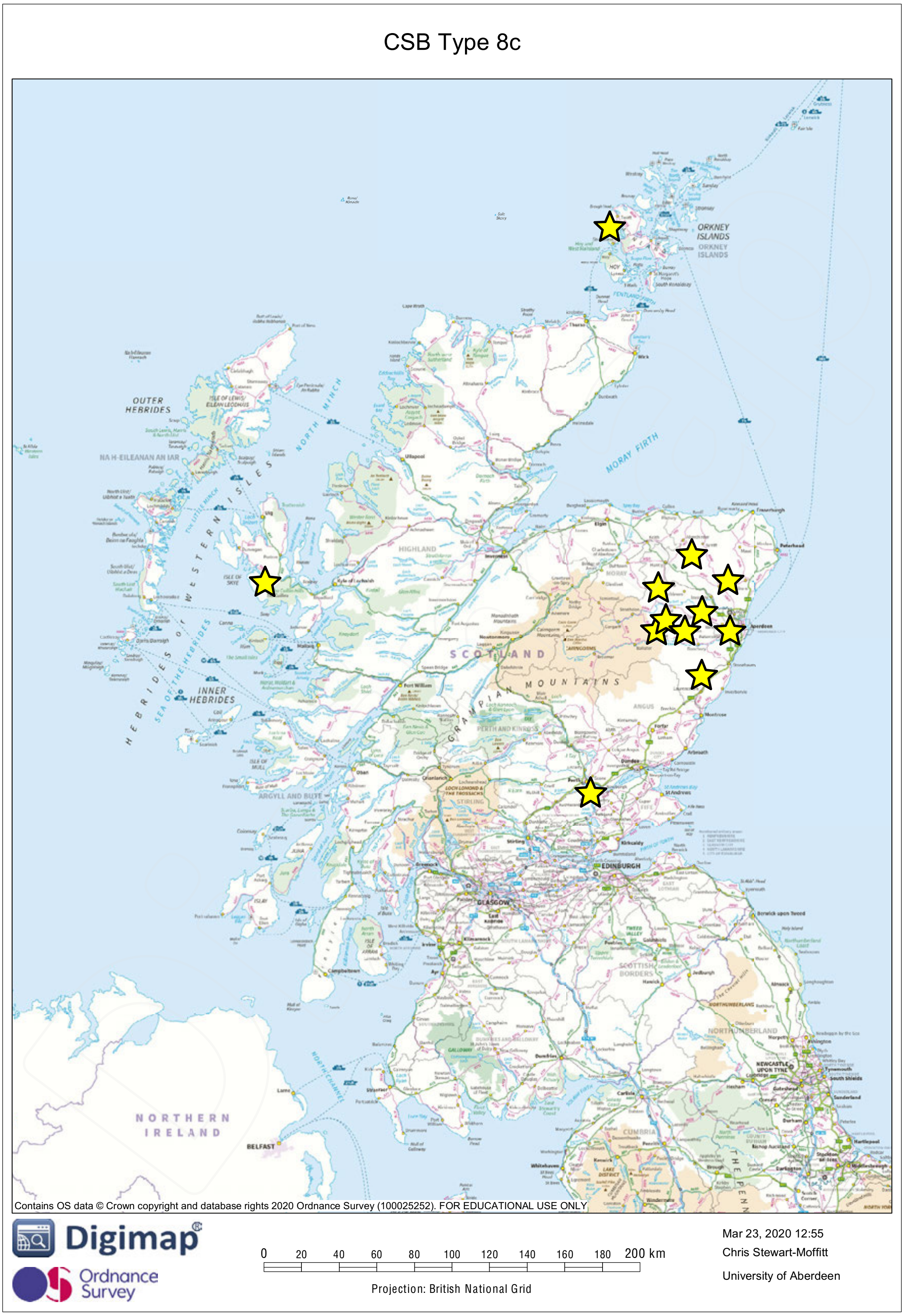
Knob diameters (AvK/D): between **18.94** and **42.73**mm.

Ratio of AvK/D to AvB/D: between **2.00** and **3.88.**

Type Image:

Of the twenty-four CSBs in this type, Table 7.36, and Chart 7.24, fourteen have approximate findspots, Map 7.32, and ten have no findspots. Many are quite badly degraded which may be due to the types of stone used. Nine have been found in northeast Scotland, seven of which were found west of Aberdeen, between the Dee and the Don, which suggests they may have been made in this general area. Three have been found in Orkney; **CSB 238** from Holm is made in a typical Orkney style while **CSB 051** is typical of Aberdeenshire, the other is like several other Orkney CSBs in having no readily definable knobs. Two other outliers are **CSB 454** from Satran on the Isle of Skye and **CSB 407** from the Bridge of Earn in Perthshire. **CSB 174** from Tarland may be skewing the data however and is either a CSB in the process of being made or is just a similarly shaped stone.

Many within this type seem to be either asymmetric, poorly planned, or poorly executed. Even in the instances where knobs can be easily identified their overall morphology and placing in relation to one another is poor. It is possible they represent a period during which several individuals were attempting to change the overall morphology of CSBs from the ubiquitous six knob type to a new and perhaps more sophisticated multi-knobbed variety.



Map 7.32: Type 8c CSB approximate findspots. C. Stewart-Moffitt 2020.

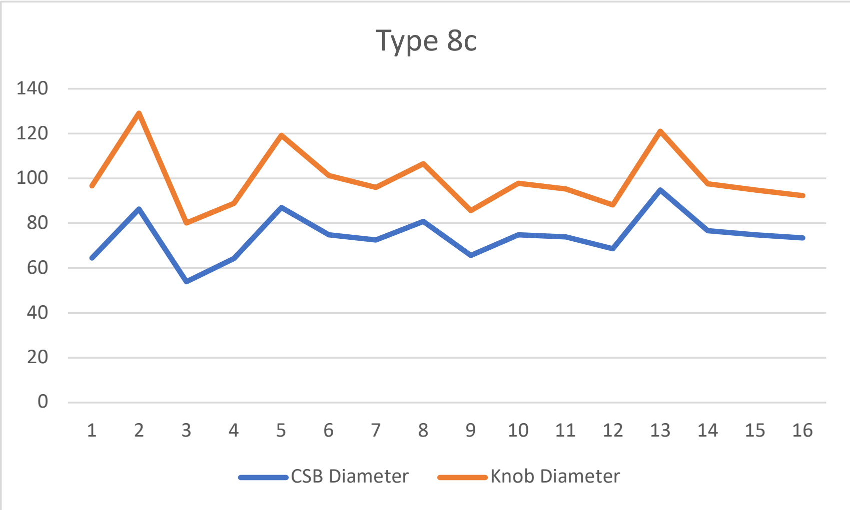


Chart 7.24: Comparison between Overall Diameter and Knob/Disc Diameter, Type 8c. C. Stewart-Moffitt 2020.

Table 7.36: Type 8c CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
122	Unknown	Quartz	64.53 mm	32.24 mm	2.00
066	Unknown	Granite	86.36 mm	42.73 mm	2.02
261	Unknown	Granite	54.00 mm	26.25 mm	2.06
209	Leochel Cushnie, Aberdeenshire	Granite	64.40 mm	24.56 mm	2.62
266	Learney, Aberdeenshire	Granite	87.16 mm	32.13 mm	2.71
267	Unknown	Dolerite	74.95 mm	26.45 mm	2.83
256	Tollo, Inverkeithny, Aberdeenshire	Greywacke?	72.61 mm	23.46 mm	3.10
238	Holm, Orkney	Unknown	80.83 mm	25.71 mm	3.14
010	Probably Glenfarquhar, Nr. Fordoun, Kincardineshire	Sandstone	65.61 mm	20.20 mm	3.25
484	Unknown	Unknown	75.00 mm	23.00 mm	3.26
447	Unknown	Psammite	74.02 mm	21.30 mm	3.48
051	Sanday, Orkney	Sandstone	68.81 mm	19.56 mm	3.52
435	Rhynie, Aberdeenshire	Psammite	94.92 mm	26.20 mm	3.62

044	Unknown	Talc or Chlorite	76.76 mm	21.04 mm	3.65
407	Bridge of Earn, Perthshire	Diorite	74.97 mm	20.05 mm	3.74
454	Satran, Merkadale, Isle of Skye	Possibly Limestone	73.56 mm	18.94 mm	3.88
174	Mar Cottage, Tarland, Aberdeenshire	Biotite Granite	83.70 x 77.30 x 65.30 mm	Between 26.00 to 31.50 mm	N/C
LM CSB 008	Tarves, Aberdeenshire	Granite	105.00 mm	Unknown	N/C
133	Unknown	Meladiorite	77.00 x 69.10 mm	29.78 mm	N/C
LM CSB 025	Craigearn, Kemnay, Aberdeenshire	Probably Quartzite	70.60 mm	Between 24.50 and 20.50 mm	N/C
220	Countesswells, Peterculter, Aberdeenshire	Pink Granite	59.50 x 56.80 x 60.50 mm	19.53 mm	N/C
239	Skara Brae, Sandwick, Orkney	Unknown	66.20 mm	Unknown	N/C
164	Unknown	Biotite Granite	89.00 x 74.30 mm	32.84 mm	N/C
LM CSB 028	Unknown	Dolerite or Gabbro	76.03 mm	Between 32.00 and 21.00 mm	N/C

Type 8d CSBs

Diagnostic Attributes: A carved stone ball with **'*forty-two regularly spaced knobs of various sizes that are evenly spaced over the surface*'** defines this type. (No Type 8d in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): Not calculated due to variation in morphology.

Knob diameters (AvK/D): Not calculated due to variation in morphology.

Ratio of AvK/D to AvB/D: Not calculated due to variation in morphology.

Type Image:

Figure 7.159: CSB 102, Kildrummy, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Of the three CSBs in this type, Table 7.37, all have approximate findspots, Map 7.33. **CSB 102** is by far the best example with well-rounded and well-spaced knobs, **CSB 086** was in all probability very similar but has subsequently been degraded during 5000 years in the ground. **CSB 159** has been degraded to the point where its knobs are almost completely worn away although it is still possible to see from the spacing of its knobs that it would have been a well-crafted ball. It is not possible to suggest a point of manufacture due to their geographical spread.

Map 7.33: Type 8d CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.37: Type 8d CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
086	Lumphart, Aberdeenshire	Granite	72.43 mm	15.72 mm	4.61
102	Kildrummy, Aberdeenshire	Greenstone	67.70 x 67.50 x 56.80 mm	14.66 mm	N/C
159	Dalgarno's Croft, Cuminestown, Aberdeenshire	Sandstone	81.50 x 68.50 mm	Central Knob.27.20 mm Outer Ring of knobs.17.60 to 13.4 mm Average 18.72 mm	N/C

Type 8e CSBs

Diagnostic Attributes: A carved stone ball with '***twenty-six to fifty-five regularly spaced and rounded knobs that are evenly spaced over the surface'*** defines this type. (No Type 8e in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): between **63.52** and **80.13**mm.

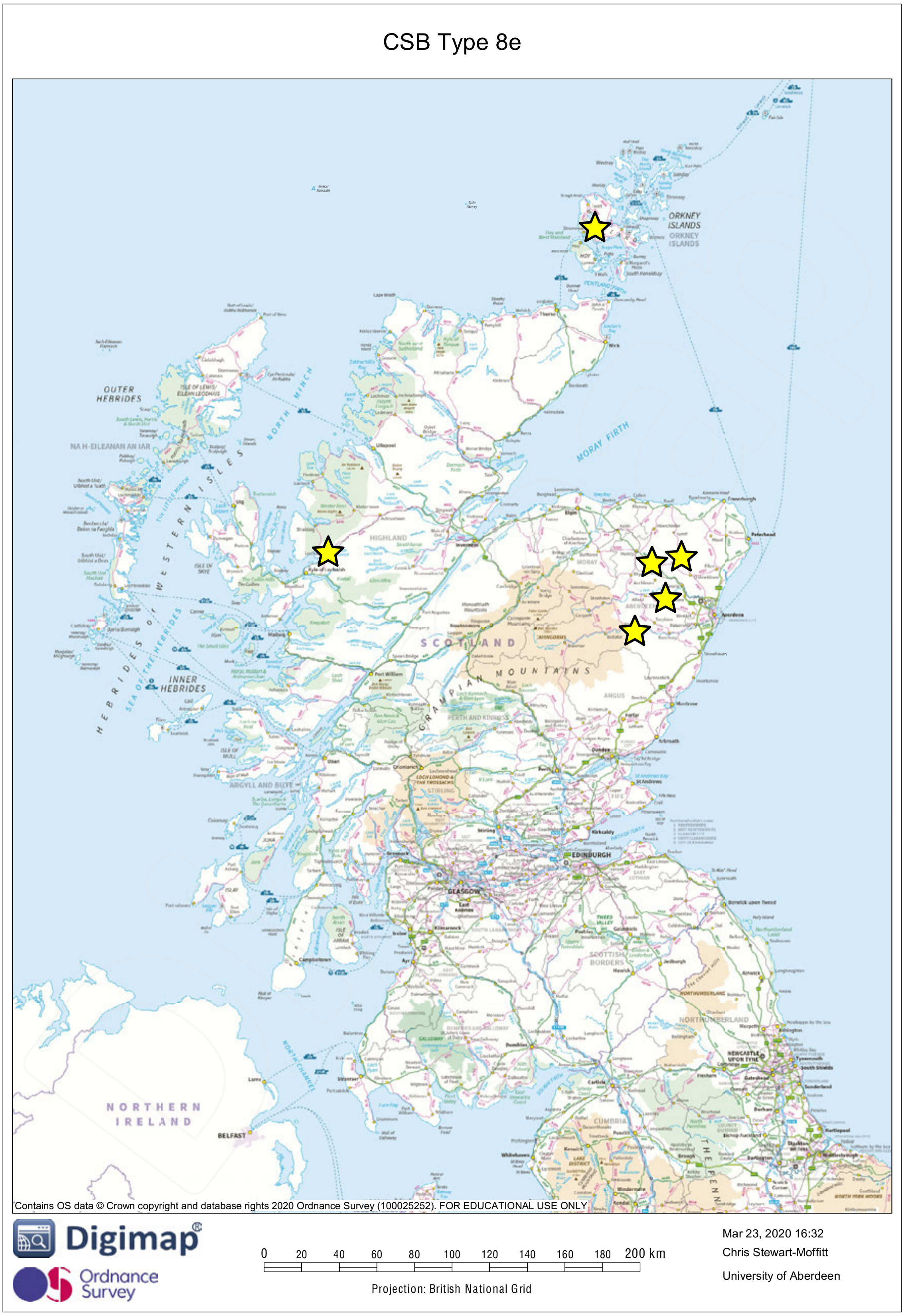
Knob diameters (AvK/D): between **13.06** and **22.50**mm.

Ratio of AvK/D to AvB/D: between **3.37** and **5.59**.

Type Image:

Figure 7.160: CSB 334, Fyvie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Of the fourteen CSBs in this type, Table 7.38, and Chart 7.25, seven have findspots, Map 7.34, and seven have no findspots. Three of the CSBs in this type (highlighted pink) are morphologically similar as can be seen from the style of their knobs, although the number differs in each case with **CSB 040** having 30, **CSB 131** having 36 and **CSB 197** having 53: the variation may have been due to improvements in design over time. Their close knob placement could mean they were made by the same craftsperson. **CSBs 334, 193** and **095** have all been made from a similar and quite distinctive material which in the case of **CSB 334** has been identified as Hornfels. Unusually, **CSB 193** also has a small hole (approximately 9.6mm diameter at the surface by 4.9mm at the bottom by 4.7mm deep), surrounded by an undamaged rosette of six knobs which suggests the hole is an original feature and has not been carved or drilled since its rediscovery in order to aid its display in a collection. **CSB 048** from Big Howe, Stenness is typical of Orkney artefacts with their distinctive pyramidical knobs and is often described as looking remarkably like a World War Two hand grenade or Mills Bomb.



Map 7.34: Type 8e CSB approximate findspots. C. Stewart-Moffitt 2020.

Table 7.38: Type 8e CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
114	Bog of Foudland, Insch, Aberdeenshire	Hornfels	75.85 mm	22.50 mm	3.37
260	Shadowside of Bourtie, N.Inverurie, Aberdeenshire	Greywacke?	72.40 mm	20.26 mm	3.57
040 **Fig 7.161**	Unknown	Sandstone	70.93 mm	19.56 mm	3.63
095	Unknown	Andesite (or Hornfels)	80.13 mm	21.10 mm	3.80
131 **Fig 7.162**	Unknown	Sandstone	71.56 mm	17.48 mm	4.09
048	Big Howe, Stenness, Orkney	Diorite or Synetic	67.03 mm	15.33 mm	4.37
197 **Fig 7.163**	New Schoolhouse, Monymusk, Aberdeenshire	Unknown (Possibly Hornfels)	73.46 mm	16.57 mm	4.43
350	Unknown	Sandstone	63.52 mm	13.74 mm	4.62
334	Fyvie, Aberdeenshire	Hornfels	73.06 mm	13.06 mm	5.59
213	Aboyne, Aberdeenshire	Granite	74.00 x 64.90 x 71.70 mm	15.53 mm	N/C
LM CSB 002	Jeantown (now Lochcarron), Ross-shire	Limestone (according to Coles in 1908)	76.20 mm	Unknown	N/C
193	Unknown	Unknown (Probably Hornfels)	68.80 x 68.40 x 53.10 mm	18.54 mm	N/C
LM CSB 024	Unknown	Unknown	Unknown	Unknown	N/C
LM CSB 037	Unknown	Unknown	Unknown	Unknown	N/C

Figure 7.161: CSB 040, Location Unknown. Courtesy of The Hunterian, University of Glasgow. C Stewart-Moffitt 2015.

Figure 7.162: CSB 131, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.163: CSB 197, Monymusk, Aberdeenshire. Private Hands. C. Stewart-Moffitt 2015.

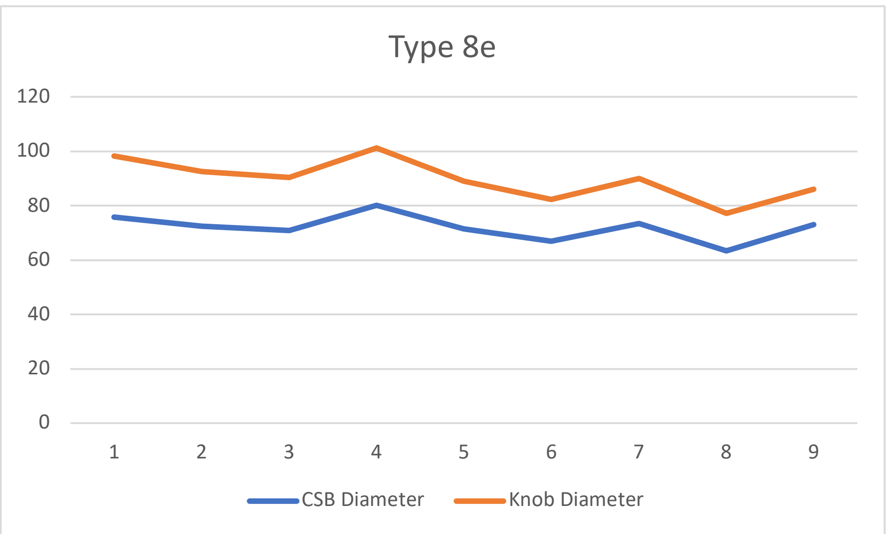


Chart 7.25: Comparison between Overall Diameter and Knob/Disc Diameter, Type 8e. C. Stewart-Moffitt 2020.

Type 8f CSBs

Diagnostic Attributes: A carved stone ball with ***'fifty-six to one hundred and ninety-six, (current maximum) rounded and evenly spaced knobs'*** defines this type. (No Type 8f in Marshall. All multi-knobbed CSBs were grouped under Type 8).

CSB diameters (AvB/D): between **62.93** and **75.31**mm.

Knob diameters (AvK/D): between **5.58** and **12.53**mm.

Ratio of AvK/D to AvB/D: between **5.43** and **11.82**.

Type Image:

Figure 7.164: CSB 227, Location Unknown. Courtesy of ANGUSalive Museums. C. Stewart-Moffitt 2015.

Of the twenty-two CSBs in this type, Table 7.39, and Chart 7.26, nineteen have approximate findspots, Map 7.35, and three have no findspots. Type 8f CSBs currently have the greatest number of knobs, with **CSB 473** currently holding the record at **192**. This must be very close to the maximum number of knobs that could practically be fitted onto the surface of a ball this size and it is clear that these diminutive knobs could no longer be of a uniform shape or size without taking considerably longer to both lay out and carve. It is possible that a technological or temporal barrier was finally reached when the knobs became either too small to map and carve accurately or it took too long to make. These multi-knobbed CSBs may have been the last to be created and were perhaps the subject of competitive emulation/competition by several different craftspeople, each of whom strove to outperform each other in the creation of multiple knobs.

The knobs of almost all Type 8f CSBs were left undecorated as they were both too small and too rough to apply decoration, however those of **CSB 268** from Tomintoul were ground flat allowing lines and simple crosshatching to be applied at some point. **CSB 255 and CSB 262** were both found at Shadowside of Bourtie, Nr Inverurie, some 3km north-northeast of Inverurie; one has **62** knobs and the other **102.** With two being found in the one place it's tempting to suggest this might have been where they were manufactured, especially as it is relatively near other Type 8f findspots. **CSB 420**, with 135 knobs, was found approximately 9km to the north-northwest at Oyne and **LM CSB 027**, with between 100/150 knobs was found on the farm of Meikle Wartle approximately 13km west-northwest, both of which are relatively near to Shadowside of Bourtie.

Apart from the Aberdeenshire group described above, the main spread of this type is to the northwest. **CSB 422**, with **89** knobs and **CSB 272**, with **84** knobs were found in the Elgin area; **CSB 033** with **80** knobs was found at Allness on the Cromarty Firth and **CSB 473** with **192** knobs was found at Ballintore on the nearby Tarbat Peninsula. A little further west **CSB 398**, with **155** knobs, was found during grave digging on Tom-na-Hurich, a glacial kame beside the River Ness. This CSB is particularly interesting as it is made from Actinolite, a rock which is rare or absent from the northeast and Central Highlands and is more likely to have come from Loch Duich/Glenelg, Sutherland, or the Outer Hebrides. This may be an example of craftspeople either travelling to other locations to make CSBs or seeking out unusual stone sources. Multi-knobbed CSBs were also found at Satran on the Isle of Skye and Jeantown (now Lochcarron) in Wester Ross both of which are in the vicinity of the Loch Duich/Glenelg source mentioned above.

Interestingly, many of the balls in **Type 8c** are oblate and have fewer, randomly spaced or poorly defined knobs and often appear to have been made from softer rock suggesting their makers may have been experimenting with new concepts. **Type 8d** CSBs could either have been made after **Type 8c** or by a more experienced craftsperson, as the knobs carved on these are more evenly spaced. Many of the **Type 8e** CSBs appear to have been made from harder rock types and as a result have survived in a much better condition than **Type 8c** and **8d** CSBs. They have also been carved with a greater number of knobs which are not only spaced more consistently but are more carefully made. Finally, it appears that the makers of **Type 8f** CSBs were using harder materials to squeeze the maximum number of knobs on to a limited surface area and may have been reaching the limits of their technical and physical ability to do so. As they exceeded 140 knobs the shape and quality of each individual knob began to deteriorate resulting in the ball becoming less attractive.

When the locations of **Types 8c, 8d, 8e** and **8f** are combined, the highest concentration of CSBs is in northeast Scotland, some 25km north-northwest of Aberdeen near Inverurie. Two further smaller groups can be seen around the Cromarty/Moray Firths and Orkney with a somewhat looser grouping to the north, south and west of Alford.

Table 7.39: Type 8f CSBs. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter AvB/D	Average Knob Diameter AvK/D	Ratio of AvK/D to AvB/D
100	Dergarcha, N.Dunoon, Argyll	Possibly Basalt	67.95 mm	12.51 mm	5.43
255	Shadowside of Bourtie, N.Inverurie, Aberdeenshire	Greenstone	68.98 mm	12.53 mm	5.51
493	Skara Brae, Sandwick, Orkney	Unknown	75.31 mm	12.13 mm	6.21
185	Buchan	Sandstone	67.53 mm	10.86 mm	6.22
422	The Moss, New Mills, Elgin, Morayshire	Hornfels	64.72 mm	10.15 mm	6.38
039	Unknown	Sandstone	69.73 mm	10.66 mm	6.54
079	Vicinity of Perth, Perthshire	Unknown	65.63 mm	9.66 mm	6.79
033	Novar, Alness, Ross-shire	Unknown	67.46 mm	9.6 mm	7.03
262	Shadowside of Bourtie, N.Inverurie, Aberdeenshire	Possibly Basalt	68.83 mm	9.00 mm	7.65
272	Herd Hillock, Mayne Farm, Morayshire	Unknown	70.93 mm	9.26 mm	7.66
411	Hillock of Echt, Lower Cabrach, Aberdeenshire	Amphibolite	66.42 mm	7.48 mm	8.88

300	Waterlair Farm, Garvock, Kincardineshire	Amphibolite	66.52 mm	7.47 mm	8.90
340	Nr. Peterhead, Aberdeenshire	Hornfels	62.93 mm	6.91 mm	9.11
420	Ardoyne, Oyne, Aberdeenshire	Meladiorite	69.50 mm	7.58 mm	9.17
268	A Moss near Tomintoul, Morayshire	Unknown	64.95 mm	6.73 mm	9.65
398	Tom-na-Hurich, Inverness-shire	Actinolite	72.87 mm	7.46 mm	9.77
037	Kirkton, Roxburghshire	Meladiorite	65.90 mm	6.71 mm	9.82
473	Balintore, Nr. Portmahomack, Ross-shire	Unknown	67.68 mm	6.43 mm	10.53
227	Unknown	Unknown	65.96 mm	5.58 mm	11.82
416	Near the Broch at St Thomas's Kirk, Hall of Rendall, Orkney	Unknown	56.20 x 57.10 x 88.70 mm	Between 12.80 and 8.80 mm	N/C
LM CSB 027	The Glen Farm, Meikle Wartle, Aberdeenshire	Possibly Serpentine	~63.50 mm	Between ~6.35 and ~4.76 mm	N/C
126	Unknown	Unknown	Unknown	Unknown	N/C

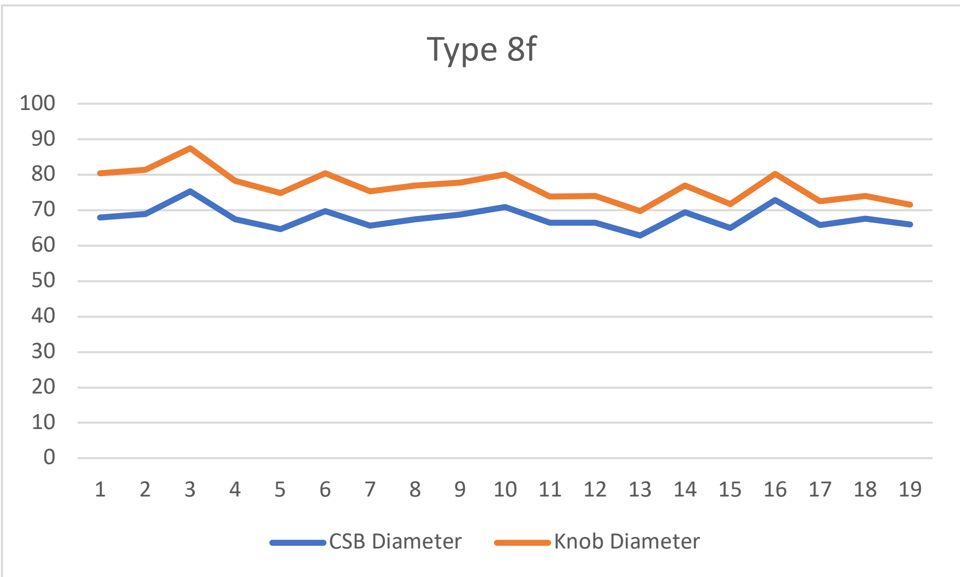
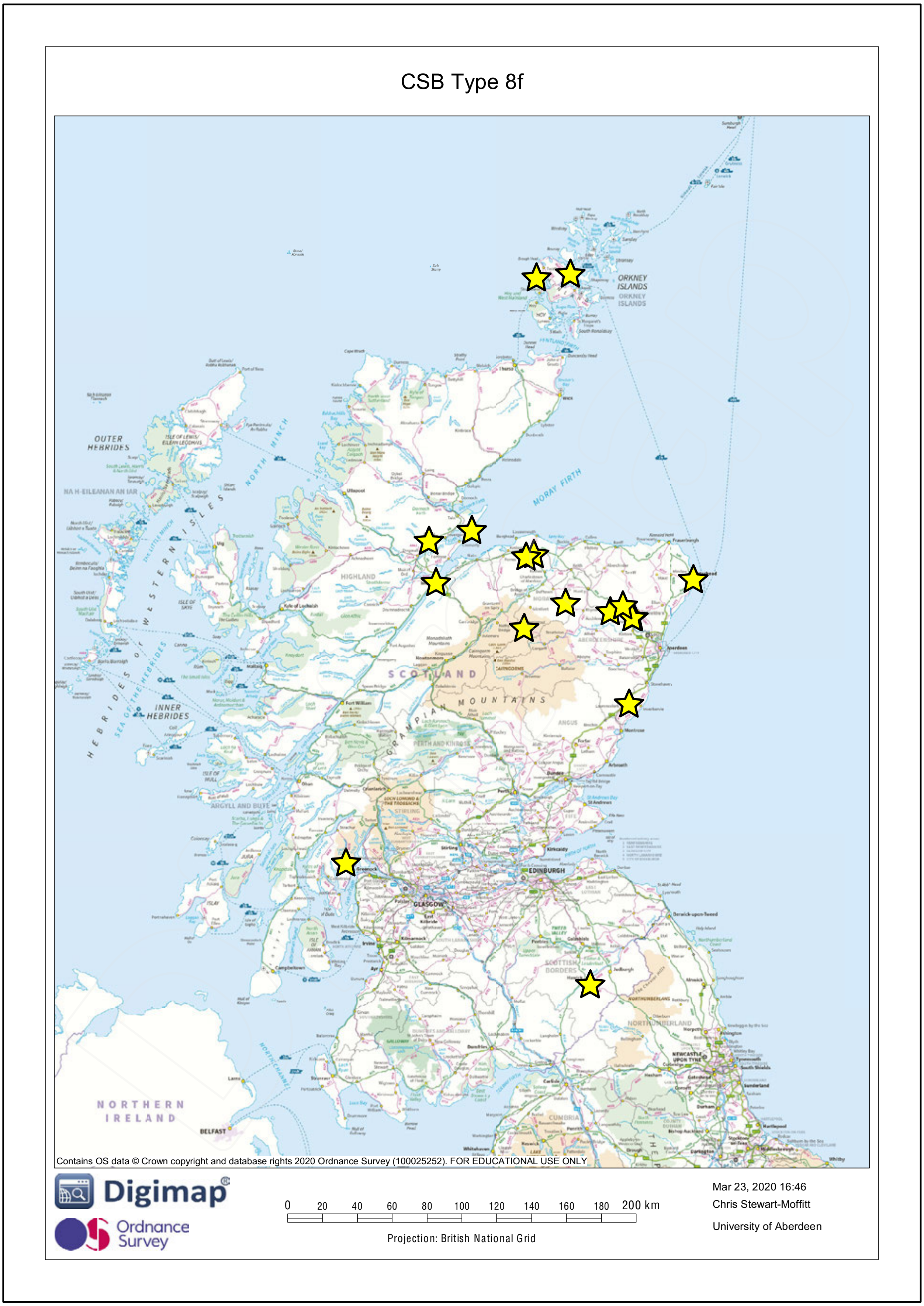


Chart 7.26: Comparison between Overall Diameter and Knob/Disc Diameter, Type 8f. C. Stewart-Moffitt 2020.



Map 7.35: Type 8f CSB approximate findspots. C. Stewart-Moffitt 2020.

Type 9 (Decorated) CSBs: Decorated CSBs will be reviewed and discussed in *Chapter Eight: CSB Decoration and their Revised Classification/Typology*.

Type 10: Forgeries or Potential Forgeries.

Figure 7.165: CSB 084, Location Unknown. Courtesy Aberdeen City Council (Art Gallery & Museum). C. Stewart-Moffitt 2016.

Figure 7.166: CSB 158, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 7.167: CSB 270, Cruden, Aberdeenshire. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.168: CSB 273, Location Unknown. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.169: CSB 275, Location Unknown. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.170: CSB 276, Location Unknown. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.171: CSB 277, Location Unknown. Courtesy of Elgin Museum. C. Stewart-Moffitt 2015.

Figure 7.172: CSB 421, Location Unknown. Courtesy of National Museums Scotland.C Stewart-Moffitt 2015.

Figure 7.173: CSB 472, Location Unknown. Courtesy of The Sutherland Dunrobin Trust. C. Stewart-Moffitt 2016.

There are currently ten Type 10 CSBs, two have approximate findspots and eight have no findspots. They have several characteristics that identify them as potential forgeries; they are often considerably overweight or oversized when compared to the majority of the corpus, have either modern tool marks or 'freshly made' peck or grinding marks and are visually dissimilar to the majority of CSBs. Nine of these are illustrated in the following examples.

Various writers have mentioned that forgers were at work in the late nineteenth century, making not only CSBs but other prehistoric artefacts, to satisfy the needs of antiquarian collectors (Foster and Curtis 2015: 1-27). While the vast majority of CSBs are almost certainly genuine, some may have been forged. Without a specific, yet to be developed methodology, which would probably involve closer inspection with a Scanning Electron Microscope, the majority of the CSB corpus must be considered original.

CSB 084 is overweight at 1456g and is both oversized and oblate at 100.9mm x 112.6mm x 117.6mm. It is quite unlike any of the other Type 8a CSBs recorded. **CSB 158** is similarly overweight at over 1 kg and both oversized and oblate at 107.6mm x 97.1mm. While their shape is not a problem, their considerable weight and size makes them seem less likely to be genuine CSBs.

CSBs 270, **273**, **275**, **276** and **277**, were all donated to Elgin Museum by a single donor in the 1930s. They have all been visually characterized as being made from granite which looks as though it came from the same unknown source. Accession record cards reveal that the curator expressed his doubts regarding their authenticity at the time they were donated and suggested they may have been modern copies. Further microscopic study showed several appeared to have fresh peck marks, all are very clean with little post excavation soiling or original soil attachment. CSBs **273** and **275** at over 1kg in weight and with diameters of 110.93mm and 111.76mm respectively, are considerably larger and heavier than average. **270**, **276** and **277** are also larger and heavier than normal and have an elongated profile rather than round. Interestingly when the ratio of knob to overall diameter was investigated, **270** and **277** were both found to have a ratio of **1.68**; **275** had a ratio of **1.76** and both **273** and **276** had a ratio of **1.77** suggesting that the same hands were at work with at least three and possibly all five.

CSB 421 is both asymmetric and oblate and while it is possible that this unusual looking object is a work in progress its irregularly shaped and positioned knobs and raised interspaces do little to suggest it was intended to be a CSB.

Although **CSB 472** is around the right size and weight for a CSB it has numerous modern tool marks making it unlikely to be Neolithic. It is made from local chert which is readily available on the shore in the vicinity of Dunrobin Castle.

Type 11 (Orkney) CSBs

Orkney CSBs will be reviewed and discussed in chapter eight: CSB Decoration and their revised Classification/Typology.

Conclusion.

In this chapter the system of classification was introduced. Although originally designed by Carl Linneaus to group plants and animals with similar characteristics into family groups to better understand their relationship, it was later used by antiquarians and archaeologists to differentiate between individual groups of similar artefacts. Oscar Montelius subsequently developed a system of typological classification to link archaeological assemblages from different sites. Classification and typology fell out of favour in the middle of the twentieth century but was later re-introduced by post-processual archaeologists. Despite misgivings by some, it was noted that many archaeologists still use classification and typology today, to help create clarity out of otherwise complex situations or, as in the case of CSBs, to reveal previously unknown information.

This author's 2015 revision and expansion of Marshall's original classification/typology was briefly introduced; this showed that several additional sub-types appeared to exist within the corpus, offering the possibility of identifing local or regional groups. A further revision carried out in 2017 revealed that there were around thirty-two additional types, and it was suggested that some might even be the 'signatures' of individual craftspeople. It was also suggested that some of these sub-types might not have been completed during the lifetime of one individual and that a number of people may have been involved in making, decorating, and enhancing a CSB over several generations.

Finally, the full 2017 revision was presented by type; this included diagnostic features, type images, type maps of findspots and charts which compared the knob diameter of CSBs to their overall diameter. The extraordinary similarity between many of the CSBs suggested that both the morphological and metric similarity of many CSBs might offer confirmation that the work of a number of individual craftspeople could be identified.

Chapter Eight

CSB Decoration and their Revised Classification/Typology

This chapter will briefly explore the potential origins of carving and incising motifs into stone and the emergence of these traditions in Europe. It will examine the types of decoration used on monuments and artefacts in France, Spain, Ireland, Britain, and Orkney to determine how these techniques and motifs might have been transmitted from place to place and how some were used on Late Neolithic artefacts. I will include a revised typology or classification of decorated CSBs and consider the relationship with their undecorated counterparts, suggesting the potential origin of some types of decoration. Finally, I will introduce case studies outlining the sophisticated decoration that was applied to two well-known CSBs. In one case I will suggest that there were several earlier iterations of the final design which were made from a coarser material preventing the craftsperson from maximising their design potential. In the other I will ask if it was indeed made during the Late Neolithic, or during the nineteenth or twentieth century to illustrate the range of decorative motifs that were used during the Late Neolithic.

Early artistic expression and changes over time

The first geometrically decorated artefacts date to c. 63,000 BC and were found in the Southern Cape area of what is now South Africa. During excavations at Blombos Cave, incised lines were found on a number of pieces of ochre and at the Diepkloof rock shelter over 270 fragments of abstractly engraved ostrich shells were identified. Mobiliary art such as this has been in existence for considerably longer than later forms of parietal (rock) art such as cave painting and consist of small movable artefacts. They range from pieces of ochre, shell beads, three-dimensional anthromorphic figures, so called 'Venus figurines' and a variety of animals (Bahn 2016: 25, 123-156; David 2017: 94-101, 108-109, 141-142). By the Upper Palaeolithic, c. 40,000BC – 10,000 BC, representative art depicting animals became popular: surviving examples can be seen in the form of cave paintings (both painted and inscribed), mobiliary art (carved) and rock art (carved and inscribed), (Bahn 2016: 157-274; David 2017: 136-201). These were crafted by people attempting to record their own personal worldview or to perhaps convey detailed knowledge of their ice age environment to existing and future generations. Whatever the reason they offer an astounding insight into their lives and the natural world around them. By the Late Palaeolithic, c. 12,500BC – 10,000 BC, the tradition of producing figurative and abstract art in caves, which had long been a feature of the Upper Palaeolithic, had ceased, and new and more regional geometric art forms were being introduced. Over 1,600 pebbles with geometric motifs, painted predominately in red ochre, were found at Mas d'Azil in France with a further 600 at sites in Spain, Italy, and Switzerland (Bahn 2016: 136; David 2017: 214). The motifs were made up of a combination of lines, dots, zigzags, and stripes, with some crosses or hatching; research suggested that this may have been a notational system.

Geometric symbols found within cave and rock art

In addition to Palaeolithic cave, mobiliary and rock art, simple geometric symbols have also been noted at many European Upper Palaeolithic rock art sites. Having mostly been dismissed as doodles or embellishments few studies had been made of them. Paleo-anthropologist Genevieve Von Petzinger, of the University of Victoria in Canada, recognized the potential for these in helping to identify the cognitive and symbolic evolution of modern humans and revealed a typology of thirty-two symbols from European sites in her book *'The First Signs: Unlocking the mysteries of the world's oldest symbols'* (Von Petzinger: 2017). She found that twenty-one of the symbols were in widespread use in the Aurignacian period, c. 38,000BC – 28,000 BC, sites, with many dated to the early part of the period and suggests that some may have been in use before the first groups of people left Africa. It's interesting, from the point of view of this current study, that nine of these symbols (28%) can be found on CSBs.

Parallel Lines: Present at 75% of sites throughout Europe and during all time periods.
Crosshatching: Present at 20% of sites; well represented in France and Spain but seen less in Italy or Eastern Europe.
Dots and Cupules: Present at over 40% of sites throughout Europe, especially Spain and during all time periods.
Zigzags or Open Angles: Present at less than 10% of sites. Perhaps an early form of later Neolithic nested V's.
Spirals: Very rare during this period; only found at three locations in France which all date to the Gravettian period, c. 26,000 - 19,000 BC.

In terms of the decoration found on carved stone balls we can see that the circle, spiral, line, crosshatch, cupule, dot, open angle, triangle and cruciform (ringed red in

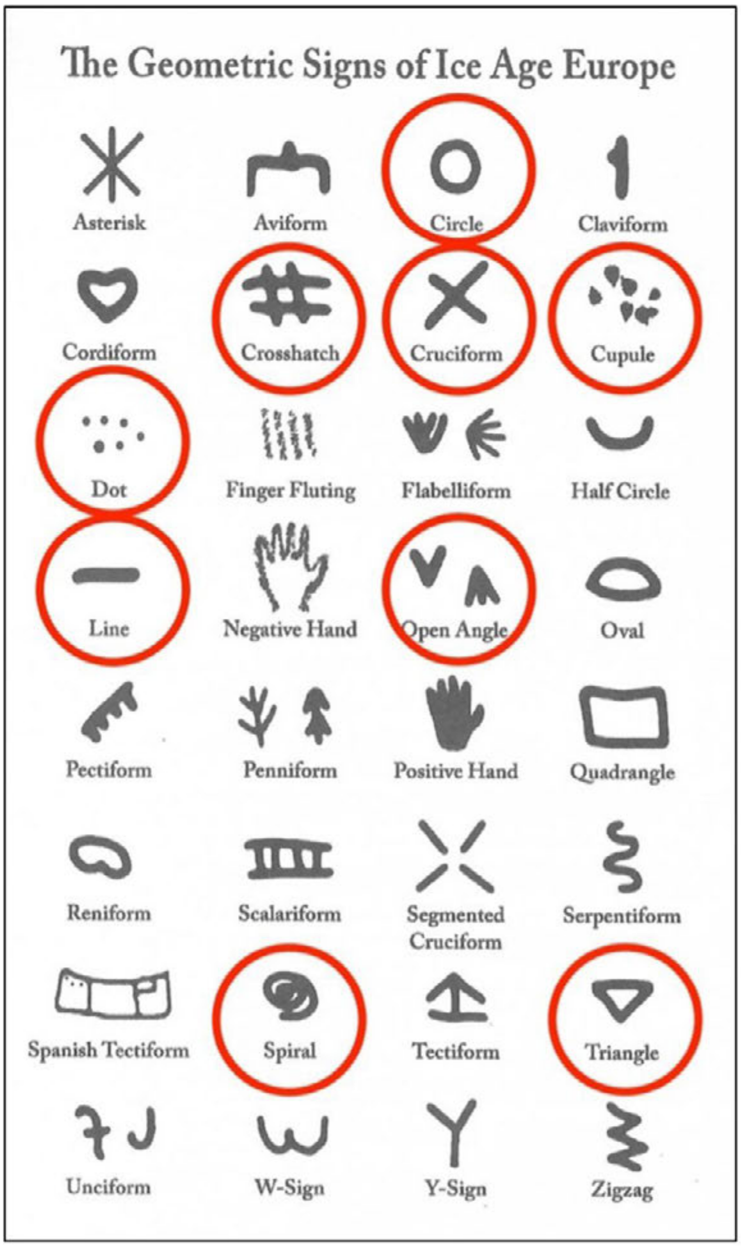


Figure 8.1: Geometric Signs of Ice Age Europe. After Von Petzinger, 2017.

Figure 8.1), are all well represented. Von Petzinger's research suggested that these symbols seem to have deep seated roots in our psyche and may originate from a pool of ideas that have existed since at least the Late Palaeolithic, if not earlier.

Art in the Western Façade of Neolithic Europe

Moving forward in time to the Neolithic we find a wide range of pick-dressed motifs on passage graves and menhir in Brittany, *c. 4200 BC-3500 BC* and Iberia, *c. 4500 BC-3100 BC*, (Stout and Stout 2008: 68-79). Nearer home, we find similar motifs at Newgrange in Ireland, 3340 BC-2910 BC, (Griffiths 2016: 293), Bryn Celli Ddu in Anglesea, *3045-2978 cal BC*, (Burrow 2010: 262) and Quoyness and Pierowall Quarry in Orkney, *3340-3090 & 3120-2600 cal BC*, (Griffiths 2016: 293). This suggests that, while the idea of passage graves may have originated in Brittany and Iberia, the tradition later diffused further north to Ireland, Anglesey, and Orkney. Although the range of motifs across these locations cover abstract, geometric, and representational art in the form of animals, weapons, and human figures, not all styles are found at all locations (Bradley 2002: 38-41; Thomas 2005: 170; Robin 2012: 140).

Artefacts and symbols found in passage graves in Brittany, Iberia and Ireland also show noteworthy similarities which reinforce this suggestion; although they may not all have existed simultaneously, they appear to have been a tradition that lasted for a long period of time. While the Stone Balls and Basins found in Ireland are missing from tombs in Brittany, they do contain impressive Stone Axes, Beads, Pendants, and other miniature objects which are comparable to similar artefacts found in Irish tombs (Stout and Stout 2008: 76). However, unlike Brittany, where pick-dressing was used to produce geometric decoration consisting of lozenges, U shapes, spirals, circles, 'ladders' (scalariform) and other representational art, the decoration on Irish passage graves is entirely geometric and eschews representational art entirely.

Potential links have also been suggested through stylistic comparisons between passage graves in Ireland and Iberia, where at around sixty sites, round mounds were decorated with both representational and geometric motifs. In Iberia, pick-dressed geometric art comprises a wider range of forms than Brittany with serpentine motifs, concentric circles, 'rayed-sun' motifs, radial lines and zigzags and have many similarities with those in Ireland (Stout and Stout 2008: 76-77). A similar range of portable artefacts are also found in Iberia with stone balls, highly polished 'Phallus' Artefacts, Figure 8.2, and Basins.

It is suggested that these very similar artforms and artefacts could have spread by sea along the Atlantic seaboard from Iberia and Brittany. Despite the distances involved, sea travel in the Neolithic would certainly have been possible as has been suggested in chapter five and may have developed along the lines indicated below, Maps 8.1 and 8.2. While Early Neolithic interaction with Britain and Ireland may have

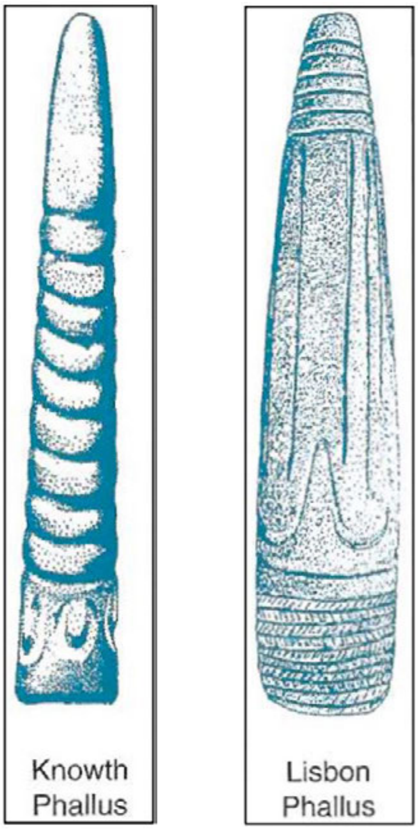
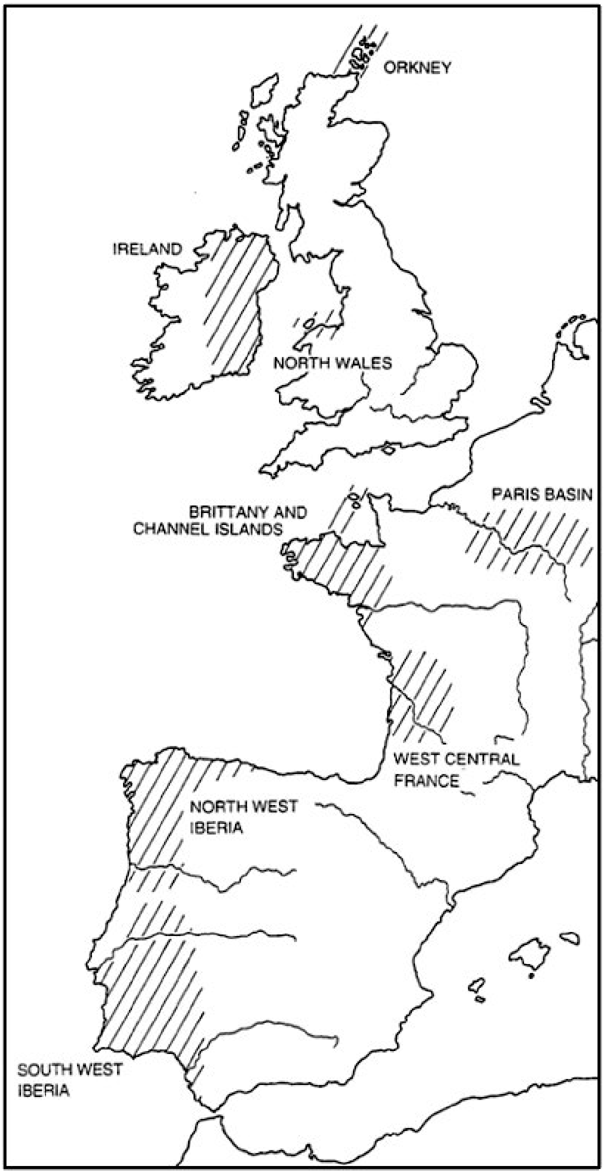


Figure 8.2: 'Phallus' shaped artefacts from Ireland and Iberia. ©Stout and Stout 2008: 81.



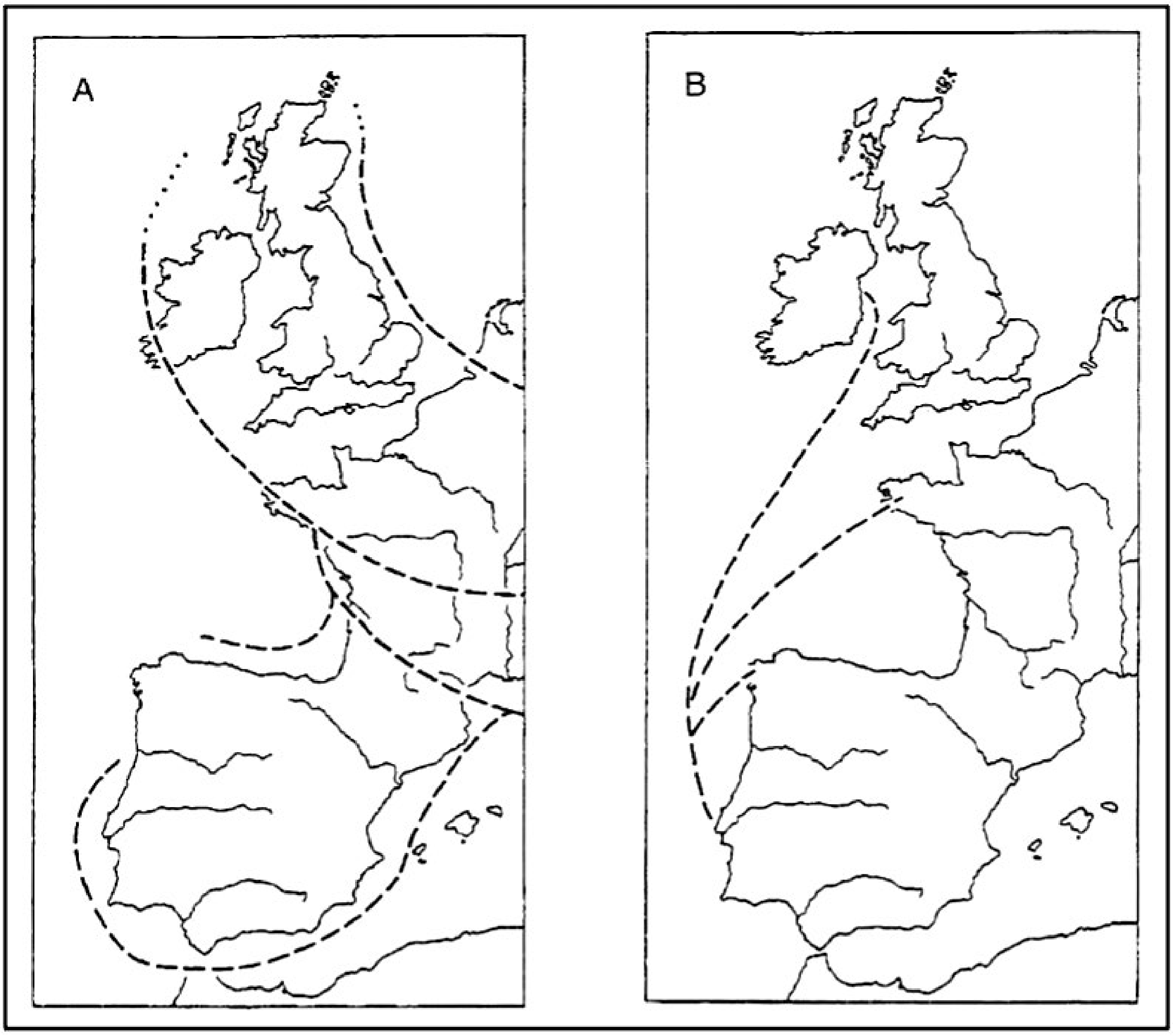
Map 8.1: Outline of the distribution of Megalithic Art. ©Bradley 2002: 40.

been through Brittany, France and the Low Countries, Later Neolithic interaction may be traced through the ideology, material culture and motifs from the Boyne Valley.

Irish Passage Grave Art

Most passage graves in Ireland are found in the northern half of the country and although some have small amounts of artwork, none are so highly decorated as those at Knowth and Newgrange in the Boyne Valley, County Meath. It has been suggested that the passage grave tradition in Ireland started *c. 3700 BC* and that those in the Boyne Valley were built towards the end of the tradition, *c. 3200 BC-3100 BC*, (Sheridan 1987 in Bradley 2002: 62). With over six hundred decorated stones, the Boyne Valley contains over 30% of all the megalithic art in Western Europe and around 80% of all passage grave art in Ireland. Decoration appears almost entirely on structural stones, many of which are hidden from view as they face into the monument and were only discovered during excavation (Stout and Stout 2008: 18; Bradley 2002: 63).

What is particularly interesting is that two distinct phases of decoration have been identified here. The early phase, which Muris O'Sullivan calls 'depictive style', faces inwards and is hidden from view; comprised of shallow pecked line motifs with seemingly random placement, it was carried out prior to the stones being placed in their final positions (O'Sullivan 1983: 11; Hensey 2015: 47). The later phase is visible and appears to have been created after the stones were set in position; occasionally overlaying the original simpler decoration. This is deeper and 'sculptural' in a form that O'Sullivan calls the 'plastic style' (O'Sullivan 1983: 12). Another researcher, Shee Twohig, has suggested three phases of art; the first 'early stage' where the art is depicted on the back and sides of the stones, the second 'main stage' represented by a range of typical passage grave motifs and the 'mature stage' represented by pick-dressed motifs (Hensey 2015: 47). At whatever stage in the life of the monuments these motifs appeared, none are obviously representational and are either abstract or geometric. A wide range of motifs, some of which are illustrated in Figures 8.3, 8.4



Map 8.2: Interaction zones in Atlantic Europe. a: Earlier Neolithic, b: Later Neolithic. ©Bradley 2002: 24.

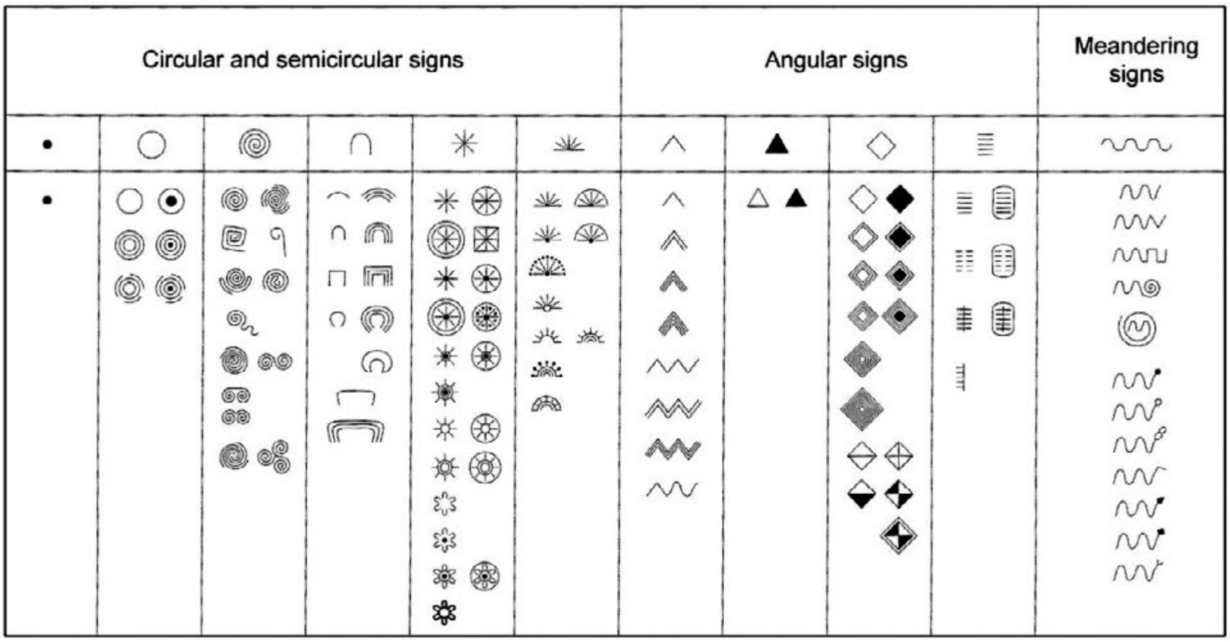


Figure 8.3: Designs and motifs found in British and Irish passage grave art. ©Robin 2008: 300.

Figure 8.4: Kerbstone K52, Newgrange, Boyne Valley, ©Stout and Stout 2008: 24. Ireland.

Figure 8.5: Kerbstone K67, Newgrange, Boyne Valley, Ireland. ©Stout and Stout 2008: 25.

and 8.5, are represented in the Boyne Valley and other passage graves in Ireland and are similar to those used in earlier Iberian megalithic art (O'Sullivan 1993: 10-12).

The artwork of Orkney

Similar megalithic artwork has also been found further north in Orkney. Here the range of motifs is much reduced and is usually found as finely made incisions rather than being pecked, three-dimensional, motifs. The reproduction of some of the geometric symbols found in Ireland and the similarity between the tombs at Newgrange, Knowth and Maeshowe suggests there was contact between the Boyne Valley and Orkney. The similarity between Irish megalithic art, Figures 8.4 and 8.5 and the Eday Manse and Pierowall horned spirals, Figures 8.14 and 8.15 can be clearly seen, although this style of decoration was unusual in Orkney. Here the range of motifs was generally restricted to linear designs such as chevrons, zigzags, parallel lines, and lozenges which were often enclosed within horizontal bands or scalariform 'ladders', Figures 8.6 and 8.7.

A further difference between the megalithic art of the Boyne Valley and that found in Orkney is one of location; much of the artwork in Orkney has been found in houses such as those at Skara Brae, Figure 8.6 and appears to have left its predominately ritual setting for a domestic one. Early recording of artwork at Skara Brae was made by V. Gordon Childe during his lengthy period of excavation there and was the largest assemblage of Neolithic art in Britain until excavation at the Ness of Brodgar (Thomas 2016: 3).

In 1925 a decorated stone with a banded design enclosing a range of geometric motifs typical of Orkney was found at Brodgar (now the Ness of Brodgar), near Stenness, Fig 8.7. It was inscribed with a wide range of motifs including a 'triple cup' in a triangular configuration, Figure 8.8, which is seen elsewhere in Orkney (Thomas 2016: 150) and on the Towie CSB from Aberdeenshire, Figure 8.9.

Orkney is also believed to be the origin of a new style of pottery vessel that emerged c. 3200 BC and is known as Grooved Ware (Bradley 2019: 141). These large flat-bottomed bucket shaped vessels with their characteristic geometric decorative motifs, are thought to have been used in acts of conspicuous consumption between elites; the tradition eventually spread across Britain and Ireland. Many of the motifs found on Grooved Ware pots reflect the incised decoration found architecturally in Orkney's buildings, with nested triangles, lozenges, horizontal and diagonal incised lines, dots and dot infill, V's and spirals, see Figure 8.10. While other more prosaic cooking vessels were also decorated, few of the motifs/symbols on these or Grooved Ware vessels seem to relate to the rather limited range seen on CSBs.

Similarly Decorated Media from elsewhere in the United Kingdom

The same horizontal bands and scalariform 'ladders' that have been used as architectural decoration in Orkney, Figures 8.6 and 8.7, may have been common throughout Britain as they can also be seen on the chalk plaque from Hanging Cliff, Kilham, Yorkshire, Figure 8.11, which is decorated with split herringbone, zig-zag, oblique strokes and saltires, and which the excavator compared with decoration on some Grooved Ware pottery (Varndell 1999: 351-355).

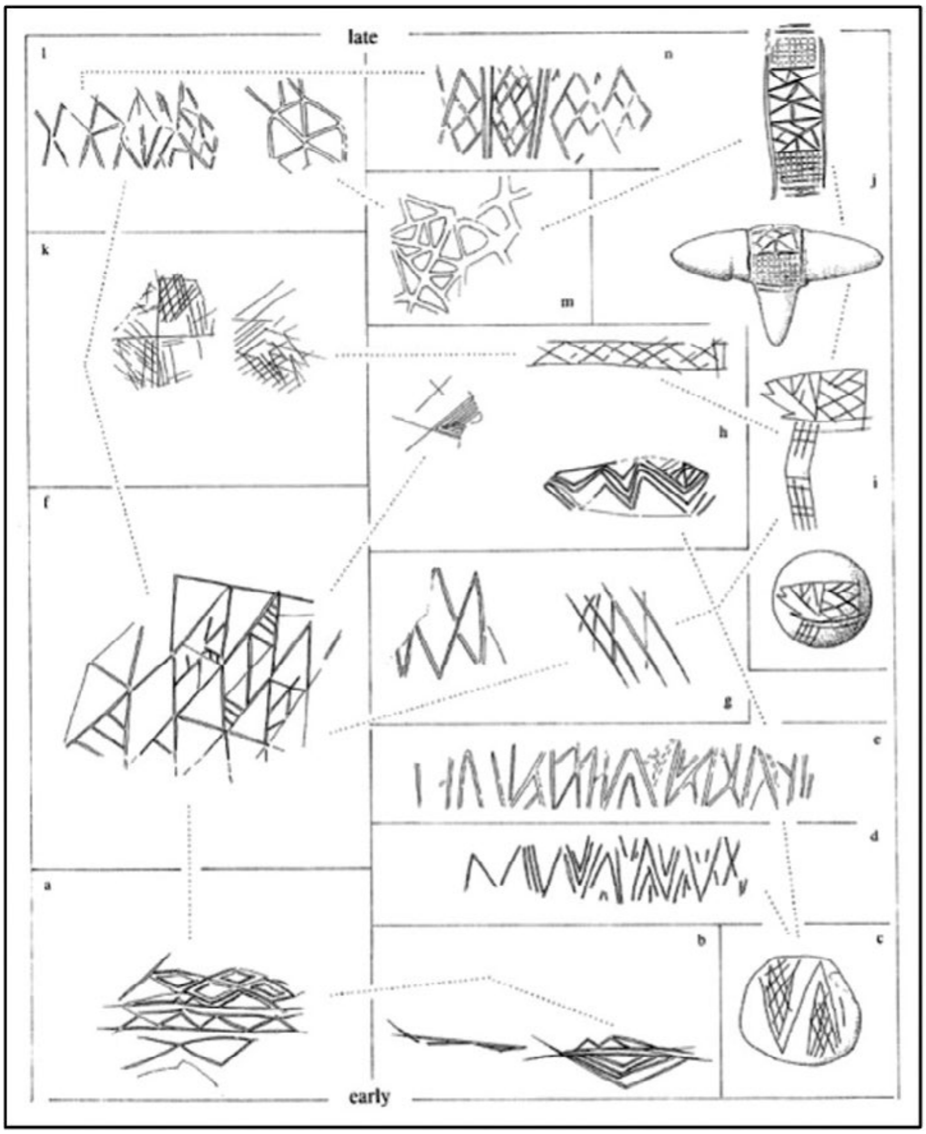


Figure 8.6: Early to late development of motifs found at Skara Brae. ©Shepherd 2000: 148.

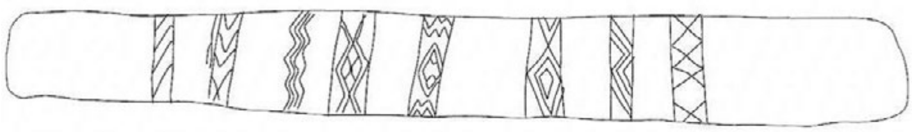


Figure 8.7: Drawing of the Brodgar Stone (triple cup motif not shown).© Bradley et al 2000: 61.

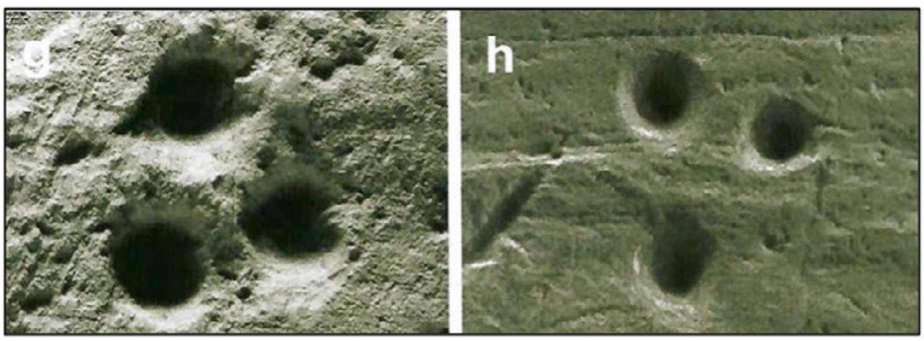


Figure 8.8: G and H Triple Cup motifs from the Ness of Brodgar, G: SF7726. H: SF11560.
© Thomas 2016: 193.

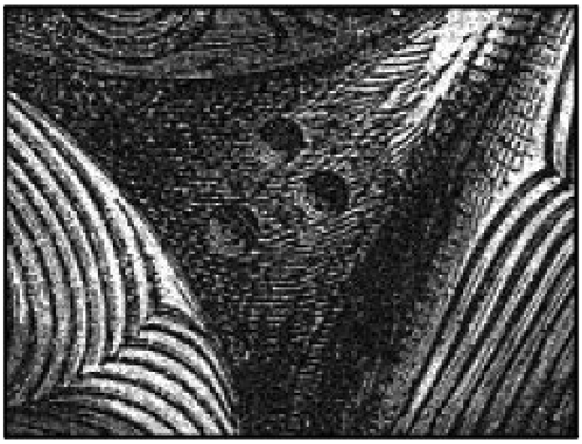


Figure 8.9: Woodcut of Towie Carved Stone Ball. ©Google 2020.

Some 340 km to the south, at Stonehenge Bottom, two other decorated chalk plaques were found with lozenge and chevron designs, Figure 8.12, which the excavator suggested was comparable with scratched decoration at Skara Brae (Vatcher 1969: 301-311). At Woodcock Corner in the Tregurra Valley in Cornwall, approximately 250 km to the west of Stonehenge Bottom, a decorated slate disc was also found, which the excavator suggested may have been a pot lid. This disc, Figure 8.13, was covered with a chequerboard design of alternating plain and crosshatched squares on one side and lozenges and triangles on the other and is similar to decoration found in the Boyne Valley in Ireland, in Orkney and also on slate burial plaques in Iberia from around the same time. Like the plaques from Stonehenge Bottom, this was also found in association with Grooved Ware pottery.

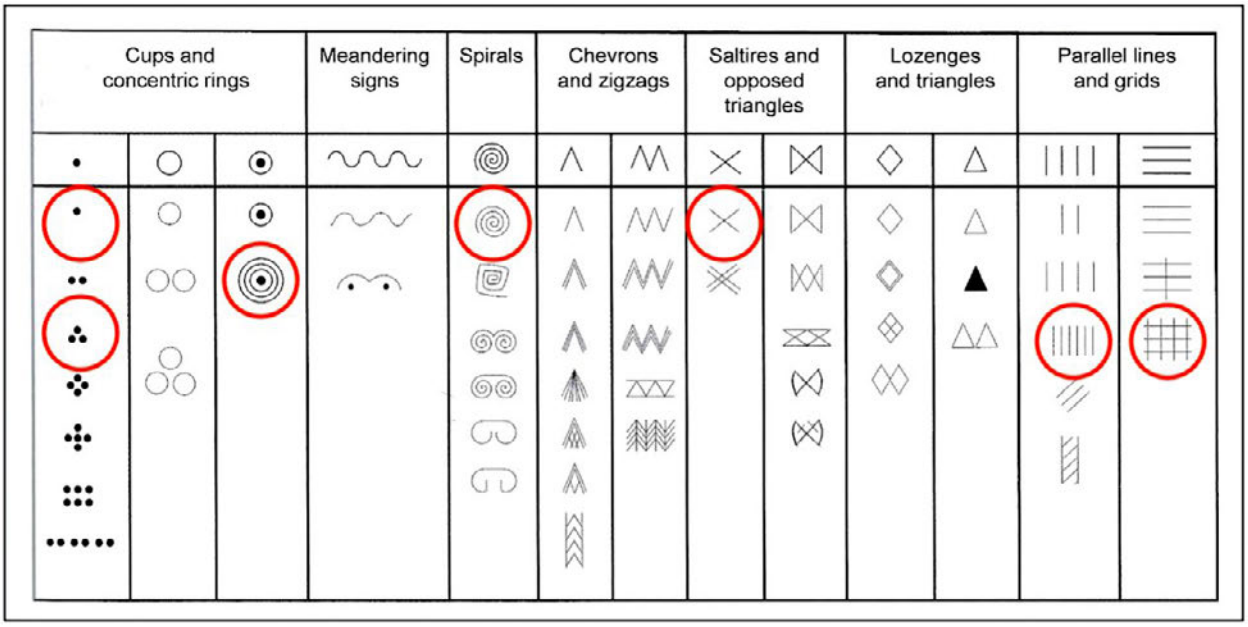


Figure 8.10: Stylised examples of Typical Neolithic Art Motifs found in Orkney, after Thomas 2016: 45. The motifs ringed in red are also found on CSBs. C. Stewart-Moffitt 2020.

Figure 8.11: Decorated Chalk Plaque from Hanging Hill, Kilham, Yorkshire. ©Google Images.

Figure 8.12: Chalk Plaque from Stonehenge Bottom. ©Google Images.

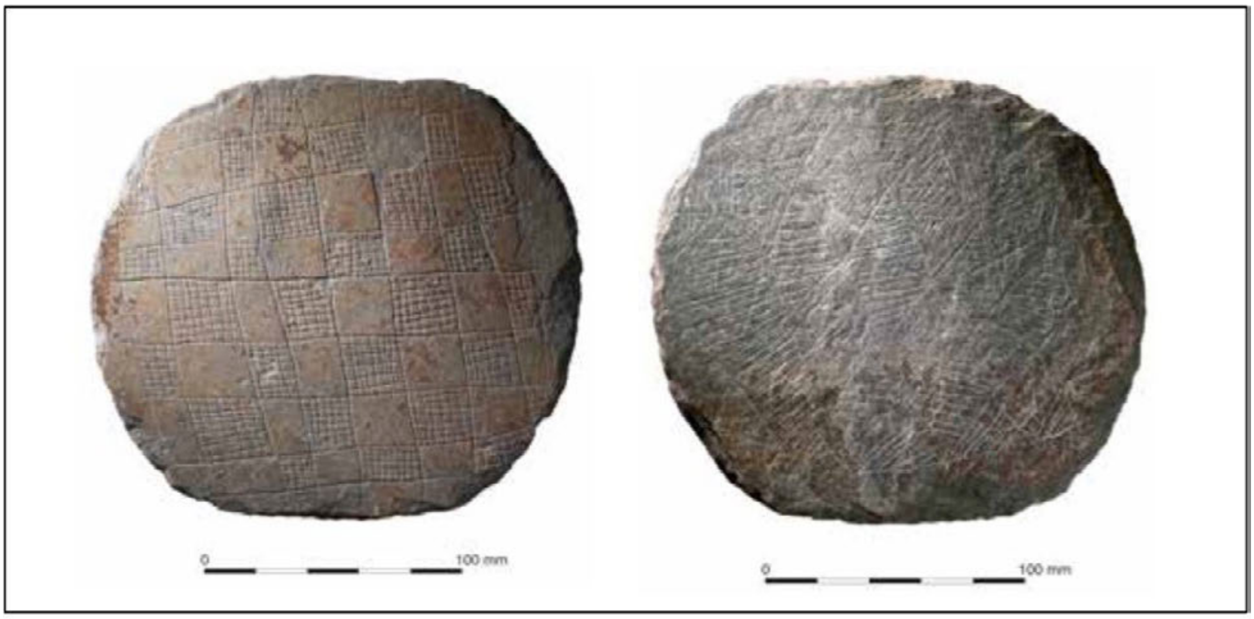


Figure 8.13: Decorated Slate Disc (possible pot lid) from Woodcock Corner, Cornwall. ©Antonia Thomas.

Figure 8.14 Horned Spiral from Eday Manse, Orkney © Google Images.

Figure 8.15: Horned Spiral or 'Spectacle motif' on the Pierowall Plaque, Orkney. ©Stout and Stout 2008: 82.

In Orkney, in the few places where spirals occurred, they were often joined together giving the impression of a pair of eyes (Thomas 2016: 44-45), a feature Shee Twohig noted was unusual In Ireland (1997: 387). Stylized versions of these horned spirals have also been found at Eday Manse, Orkney, Figure 8.14, the Pierowall Plaque, Orkney, Figure 8.15, on the Folkton Drums in Yorkshire, Figure 8.16, a rock art panel at Achnabreck in Argyll, Figure 8.17, and on the Knowth Macehead from the Boyne Valley, Figure 8.18.

These few, but widespread examples, give an indication of how extensive this type of decoration was during the Late Neolithic and, although we cannot say conclusively, it is probable that these ideas spread throughout Britain from their origin in the Boyne Valley in Ireland.

Other Decorative Media: Cup Marks, and Cup and Ring Marks

This form of rock art is found across Scotland, Northumberland, Figure 8.19, the North Yorks Moors, Cumbria, Ilkley Moor, Figure 8.20, the Peak District, several locations in Wales, Donegal, Louth, and Kerry in Ireland and Galicia, 8.21; all locations seem to have a similar chronology (Bradley 2002: 1, 65).

Normally found on earth-fast rocks, and associated with Neolithic and Bronze Age activity, cup and ring marks are considered to date to the Neolithic period, however difficulty in dating has led to the suggestion that they may have been made at any time between approximately 4000 BC-1800 BC (HES: ScRAP 2017-2021). Although the use of these motifs during prehistory is now lost to us, they have been described by Ingold as being 'advertisements'; signs permanently written in the landscape, perhaps denoting territorial

Figure 8.16: Stylized 'spectacle motif' on the Folkton Drums from Yorkshire. ©Google Images.

Figure 8.17: Horned Spiral or 'Spectacle' with Cup Marks and Cup and Ring Marks at Achnabreck, Mid Argyll. ©Bradley 2002: Plate 21.

extent or routes through the landscape, to be read by visitors to the area (Ingold 1986: 146-147). From an archaeological perspective it is possible that they were made to identify sacred localities, prominent features, routeways or territorial boundaries (Bradley 2002: 11-14). Their importance to Bronze Age people saw portable decorated slabs, perhaps Standing Stones in a previous life, being used as side slabs and Cist covers, like those at Carn Ban on the Isle of Bute and at Carnwath, Figure 5.1.

These shallow circular depressions are generally cut into gently sloping rock surfaces and, while they are often found singly, they are sometimes found in small groups, Figures 8.20 and 8.22; a smaller number may also be surrounded by one or more rings when they are known as Cup and Ring Marks. These rings are also occasionally interconnected by a series of gutters and often form larger patterns on rock surfaces, Figures 8.17 and 8.21.

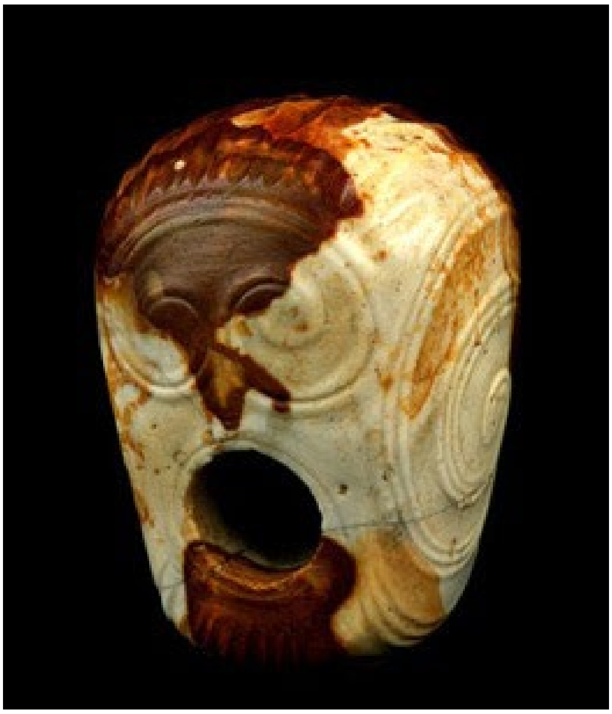


Figure 8.18: Macehead from Knowth, Ireland. ©Google Images.

Figure 8.19: Cup and Ring Marks at Wooler, Northumberland.
© Bradley 2002: Plate 27.

The Canmore database shows a distinct lack of Cup Marks in some areas of Scotland suggesting they are either yet unrecorded, have been lost through agricultural improvements, or were a regional tradition.

Cups and Cup and Ring Marks can be found in Dumfries and Galloway, Figure 8.22, in and around Kilmartin Glen, Argyll, Figure 8.17, on the high ground above Loch Tay, Perthshire (Bradley et al. 2012: 27-61) and at a few locations in Aberdeenshire, especially on Recumbent Stone Circles. Their apparent dearth in Aberdeenshire may be due to agricultural stone clearance over the centuries which has rendered large areas of land relatively stone free, with cup marks lost as a result. Those found in areas untouched by agricultural clearance suggest that more may have existed prior to agricultural improvement works being undertaken and which may now be buried in field walls and clearance cairns. They are also to be found in limited numbers in Cowal, Dumbartonshire and on the Isle of Bute where more would probably have existed prior to estate improvement works being undertaken. Strangely though, Bute's near neighbour Arran has few examples despite its complement of Neolithic and Bronze Age monuments (Stevenson 2002: 100-117).

Figure 8.20: Cup Marked Rock on Ilkley Moor.
© Bradley 2002: Plate 8.

Figure 8.21: Cup Marks with multiple rings and gutters at Laxe das Rodas, Galicia © Bradley 2002: Plate 32.

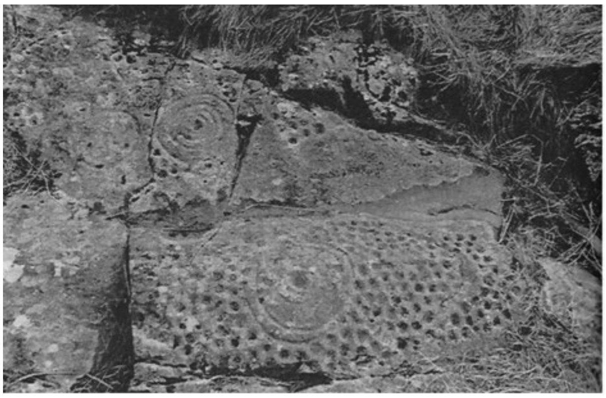
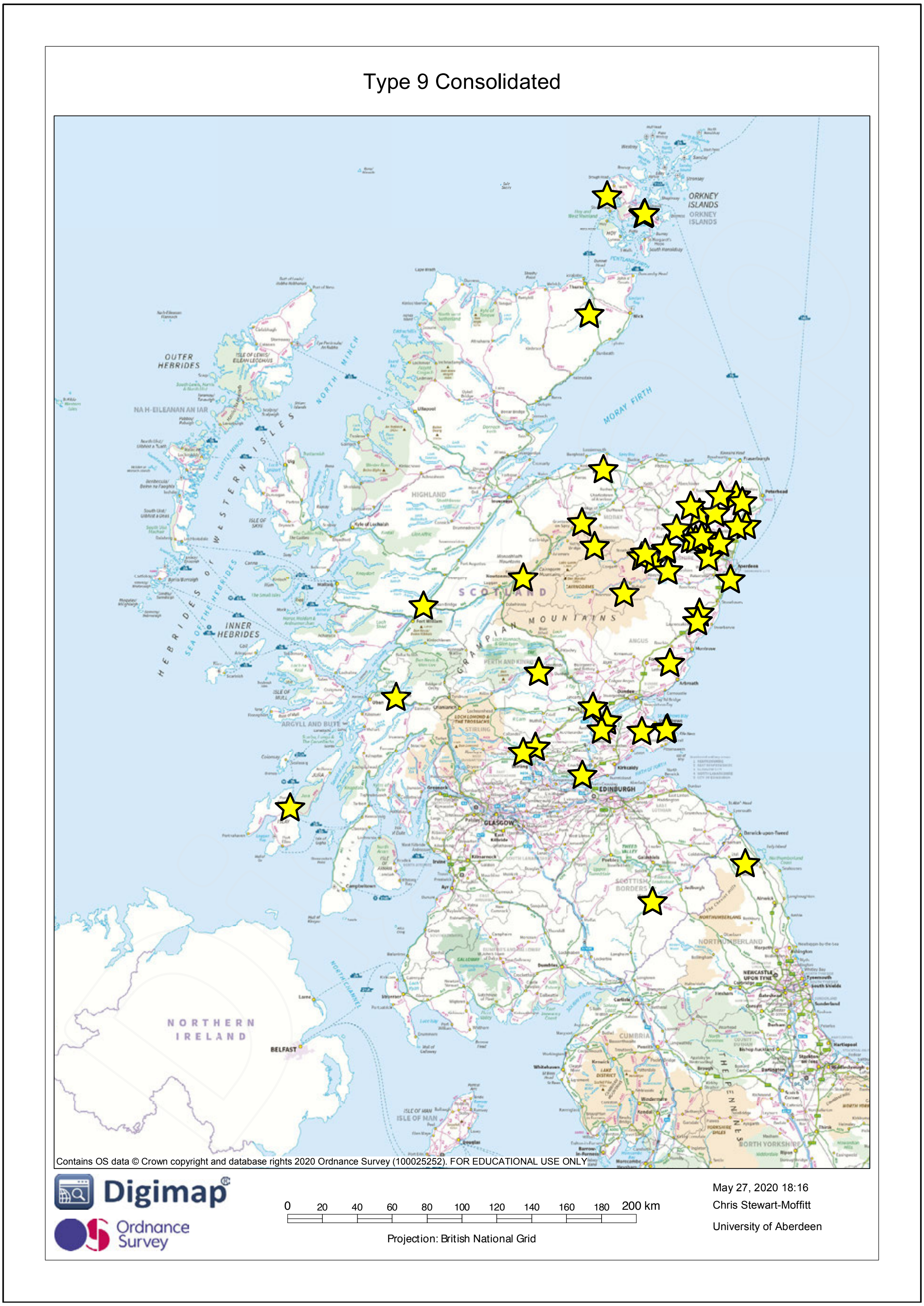


Figure 8.22: Multiple cup-marks at High Banks, Kirkcudbright, Galloway. © Bradley 2002: Plate 16.



Map 8.3: Known Findspots of Type 9 Decorated CSBs. C. Stewart-Moffitt.

Considerable prehistoric activity in the form of cup marks can be seen in the vicinity of Urlar which lies on high ground to the west of Aberfeldy, Perthshire. This is an area where several different types of CSB have also been found; the fact that this area has not been subjected to agricultural improvement works in the past perhaps provides us with an example of the potential for cup mark activity that may have existed in other areas of Scotland. Apart from CSBs found at Urlar and Lowick in Northumberland no others have been found in close association with Cup and Ring Marks, perhaps indicating there is no direct relationship between them; although the Lowick CSB has been decorated with what could be described as large cups. Their shape suggests that they may be yet another example of the characteristic circularity so evident during the Neolithic and may represent the circular architecture that is especially distinctive during this period.

Concentrations of decorated CSBs in Scotland

Having introduced the background to rock art motifs it is now possible to consider those used to decorate CSBs. As Map 8.3 shows, the northeast of Scotland and in particular Aberdeenshire has the highest concentration of decorated CSBs. It also shows that although decorated CSBs are scattered throughout Scotland, few have travelled outwith the mainland, with the exception of a small number in Orkney, and another potential example in Islay. In the next section a more detailed appraisal will be undertaken to define each type of decoration.

Carved Stone Ball Classification/Typology (continued): Decorated CSBs

Rather than imposing a completely new typological or classificatory system which may not lend itself easily to subsequent comparison, this revision has followed Marshall's basic format but has introduced additional categories in order to consider the important differences between the types of decoration. The definitions of each type are listed below: changes to Marshall's original scheme are highlighted in bold type.

Type 9a: CSBs '**single three-dimensional incised spiral over the entire surface of the CSB'**. (Marshall included all spiral decoration).

Type 9b: CSBs '**single or multiple two-dimensional spiral decoration'**. (New Type)

Type 9c: CSBs '**incised lines but excluding crosshatching'**. (Marshall included crosshatching).

Type 9d: CSBs '**horizontal, vertical or diagonal crosshatching'**. (New Type).

Type 9e: CSBs '**nested triangles and/or Vs'**. (Marshall Type 9d). (New Type).

Type 9f: CSBs '**incised or ground concentric circular decoration'**. (Marshall Type 9b).

Type 9g: CSBs '**deliberate peckmarks, cupules or pits'**. (New Type).

I noted in chapter seven that many decorated CSBs were also included in Types 2 to 8 due to similarities in their morphology and cited the following examples: **CSB 090** is listed in the database as **8a plus decoration 9 (9b, 9c, 9d)** indicating it belongs to **Type 8a** but also has **9b (single or multiple spiral decoration)**; **9c (incised lines but excluding crosshatching)** and **9d (horizontal, vertical, or diagonal crosshatching)** decoration. **CSB 168** is listed as **4n 9 (9b, 9c, 9g)** indicating it belongs to **Type 4n** but also has **9b (single or multiple spiral decoration)**; **9c (incised lines but excluding crosshatching)** and **9g (peck marks or pits)** decoration. The few Type 9 CSBs that cannot be fitted into any of the above types are unique and are listed as **Type 9 plus one or more suffix** which indicates the specific type of decoration.

In the tables that follow, CSBs are listed by the type or types of decoration applied to them, where they have more than one type of decoration they will be listed in each appropriate table: the accompanying type maps mark the findspots of each CSB with a yellow star: CSBs with either unknown locations or non-specific locations such as county are not marked. All image figure numbers are cross referenced within the associated table and text.

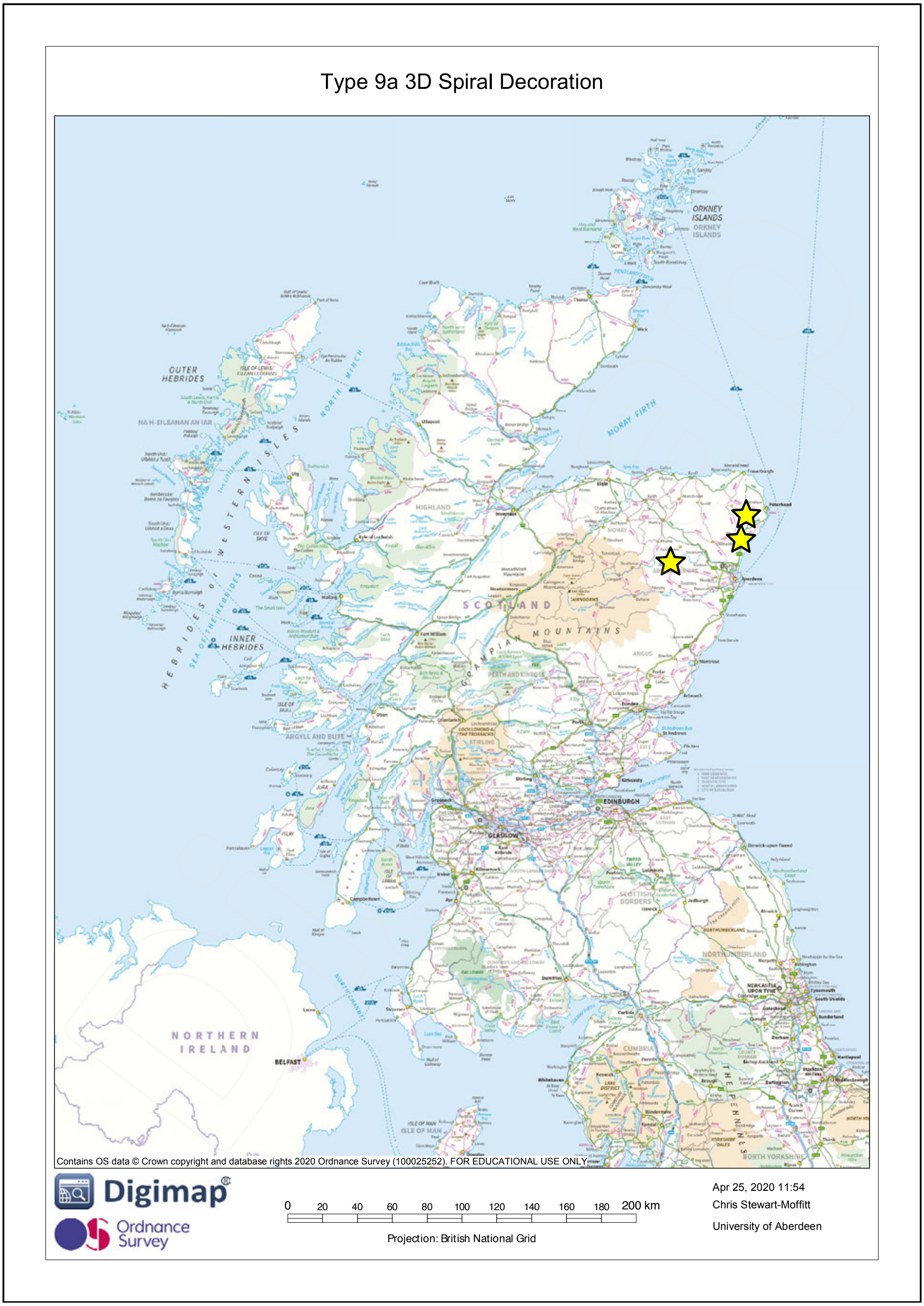
Type 9a (3D Spiral Decoration)

Figure 8.23: CSB 103, Hill of Buchan, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.24: CSB 451, Buchan area, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.25: CSB 237, Kinmundy, Buchan, Aberdeenshire. Highland Folk Museum, High Life Highland.C. Stewart-Moffitt 2015.

Figure 8.26: CSB 216, Alford, Aberdeenshire. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.



Map 8.4: Known findspots of Type 9a CSBs. C. Stewart-Moffitt 2020.

Table 8.1: Type 9a, 3D-Spiral Decoration (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9a**		**Three Dimensional Spiral**			
CSB 103 **Fig 8.23**	9 (9a)	None	Deep **3D right-handed spiral** incised over entire surface of ball.	Hill of Logie Buchan, Aberdeenshire.	Red Granite.	Aberdeen University Museum.
CSB 216 **Fig 8.26**	9 (9a)	None	Lightly incised **3D right-handed spiral** incised over entire surface of ball.	Alford, Aberdeenshire.	Possibly .	Glasgow Museums.
CSB 237 **Fig 8.25**	9 (9a)	None	Deep **3D right-handed spiral** incised over entire surface of ball.	Kinmundy, Buchan.	Red Sandstone.	Inverness Museum & Art Gallery.
CSB 451 **Fig 8.24**	9 (9a)	None	Deep **3D right-handed spiral** incised over entire surface.	Buchan area.	Red Granite.	National Museums Scotland.

Type 9a Summary

All four CSBs in Table 8.1, have a three dimensional right-handed spiral carved/incised over their entire surface and were found in the far northeast of Aberdeenshire, Map 8.4. **CSBs 103**, **451** and **216** appear to be quite crudely decorated, although this may be due to them having been made from Granite; **CSBs 103** and **451** have been made from a particularly coarse crystalline granite from the Peterhead area. **CSB 237** is made from a Red Sandstone which would have been easier to work as can be seen from the finer workmanship.

Type 9b (Other spiral decoration)

Figure 8.27: CSB 228, Glasterlaw, Angus. Courtesy of ANGUSalive Museums. C. Stewart-Moffitt 2015.

Figure 8.28: CSB 476, Kinkell, Aberdeenshire. Courtesy of Bromley Historic Collections. C. Stewart-Moffitt 2017.

Figure 8.29: CSB 449, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Table 8.2: Type 9b, Other Spiral Decoration (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9b**		**Other Spiral Decoration**			
CSB 388 **Fig 8.36**	2g (9b)	4	One knob is decorated with a **right-handed spiral** and part of another two **right-handed spirals** along with a series of lines at the edge of the knob and several small pits between the spirals. Another has an unfinished **spiral** while the other two are undecorated.	Nr. Elgin, Morayshire.	Hornfels.	National Museums Scotland.
CSB 160 **Fig 8.35**	4n (9b)	6	Lightly incised **right-handed spiral** with three trailing arms on one knob. Museum records show two **spirals** but were not seen at time of visit. Another knob has a 'W' inscribed on it which is in the style of the eighteenth/nineteenth century (may be a collectors mark).	New Deer, Aberdeenshire.	Hornfels.	Aberdeen University Museum.

CSB 120 **Fig 8.32**	9 (9b)	None	Incomplete stone ball: Very symmetrical plain stone ball decorated with a small single **spiral**.	Portstown, Nr. Keithall, Aberdeenshire.	Sandstone.	Aberdeen University Museum.
CSB 333	4h (9b)	6	Coles noted that three of the knobs were inscribed with faint **spirals** that could only be seen in full sunshine. These could not be seen at the time of recording to low light levels in the National Museums store.	Kirkton of Auchterless, Aberdeenshire.	2-Mica Granite	National Museums Scotland.
CSB 186 **Fig 8.31**	9 (9b)	None	Four, large heavily incised, but worn **spirals**, which are linked together in pairs almost on opposite sides of ball. Not quite symmetrically placed.	Unknown.	Sandstone.	Aberdeen University Museum.
CSB 179 **Fig 8.37**	9 (9b)	None	Small loosely inscribed **spiral** with trailing arm.	Unknown.	Dolerite.	Aberdeen University Museum.
CSB 089 **Fig 8.30**	8a (9b – 9c – 9d)	9	Two knobs have been carefully crosshatched while six knobs have been roughly crosshatched. Crosshatching is both vertically and diagonal. A single knob has a worn **left-handed spiral**. Additionally, two knobs have also been incised with two parallel lines around their extremity. Another knob has been incised with a single line around its extremity and a further three knobs have been incised with two parallel lines around their extremity with diagonally incised lines between them.	Unknown.	Unknown.	Aberdeen Maritime Museum.
CSB 168 **Fig 8.34**	4n (9b – 9e – 9g)	6	One knob decorated with a group of four lightly incised **left-handed spirals**. Another knob is incised with a single **left-handed spiral**, the upstanding material of which has been divided into many small segments.	Gaucyhillock, New Machar, Aberdeenshire.	Hornfels.	Aberdeen University Museum.
CSB 169 **Fig 8.33**	4g (9b – 9d)	6	Roughly decorated with cross hatching and two spirals. The **right-handed spiral** on one knob has been inscribed more deeply than the one on an adjacent knob which is lightly and roughly inscribed.	Unknown.	Hornfels.	Aberdeen University Museum.
CSB 453	2e (9b – 9f)	4	One knob is decorated with three **spirals**. One with concentric circles with chevron design enclosed between them and the last is undecorated.	Lumphanan, Aberdeenshire.	Unknown.	National Museums Scotland.

CSB 228 **Fig 8.27**	4l (9b – 9e)	6	Lightly inscribed **left-handed spiral** in one interspace and another is decorated with three heavily incised nested triangles.	Glasterlaw		
CSB 476 **Fig 8.28**	4j (9b – 9g)	Originally 6	Incomplete CSB: The complete knob is incised with a ten-groove **right-handed spiral** across its surface. A partial knob is incised with a twelve grooved spiral across its surface. Two remaining knobs are decorated with multiple pits. The remaining interspaces are decorated with lightly incised **right-handed spirals**.	Keith Hall, Kinkell, Inverurie, Aberdeenshire.	Hornfels.	Aberdeen University Museum.
CSB 452	2e (9b – 9f)	4	The first knob left plain. Second knob is decorated with concentric lines which end in a **left-handed spiral** in the middle of the knob and incorporate four small partial **left-handed spirals** near its edge. Between the central **spiral** and inner of the concentric lines is an area of triangular and other irregular incisions and lines. Third knob has four interlinked **left-handed spirals** covering its surface and a lozenge shape in the middle of the knob. Last knob has a series of concentric scalloped lines across its surface which radiate from a central three leaf clover shape with a single ring and central dot making up the centre of each 'leaf'. One interspace has three single cups in a triangular arrangement.	Glaschul Hill or (Glass Hill), Towie, Aberdeenshire.	Unknown.	Aberdeen Maritime Museum.
CSB 083 **Fig 8.38**	4d (9b)	6	Two of this CSBs six flat topped knobs have worn **right-handed spirals**, one more deeply incised than the other.	Methlick, Aberdeenshire.	Unknown.	Aberdeen Maritime Museum.
CSB 332	4n (9b)	6	Three knobs have faint **spirals**.	Unknown.	Hornfels.	National Museums Scotland.
CSB 104	2e (9b -9f)	4	First knob left plain. Second knob has incised concentric scalloped lines similar to that of CSB 452 but with the centre of the knob undecorated. Third knob has a **spiral**. Last knob has a spiral design with segmented sections between **spirals**.	Unknown.	2-Mica Granite.	Aberdeen University Museum.
CSB 449 **Fig 8.29**	5 (9b – 9c)	6 + 1 smaller knob	One knob has a cross lightly incised on its surface. Another knob has a **spiral** incised over its entire surface.	Unknown.	Unknown.	National Museums Scotland.

Figure 8.30: CSB 089, Location Unknown. Courtesy Aberdeen City Council (Art Gallery & Museum). C. Stewart-Moffitt 2016.

Figure 8.31: CSB 186, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.32: CSB 120, Portstown, Keithhall, Aberdeenshire Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.33: CSB 169, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.34: CSB 168, New Machar, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.35: CSB 160, New Deer, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

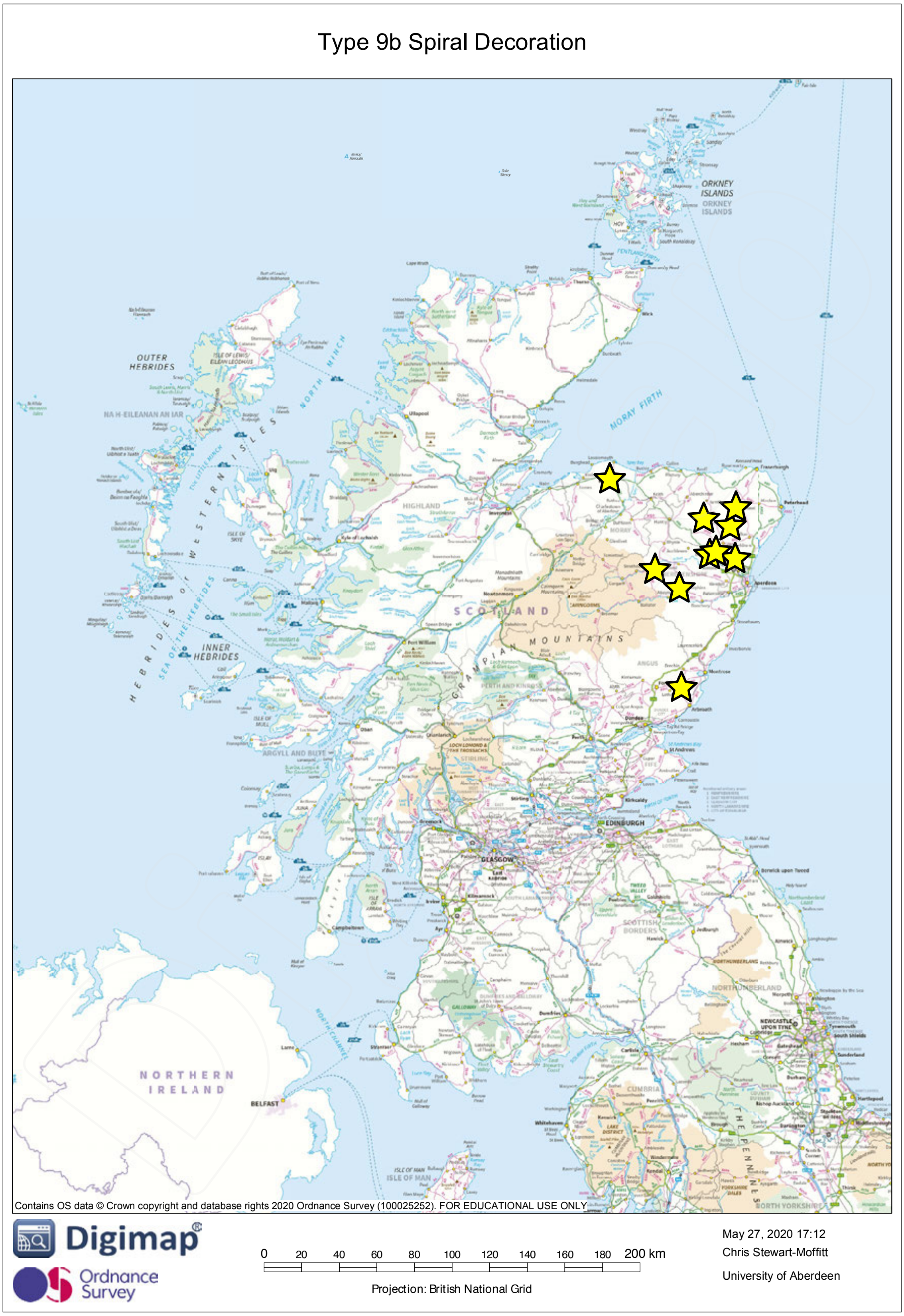
Figure 8.36: CSB 388, Elgin, Morayshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.37: CSB 179, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.38: CSB 083, Methlick, Aberdeenshire. ©Aberdeen City Council (Art Gallery & Museum). C. Stewart-Moffitt 2016.

Type 9b Summary

The seventeen CSBs in Table 8.2, all have one or more, two dimensional incised spirals which is the third most popular type of decoration overall. Some 35.3% (6 out of 17) of these CSBs have been made from Hornfels which, although hard to work, is very fine-grained and suitable for inscribing this type of decoration. The majority of spirals have been inscribed on a single knob although **CSB 083** has spirals inscribed on two knobs and **CSB 332** (not illustrated) has faint spirals on three knobs. Two CSBs have spirals in their interspaces; **CSB 476** has several lightly incised but finely drawn spirals in its interspaces and **CSB 228** has a single spiral inscribed in one interspace. **CSBs 476, 089**, **168** and **083** all have well made, symmetrical and clear cut spirals and the raised parts of the spiral on **CSB 168** have been delicately segmented by crosscutting; it also has four small spirals incised on a single knob. **CSB 388** has three well cut spirals on one knob along with several incised lines between two of the spirals; another knob has a poorly made and unfinished spiral, while the remaining two are plain. During a visit to the Boyne Valley in 2016 the similarity between the placement of the spiral decoration and incised lines on this CSB and the spiral decoration and associated lines on the entrance stone was particularly noticeable suggesting that its maker, or the person who decorated it, may have been familiar with this design. **CSB 186** is ball shaped and has no knobs; instead, it has been symmetrically decorated with four spirals joined in pairs which at first glance give the impression of being knobs. **CSB 120** is also ball shaped and has a small single spiral at the point at which it is broken. Seven spirals are right-handed while four are left-handed. Several of these spirally decorated CSBs have additional types of decoration which will be commented on under the appropriate type below. As can be seen from Map 8.5, the majority of this type with findspots are grouped together just northwest of Aberdeen, which may have been the point of origin of this style of decoration. The fact that both left-handed and right-handed spirals have been found, in some cases on the same CSB, is interesting and suggests that two individuals may have been involved in decorating the same object. Apart from stone tools or cordage (McManus 2003: 210-211), it is generally impossible to determine the frequency of left and right-handed people during the Late Neolithic. However, there does appear to be a tendency for both left and right-handed people to draw spirals in particular ways. The author of 'Right Hand, Left Hand' advises that in general left-handers tend to draw both spirals and hatched lines in the opposite direction to right-handers (Chris McManus, Professor of Psychology and Medical Education, University College London pers.comm: 2020).



Map 8.5: Known findspots of Type 9b CSBs. C. Stewart-Moffitt 2020.

Type 9c (Incised and ground lines but excluding crosshatching)

Figure 8.39: LM CSB 004, Budfield, Aberdeenshire.

Type 9c Summary

All twenty CSBs in Table 8.3 have incised lines or pecked and ground grooves, and although they are the largest decorated type, some may not be decorated in the true sense of the word as the lines appear to have been randomly applied. It comes in two basic forms, thin incised lines, which have been made with a sharp-edged tool and wide grooves or channels which were pecked and ground. **CSB 498** has lightly incised/grooved lines across its knobs and was found at Skara Brae in Orkney; it is typical of an Aberdeenshire Type 4 CSB and may have originated from there, although expert geological/petrological analysis would be required to offer an indication of its origin. **LM CSB 004**, **CSB 001**,

Figure 8.40: CSB 489, Hill of Uisneach, Rathnew, Co. Westmeath, Ireland. Courtesy of National Museum of Ireland. C. Stewart-Moffitt 2016.

Figure 8.41: CSB 001, Hawick, Roxburghshire. Courtesy of Hawick Museum. C. Stewart-Moffitt 2015.

Figure 8.42: CSB 257, Newmill, Keithhall, Aberdeenshire. Courtesy of Aberdeenshire Council Museums Service & Banff Museum. C. Stewart-Moffitt 2015.

Figure 8.43: CSB 498, Skara Brae, Orkney. Courtesy National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.44: CSB 046, Hillhead, Orkney. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 8.45: CSB 287, Inverawe, Argyll. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.46: CSB 500, Sherriffmuir, Perthshire. Courtesy Perth Museum and Art Gallery. Perth and Kinross Council. C. Stewart-Moffitt 2018.

Figure 8.47: CSB 248, Pitmilly Law, Boarhills, Fife. Courtesy of Fife Cultural Trust on behalf of Fife Council. C. Stewart-Moffitt 2015.

Figure 8.48: CSB 089, Location Unknown. Courtesy Aberdeen City Council (Art Gallery & Museum). C. Stewart-Moffitt 2015.

and **CSB 257** are all in the latter category and were found in Scotland, while **CSB 489** found at Uisneach in Ireland, may well have originated in Scotland. **CSB 046** from Orkney has deeply grooved decoration which is typical of Orkney.

CSB 287 has very carefully and finely incised knobs that give a distinct impression of being finished. **CSB 268** from Tomintoul (not illustrated here but see Figure 8.62) has 142 small knobs with flat surfaces and is the only multi-knobbed CSB to have been decorated; forty-five knobs have cross hatching while fourteen have been incised with parallel lines, this may be indicative of unfinished decoration and have been a work in progress. **CSB 500** has one crosshatched knob and another knob with what appears to be an incomplete set of incised lines which do not cover the surface: again, this might be a work in progress with the intention of eventually crosshatching this knob also. **CSB 248** not only looks unfinished, but the random curvilinear lines look rather expediently and inexpertly applied.

CSBs 449 and **376** (not illustrated) both have a cross inscribed across the face of one knob; while it's possible

Table 8.3: Type 9c, Incised and Ground Lines and Grooves but Excluding Crosshatching (CSB findspots, material and current locations. C. Stewart-Moffitt 2020

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9c**		**Incised and Ground Lines and Grooves but Excluding Crosshatching**			
LM CSB 004 **Fig 8.39**	9 (9c)	7	Some knobs incised with single wide **grooves** or two **grooves** in the form of a **cross**.	Budfield Farm, Leochel Cushnie, Aberdeenshire.	Unknown.	Lost/Missing
CSB 035 **Fig 8.49**	4m (9c)	6	All knobs are decorated with parallel **incised lines**. Two knobs have an additional single **incised line** across the middle of the others. Each knob also has either two or three **incised lines** around the periphery, some of which join others in the interspaces.	Old Deer, Aberdeenshire.	Unknown.	British Museum.
CSB 046 **Fig 8.44**	9 (9c)	None	Decorated with deep concentric **wavy grooves** around its circumference, a group of twenty-two small pyramidical knobs in a circle at one end and deep straight and angular **grooves** at the other end.	Hillhead, St Ola, Orkney.	Unknown.	Hunterian Museum.
CSB 489 **Fig 8.40**	4 Misc (9c)	6	**Grooves** cut top and bottom of a CSB divided into four quadrants.	Hill of Uisneach, Rathnew, Co. Westmeath, Ireland.	Unknown.	National Museum of Ireland.
CSB 287 **Fig 8.45**	4e (9c)	6	One disc only is decorated with precise shallow parallel **incised lines** the other discs are undecorated.	Inverawe, Argyll.	Meladiorite/Appinite	National Museums Scotland.
CSB 498 **Fig 8.43**	4f (9c)	6	Roughly incised **grooves** of varying width and depth.	Skara Brae, Sandwick, Orkney.	Dolerite.	National Museums Scotland.
CSB 376	4n (9c)	6	Shallow **incised cross** with arms meeting in a small pit in the centre of the knob.	Keills, Islay	Hornfels.	National Museums Scotland.
CSB 001 **Fig 8.41**	4b (9c – 9g)	6	Three plain knobs. Two knobs divided into four quadrants by deeply **incised grooves** with opposing quadrants filled with peck marks while the others are left undecorated. Final knob has similar peck mark decoration but is on opposing quadrants to the other two.	Hawick, Roxburghshire.	Unknown.	Hawick Museum.
CSB 211	4c (9c – 9d – 9e – 9g)	6	Interspaces are decorated with various incised designs: **zig-zag lines**, concentric triangles, cross hatching, pits. One knob has a partial, and probably unfinished off-centre **zig-zag** marking.	Alford, Aberdeenshire.	Unknown.	Glasgow Museums.
CSB 449	5 (9b – 9c)	6 + 1 smaller knob	One knob has a **cross** lightly incised on its surface. Another knob has a spiral incised over its entire surface.	Unknown.	Unknown.	National Museums Scotland.

CSB 073 **Fig 8.52**	9 (9c-9d- 9e)	4	Each knob/disc ornamented with different patterns with heavily **inscribed lines** outlining/underscoring each knob/disc and joining three nested triangles in the interspaces. Three knobs have **incised hatching** dividing the surface into irregularly shaped/sized knobs while the fourth has raised and rounded knobs over its surface.	Between New Scone & Murrayshall, Perthshire.	Possibly fine-grained Felsite or Basalt.	Perth Museum.
CSB 268	8f (9c – 9d)	142	Fourteen knobs are **incised with vertical lines** and a further forty-five have been cross hatched.	Tomintoul, Morayshire.	Unknown.	Aberdeen Museums Service.
CSB 500 **Fig 8.46**	4n (9c – 9d)	6	One knob is horizontally and vertically cross hatched with **incised lines**, another has been incised with five **lines** and looks unfinished. The remaining four knobs are undecorated.	Sherriffmuir, Perthshire.	Unknown	Perth Museum.
CSB 109 **Fig 8.53**	9 (9c – 9d – 9e)	4	Four large, dome-shaped knobs or discs which are finely decorated all over. Three knobs are **cross hatched** dividing the surface into small squares and rectangles which vary in size and symmetry. The fourth knobs is covered in tiny, carefully made domed knobs. The **grooves** around each knob are surrounded by a series of **incised lines** which meet in the interspaces which have additional decoration in the form of nested triangles.	Unknown.	Possibly Serpentine.	Aberdeen University Museum.
CSB 370	9 (9c - 9g)	6	Three knobs have between eight and forty cups carved into their surfaces. Another knob has been divided into four quarters: two of which (opposing one another) have been incised with **nested triangles** with a vertical **line** in the triangle nearest the edge of the knob. The other two (again opposing one another) have a rough **cross** incised in each triangular space. The remaining two knobs are undecorated.	Urlar, Nr. Aberfeldy, Perthshire.	Amphibolite.	National Museums Scotland
CSB 222 **Fig 8.51**	4l (9c - 9e)	6	Two **incised lines** around the outer edge of each knob form **nested triangles** in the interspaces.	Unknown.	Unknown.	Glasgow Museums.
CSB 248 **Fig 8.47**	4j (9c – 9d)	6	One knob has **straight and curvilinear lines** across two thirds of it plus a few partial cross hatches at right angles	Pitmilly Law, Boarhills, Fife.	Possibly Yellow Sandstone.	Fife Cultural Trust Museums.
LM CSB 017 **Fig 8.54**	2a (9c – 9e)	4	Decorated with **incised lines**, arrows, pointers and nested triangles. Each knob has been outlines with an **incised line** around each knob. Not all knobs are decorated.	Kingussie, Inverness-shire.	Unknown.	Lost/Missing.
CSB 089 **Fig 8.48**	8a (9b – 9c – 9d)	9	Two knobs have been carefully crosshatched while six knobs have been roughly crosshatched. Crosshatching is both vertically and diagonal. A single knob has a worn **left-handed spiral**. Additionally, two knobs have also been incised with two **parallel lines** around their extremity. Another knob has been incised with a single **line** around its extremity and a further three knobs have been incised with two **parallel lines** around their extremity with **diagonally incised lines** between them.	Unknown.	Unknown.	Aberdeen Maritime Museum.
LM CSB 013 **Fig 8.50**	4 m (9c -9d)	6	Knobs are decorated by diagonal cross hatching. Each knob has two **incised grooves** around its outer edge which has produced nested triangles with a central pit in each of the interspaces.	Dale Moss, Westerdale, Caithness.	Unknown.	Lost/Missing

Figure 8.49: CSB 035, Old Deer, Aberdeenshire. Courtesy of the Trustees of the British Museum. C. Stewart-Moffitt 2015.

Figure 8.50: LM CSB 013, Westerdale Caithness. Reproduced courtesy of Glasgow Museums.

Figure 8.51: CSB 222, Location Unknown. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

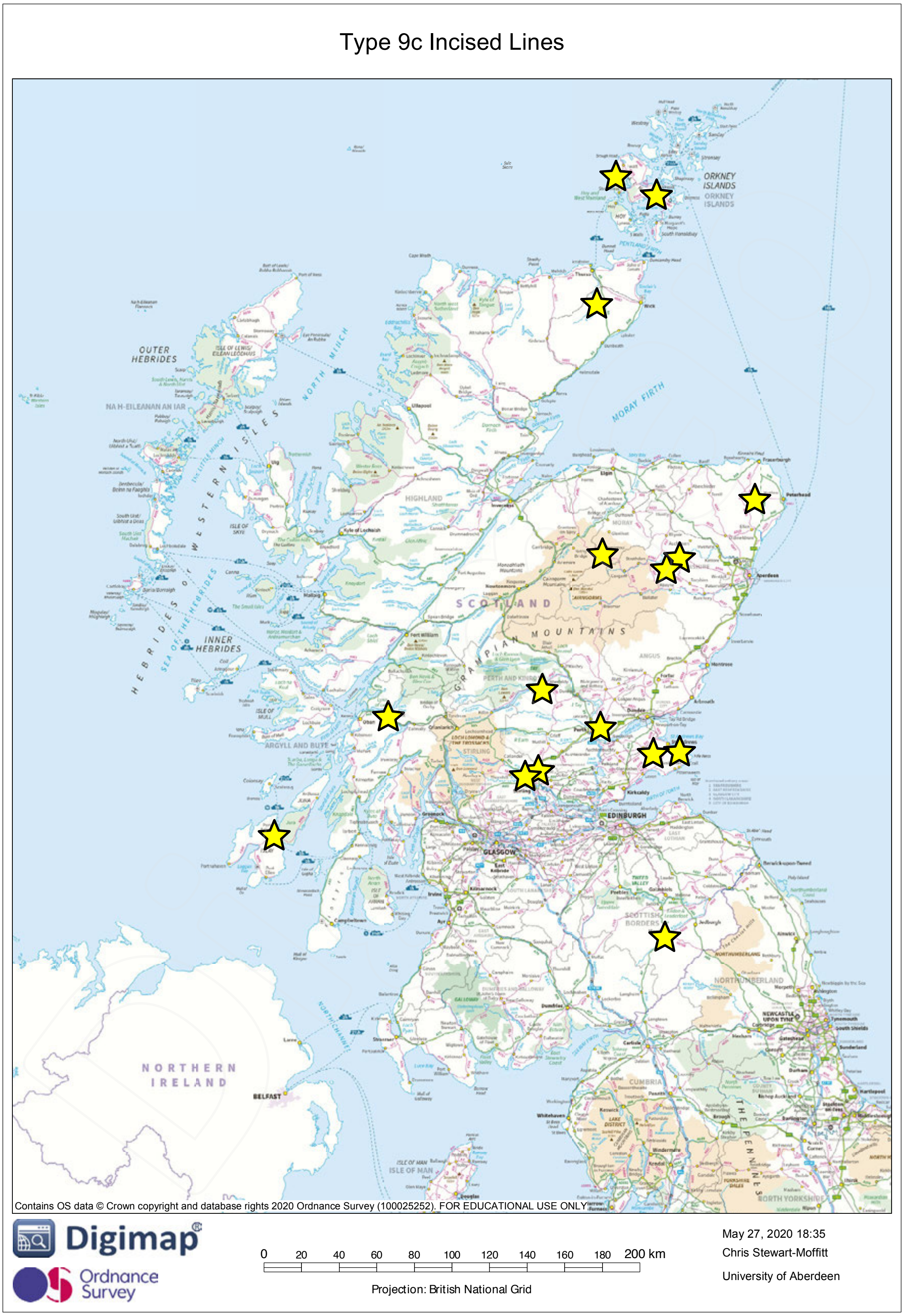
Figure 8.52: CSB 073, Murrayshall, Perthshire. Courtesy Perth Museum and Art Gallery, Perth and Kinross Council. C. Stewart-Moffitt 2015.

Figure 8.53: CSB 109, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.54: LM CSB 017, Kingussie, Inverness-shire. Courtesy of National Museums Scotland.

that this was inscribed after its rediscovery to negate a previous pagan function, saltire or cross motifs have been noted in Orkney, Figure 8.10 (Thomas 2016: 45). However, **CSB 370** (not illustrated) perhaps underlines prehistoric decoration rather than later attempts at Christianization as it has two incised crosses within separate quadrants on one of its knobs.

CSBs 089 and **LM CSB 017** have a single line inscribed around the periphery of each knob while **CSBs 222**, **073** and **109** have double lines which flow into the interspaces creating nested triangles: these lines may have been added to define the knobs. **CSBs 035** and **LM CSB 013** also have lines which appear to define their knobs; **CSB 035** has parallel lines inscribed over the surface of each knob and a single line inscribed in the opposite direction in the centre of each knob. **CSB 035** and **LM CSB 013** are similar in another respect, both have an additional asymmetric knob squeezed in between the other six knobs which defines them as Type 5s although in terms of decoration **CSB 035** has been crosshatched, otherwise they are very similar and could have been made by the same person. As might be expected from this large and dissimilar range of CSBs they are scattered widely across Scotland as shown on Map 8.6.



Map 8.6: Known findspots of Type 9c CSBs. C. Stewart-Moffitt 2020.

Type 9d (Horizontal, vertical, and diagonal crosshatching)

Figure 8.55: CSB 438, Dalriach, Cromdale. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.56: CSB 165, Fyvie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.57: CSB 208, Slains, Aberdeenshire. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.58: CSB 257, Newmill, Keithhall, Aberdeenshire.Courtesy of Aberdeenshire Council Museums Service (Banff Museum). C. Stewart-Moffitt 2015.

Figure 8.59: CSB 071, Between New Scone and Murrayshall. Courtesy Perth Museum and Art Gallery, Perth and Kinross Council. C. Stewart-Moffitt 2015.

Type 9d Summary

With seventeen CSBs being decorated with crosshatching it seems that this style of decoration was popular, Table 8.4. Some 37.5% (6 out of 16) of these CSBs have been made from Hornfels which, although hard to work, is very fine-grained and suitable for inscribing this type of decoration: the identification and potential source of Hornfels was discussed in chapter four. As can be seen clearly in the illustrations the quality of crosshatching on CSBs differs considerably; from poor on **CSBs 166** (not illustrated), **268**, **438**, **089** and **462**, to average on **CSBs 071**, **500** and **LM CSB 013**, to excellent on **CSBs 165**, **073** and **109**. Poorer quality work might have been applied by their individual keepers at some point during their life, while better quality crosshatching could have been applied by the craftsperson who manufactured them, although it may simply reflect differing levels of craft skill during manufacture. **CSBs 073** and **109** are quite different and were almost certainly produced by a master craftsperson. Although it has been suggested that these may be forgeries based upon the morphology of a golf ball, simple research showed that **CSB 073** was found well before the invention/development of golf balls with dimpled surfaces. Approximately 60% of the crosshatching is vertical/horizontal and approximately 40% diagonal, with one at random. The approximation is due to an inability to see the entire decoration on lost/missing CSBs. Map 8.7 shows that the majority with known findspots came from two specific areas, Aberdeenshire, and Tayside.

Figure 8.60: CSB 462, Location Unknown. Courtesy Stirling Smith Museum. C. Stewart-Moffitt 2016.

Figure 8.61: CSB 500, Sheriffmuir, Perthshire. Courtesy Perth Museum and Art Gallery, Perth and Kinross Council. C. Stewart-Moffitt 2018.

Figure 8.62: CSB 268, Tomintoul, Morayshire. Aberdeenshire Council Museums Service. C. Stewart-Moffitt 2015.

Figure 8.63: CSB 089, Location Unknown. ©Aberdeen City Council (Art Gallery & Museum Collections). C. Stewart-Moffitt 2015.

Figure 8.64: LM CSB 013, Dale Moss, Westerdale, Caithness. Reproduced courtesy of Glasgow Museums.

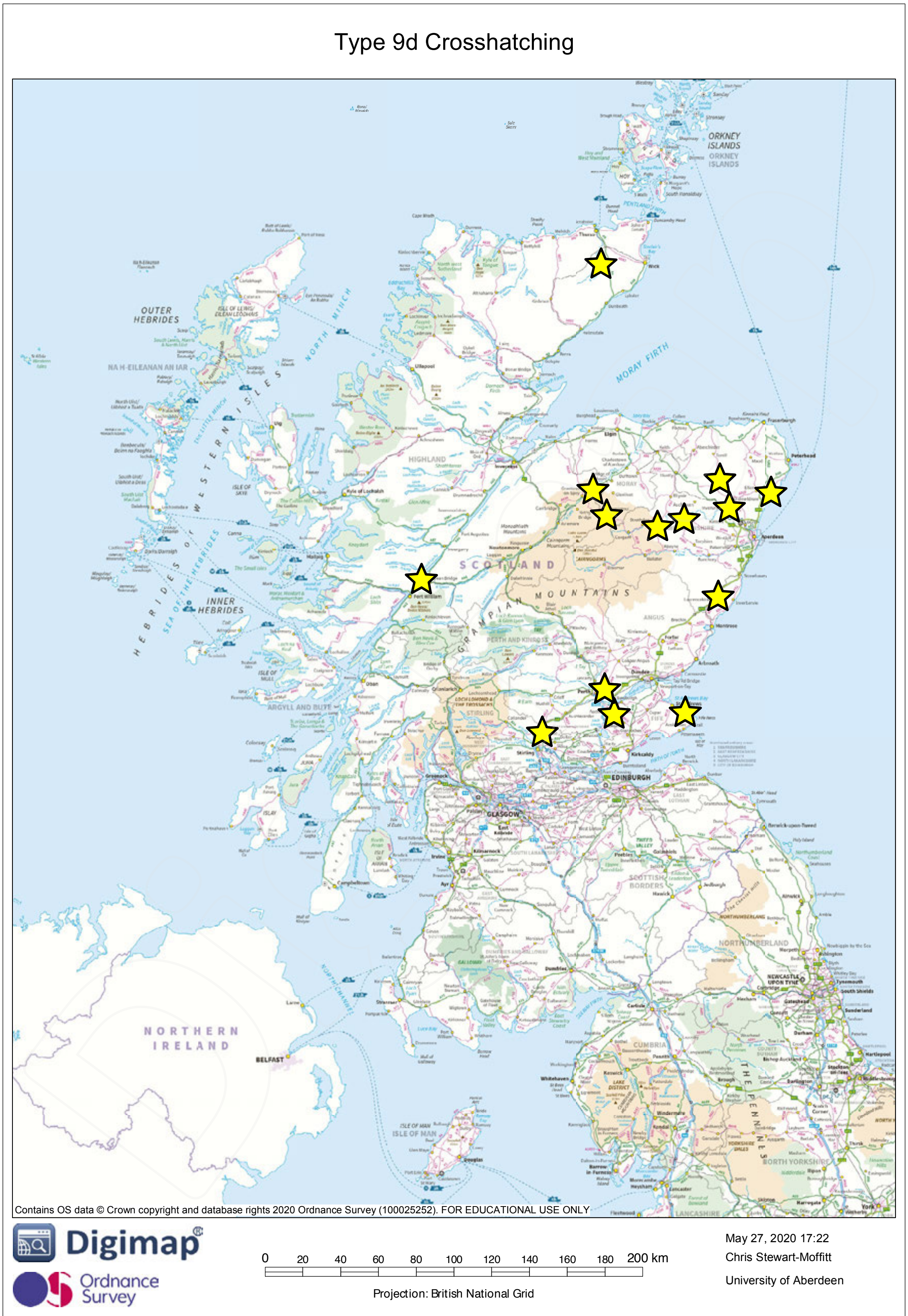
Figure 8.65: CSB 073, Murrayshall, Perthshire. Courtesy Perth Museum & Art Gallery, Perth and Kinross Council. C. Stewart-Moffitt 2015.

Figure 8.66: CSB 109, Location Unknown. Courtesy Aberdeen University Museum. C. Stewart-Moffitt 2015.

Table 8.4: Type 9d, Horizontal, Vertical, and Diagonal Crosshatching (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9d**		**Horizontal, vertical and diagonal crosshatching**			
CSB 280	9 (9d)	5	Each knob is decorated with random **crosshatching**.	Nr Fordoun, Aberdeenshire.	Hornfels.	National Museums Scotland.
CSB 404	4n (9d)	6	Incomplete: Rough **crosshatched** decoration on all but one of the existing knobs which is undecorated.	Nocharie, Strathmiglo, Fife.	Hornfels	National Museums Scotland.
CSB 166	4n (9d)	6	One knob vertically and **horizontally crosshatched**, another poorly **crosshatched** at ~45 degrees. The other four knobs are undecorated.	Fyvie, Aberdeenshire.	Hornfels.	Aberdeen University Museum.
CSB 165 **Fig 8.56**	4n (9d)	6	Four knobs are well decorated with incised **crosshatching**, the other two are undecorated.	Fyvie, Aberdeenshire.	Hornfels.	Aberdeen University Museum.
CSB 248	4j (9d)	6	One knob has straight and curvilinear lines across two thirds of it plus a few partial **crosshatches** at right angles. The remainder are undecorated.	Pitmilly Law, Boarhills, Fife.	Sandstone.	Fife Cultural Trust Museums.
CSB 208 **Fig 8.57**	4n (9d)	6	Incomplete: Knobs are incised with **crosshatching**.	Slains, Aberdeenshire.	Unknown.	Glasgow Museums.
CSB 257 **Fig 8.58**	6 (9d)	8 Segments	Six of the segments are roughly **crosshatched** the remaining two are undecorated.	Newmill, Keithhall, Aberdeenshire.	Possibly Basalt.	Banff Museum.
CSB 071 **Fig 8.59**	9 (9d)	4	Four discs each decorated with **diagonal crosshatching**. The **crosshatching** on one disc is unfinished. One interspace has two small pits.	Field between New Scone and Murrayshall, Perthshire.	Possibly Basalt.	Perth Museum.
CSB 462 **Fig 8.60**	4a (9d)	6	Incomplete: Rough **diagonal crosshatching** to one knob and finer diagonal **crosshatching** to the remaining two.	Unknown.	Unknown.	Stirling Smith Museum.
LM CSB 013 **Fig 8.64**	4 m (9d)	6	Knobs are decorated by **diagonal crosshatching**. Each knob has two incised grooves around its outer edge which has produced nested triangles with a central pit in each of the interspaces.	Dale Moss, Westerdale, Caithness.	Unknown.	Lost/Missing
CSB 286	4n (9d)	6	One knob has incised **crosshatching**.	South3ern end of Loch Lochy, Inverness-shire.	Hornfels.	National Museums Scotland.

CSB 089 **Fig 8.63**	8a (9b – 9c – 9d)	9	Two knobs have been carefully **crosshatched** while six knobs have been roughly **crosshatched**. **Crosshatching** is both vertically and diagonal. A single knob has a worn **left-handed spiral**. Additionally, two knobs have also **been incised with two parallel lines** around their extremity. Another knob has been incised with a single line around its extremity and a further three knobs have been incised with two parallel lines around their extremity with diagonally incised lines between them.	Unknown.	Unknown.	Aberdeen Maritime Museum.
CSB 073 **Fig 8.65**	9 (9d – 9e)	4	Three knobs are **crosshatched** dividing the surface into small squares and rectangles which vary in size and symmetry. The fourth knob is covered in tiny carefully made domed knobs. The grooves around each knob are surrounded by a **series of incised lines** which meet in the interspaces which have additional decoration in the form of **nested triangles**.	Field between New Scone and Murrayshall, Perthshire.	Possibly Basalt or Felsite	Perth Museum.
CSB 500 **Fig 8.61**	4n (9c – 9d)	6	One knob is **horizontally and vertically crosshatched** with incised lines, another has been **incised with five lines** and looks unfinished. The remaining four knobs are undecorated.	Sherriffmuir, Perthshire.	Unknown	Perth Museum.
CSB 211	4c (9c – 9d – 9e – 9g)	6	Interspaces are decorated with **various incised designs**: zig-zag lines, concentric triangles, **crosshatching**, pits. One knob has a partial, and probably unfinished off-centre **zigzag** marking.	Alford, Aberdeenshire.	Unknown.	Glasgow Museums.
CSB 268 **Fig 8.62**	8f (9c – 9d)	142	Fourteen knobs are **incised with vertical lines** and a further forty-five have been **crosshatched**.	Tomintoul, Morayshire.	Unknown.	Aberdeen Museums Service.
CSB 169	4g (9b – 9d)	6	Roughly decorated with **crosshatching and two spirals**. The right-handed spiral on one knob has been inscribed more deeply than the one on an adjacent knob which is lightly and roughly inscribed.	Unknown.	Hornfels.	Aberdeen University Museum.



Map 8.7: Known findspots of Type 9d CSBs. C. Stewart-Moffitt 2020.

Type 9e (Nested Triangles or 'Vs')

Figure 8.67: CSB 228, Glasterlaw by Friockheim, Angus. Courtesy of ANGUSalive Museums. C. Stewart-Moffitt 2015.

Figure 8.68: CSB 222, Location Unknown. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.69: CSB 073, Murrayshall, Perthshire. ©Perth Museum and Art Gallery. Perth and Kinross Council. C. Stewart-Moffitt 2015.

Figure 8.70: CSB 109, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

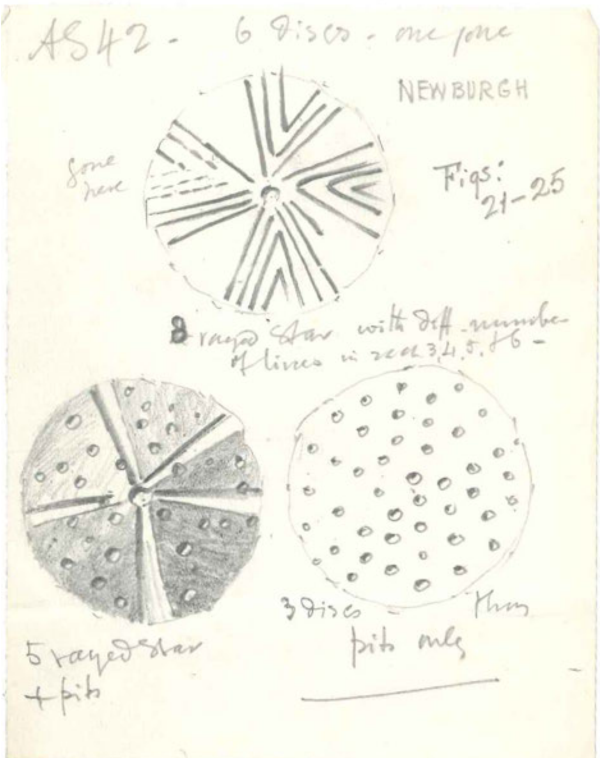


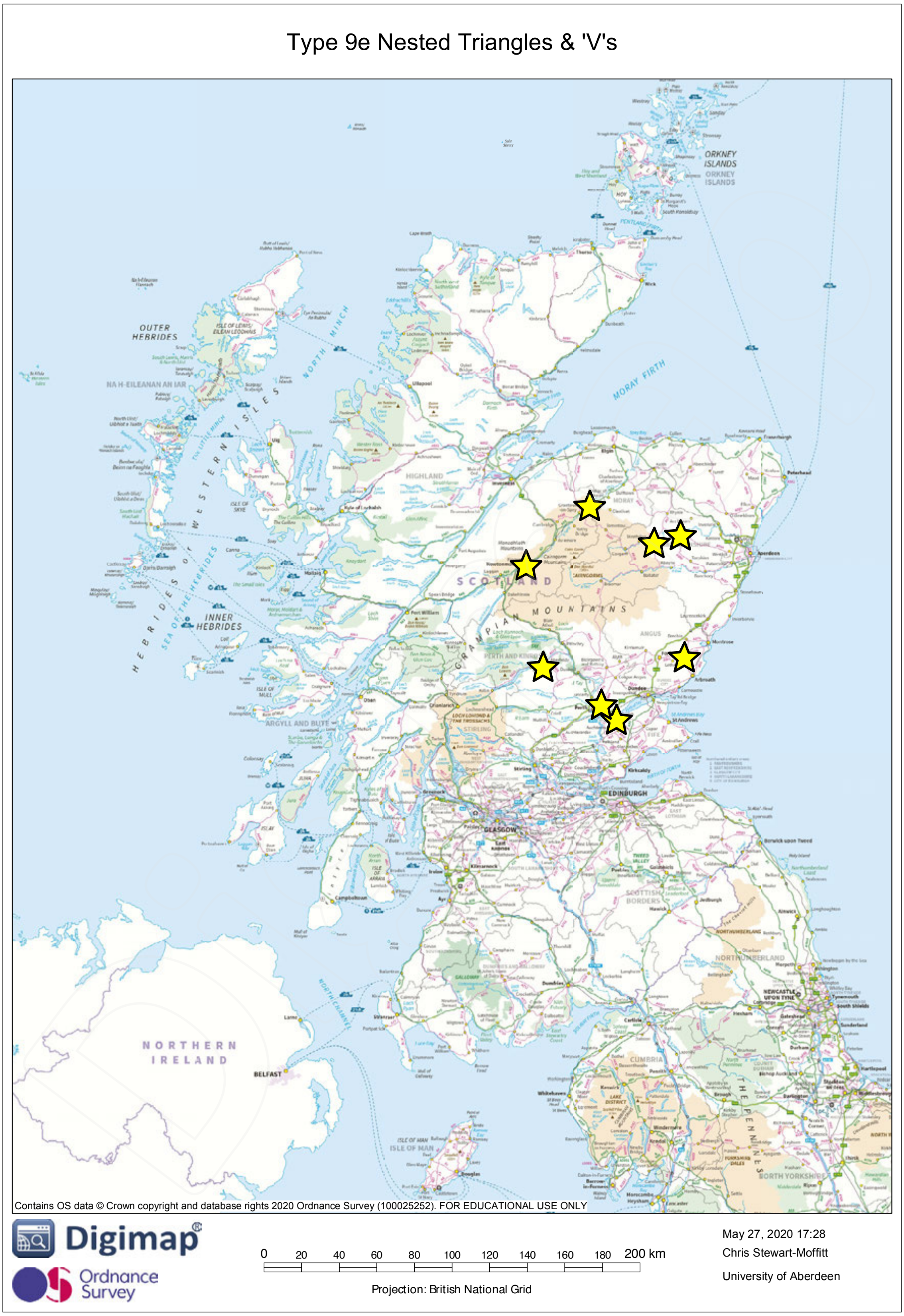
Figure 8.71: CSB 306 from Newburgh, Fife, drawing by Frederick Coles (1908). Courtesy of National Museums Scotland.

Type 9e Nested Triangles and 'V's Summary

Only nine CSBs, Table 8.5, have been found decorated with nested triangles or 'V's to date; this is the most interesting but rarest type of decoration. At least 22.2% (2 out of 9) of these CSBs have been made from Hornfels which would have been an ideal material to work with. **CSB 228** is the only CSB to have been decorated with three, deliberately made, nested triangles incised into one of its unusually large interspaces; another of its interspaces has been decorated with a single spiral. The nested triangle interspaces on **CSBs 222**, **073**, and **109** are formed as a result of the double lines used to highlight each of their knobs, as is to a certain extent, **LM CSB 017** (not illustrated). This latter CSB has a single line encircling each knob plus a few seemingly random lines that make a single triangle in two interspaces; unfortunately, as it is currently lost/missing it is not possible to see the decoration in the third interspace. **CSBs 370** (not illustrated) and **306** are strictly speaking nested 'V's as they do not have the bottom line of the isosceles triangle, although the persons decorating them may have meant the edge of the knob to be the bottom of a triangle. Map 8.8 shows them to be distributed across a wide area with only two in Aberdeenshire.

Table 8.5: Type 9e, Nested Triangles or 'Vs' (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9e**		**Nested Triangles or 'Vs'**			
CSB 222 **Fig 8.68**	4l (9e)	6	Two **incised lines** around the outer edge of each knob form **nested triangles** in the interspaces.	Unknown.	Unknown.	Glasgow Museums.
CSB 438	4n (9d – 9e)	6	One knob divided into four quadrants. Two quadrants have a series of **nested V's** the other two are filled with random **cross hatching**.	Dalraich, Cromdale, Morayshire.	Hornfels.	National Museums Scotland.
LM CSB 017	2a (9c – 9e)	4	Decorated with **incised lines**, arrows, pointers and **nested triangles**. Each knob has been outlines with an incised line around each knob. Not all knobs are decorated.	Kingussie, Inverness-shire.	Unknown.	Lost/Missing.
CSB 211	4c (9c – 9d – 9e – 9g)	6	Interspaces are decorated with various **incised designs**: **zigzag lines**, **nested triangles**, **cross hatching**, **pits**. One knob has a partial, and probably unfinished off-centre zig-zag marking.	Alford, Aberdeenshire.	Unknown.	Glasgow Museums.
CSB 306 **Fig 8.71**	4n (9c -9e – 9g)	6	Incomplete: Three knob have a pecked surface. One has been inscribed with **nested V's** and the last has been inscribed with narrow V shaped grooves and pecking.	Newburgh, Fife.	Hornfels.	National Museums Scotland.
CSB 109 **Fig 8.70**	9 (9c – 9d – 9e)	4	Four large, dome-shaped knobs or discs which are finely decorated all over. Three knobs are **crosshatched** dividing the surface into small squares and rectangles which vary in size and symmetry. The fourth knobs is covered in tiny, carefully made domed knobs. The grooves around each knob are surrounded by a series of **incised lines** which meet in the interspaces which have additional decoration in the form of **nested triangles**.	Unknown.	Possibly Serpentine.	Aberdeen University Museum.
CSB 228 **Fig 8.67**	4l (9b – 9e)	6	Lightly inscribed **left-handed spiral** in one interspace and another is decorated with three heavily incised **nested triangles**.	Freelands, Glasterlaw by Friockheim, Angus	Unknown.	Montrose Museum & Art Gallery.
CSB 370	9 (9c - 9g)	6	Three knobs have between eight and forty cups carved into their surfaces. Another knob has been divided into four quarters: two of which (opposing one another) have been incised with **nested triangles** with a vertical line in the triangle nearest the edge of the knob. The other two (again opposing one another) have a **rough cross incised** in each triangular space. The remaining two knobs are undecorated.	Urlar, Nr. Aberfeldy, Perthshire.	Amphibolite.	National Museums Scotland
CSB 073 **Fig 8.69**	9 (9d – 9e)	4	Three knobs are **crosshatched** dividing the surface into small squares and rectangles which vary in size and symmetry. The fourth knobs is covered in tiny carefully made domed knobs. The grooves around each knob are surrounded by a series of **incised lines** which meet in the interspaces which have additional decoration in the form of **nested triangles**.	Field between New Scone and Murrayshall, Perthshire.	Possibly Basalt or Felsite	Perth Museum.



Map 8.8: Known findspots of Type 9e CSBs. C. Stewart-Moffitt 2020.

Type 9f (Incised circular decoration or concentric stepped knobs)

Figure 8.72: CSB 188, Knock Hill, Fordoun, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

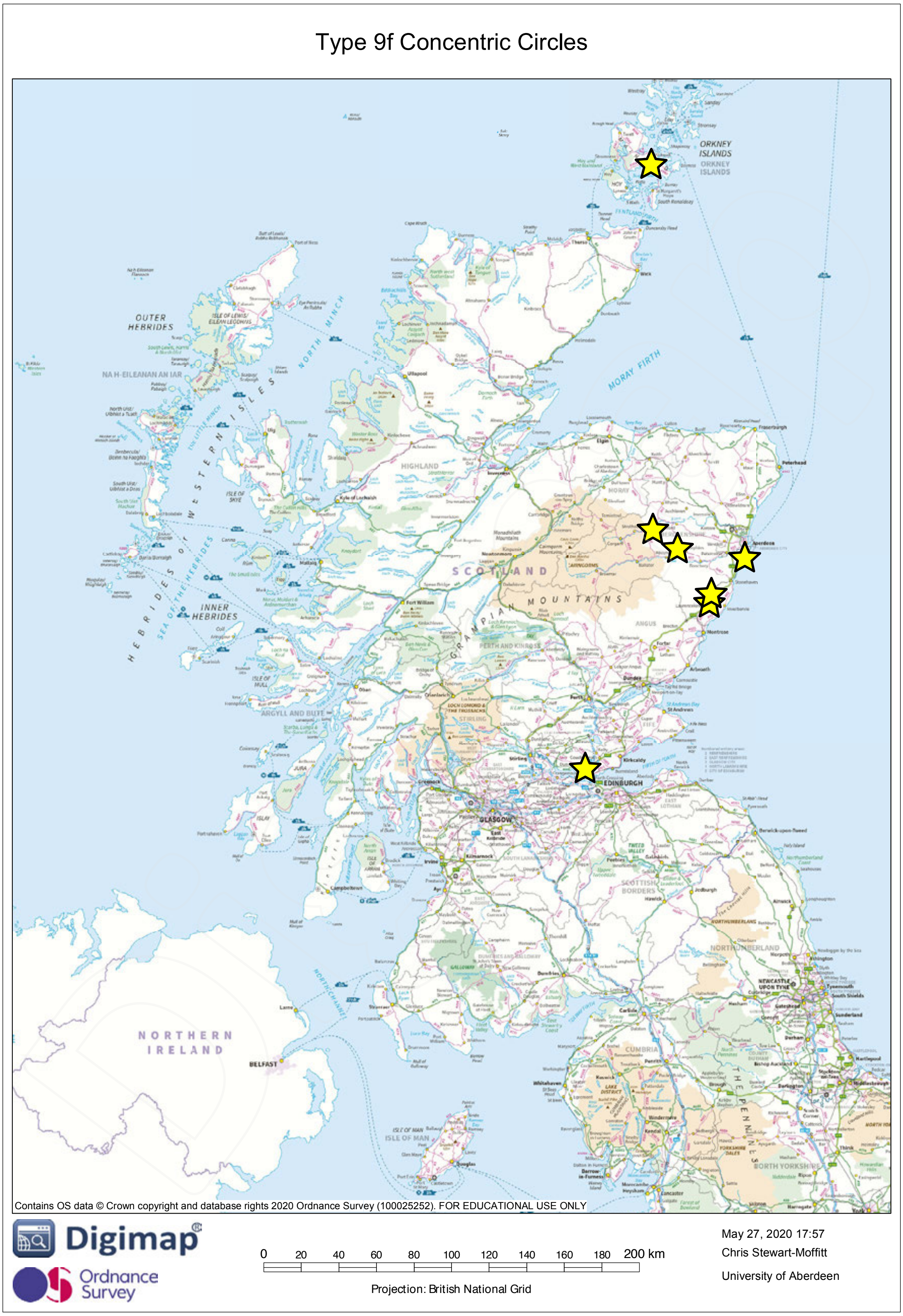
Figure 8.73: CSB 448, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.74: CSB 171, Cairn Roben, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.75: CSB 444, Probably Dunfermline. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.76: CSB 301, Fordoun, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.77: CSB 045, Hillhead, St Ola, Orkney. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.



Map 8.9: Known findspots of Type 9f CSBs. C. Stewart-Moffitt 2020.

Table 8.6: Type 9f, Incised Circular Decoration or Concentric Stepped Knobs (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9f**		**Incised circular decoration or concentric stepped knobs**			
CSB 301 **Fig 8.76**	9 (9f)	9	Carefully incised discs made up of **inscribed concentric circles** some of which have chevrons inscribed between the circles.	Fordoun, Kincardineshire.	Mudstone	National Museums Scotland.
CSB 045 **Fig 8.77**	9 (9f)	6	Carefully incised discs made up of **inscribed concentric circles** in the manner of a six knobbed CSB.	Hillhead, St Ola, Orkney.	Unknown.	Hunterian Museum.
CSB 171 **Fig 8.74**	9 (9f)	6	Each knob is cut into a series of **three flat concentric steps** each decreasing in diameter and surrounding a small round central projection.	Cairn Robin, Banchory Devernick, Aberdeenshire.	Unknown.	Aberdeen University Museum.
CSB 444 **Fig 8.75**	9f	6	Two or **three stepped concentric rings** on each knob with nicely pecked **scalloped interspaces**.	Thought to be Nr. Dunfermline, Fife.	Meladiorite.	National Museums Scotland.
CSB 448 **Fig 8.73**	9 (9f – 9g)	15	Two knobs with pits, four are crosshatched, four have **concentric rings** with a pit in the centre, two knobs have a pit in the centre and three knobs are undecorated.	Unknown.	Gabbro.	National Museums Scotland.
CSB 104	2e, 9 (9b – 9f)	4	The shape and decoration of this CSB are very similar to the Towie CSB which suggests it may have been an earlier version. First knob left plain. Second knob has incised **concentric scalloped lines** similar to that of CSB 452 but with the centre of the knob undecorated. Third knob has a **spiral**. Last knob has a spiral design with segmented sections between spirals.	Unknown.	2-Mica Granite.	Aberdeen University Museum.

CSB 356	9 (9b – 9f)	4	Four knobbed CSB, one knob inscribed with **concentric rings**, one with a single **incised line**, one with a broad **cable work** design and plain central area, the fourth knob has a plain central area surrounded by an inscribed line which is in turn surrounded by two contra bands of **cable work**. See CSB 104 / CSB 453 (Cast/Replica).	Unknown.	Biotite Granite.	National Museums Scotland.
CSB 452	2e (9b – 9f)	4	The first knob left plain. Second knob is decorated with **concentric lines** which end in a **left-handed spiral** in the middle of the knob and incorporate four small partial **left-handed spirals** near its edge. Between the central spiral and inner of the **concentric lines** is an area of triangular and other irregular incisions and lines. Third knob has four interlinked **left-handed spirals** covering its surface and a lozenge shape in the middle of the knob. Last knob has a series of **concentric scalloped lines** across its surface which radiate from a central three leaf clover shape with a single ring and central pit making up the centre of each 'leaf'. One interspace has three single cups in a triangular arrangement.	Glaschul Hull, Towie, Aberdeenshire.	Fine-grained Siltstone.	National Museums Scotland.
CSB 453	2e, 9 (9b – 9f)	4	Symmetrical CSB decorated with three spirals, **concentric circles** with **chevron design**, one knob undecorated. Coles noted this was also decorated with a **triquetra**. (See CSB 452 from Towie which also has a triquetra).	Lumphanan, Aberdeenshire.	Unknown.	National Museums Scotland.
CSB 188 **Fig 8.72**	9 (9f)	None	Decorated with five incised **concentric circles** with a central pit.	Knock Hill, Fordoun, Kincardineshire.	Gabbro.	National Museums Scotland.

Type 9f Summary

Leaving aside for the moment CSBs 452, 453, 104 and 356 which will be subject to a case study later in this chapter, the remaining CSBs with concentric circular decoration, Table 8.6, are quite different to the generally accepted configuration normally associated with CSBs. **CSB 188** has neither knobs or discs but is decorated with five incised concentric lines around a small pit, the remainder of this artefact is heavily and roughly pecked: as it is slightly oblate, oversized and overweight compared with the average CSB it is possible that, rather than being a CSB, it is a grain rubber. **CSB 448** is unusual in that it is perfectly spherical and has fifteen low raised discs, thirteen of which have been decorated; four have incised concentric rings, each with a pit in the centre, two are pecked, four have incised cross hatching, three are plain and the remaining two each have a pit in the centre. Although it might be suggested that it is a work in progress, in this instance the decoration all appears to have been carried out by one person. It is not unusual to find decorated CSBs to have at least one knob left plain and this seems to have been a deliberate strategy in a number of cases.

CSBs 171 and **444** are also unusual as each of their six knobs are stepped concentrically; **CSB 171** appears to have been made from a softer sandstone or Mudstone than **CSB 444** which is made from harder Meladiorite. This seems to have allowed its maker to produce a crisper finish to the stepped knobs and decorate its interspaces with pecked pits or cupules. It could perhaps be argued that these were inspired by Cup and Ring Marks as, looking down at the top of each knob, there is a clear resemblance to this type of decorative rock art. It is probable that these two CSBs were made by the same person and that **CSB 171** was an earlier version of **CSB 444** which was more carefully and expertly decorated.

CSBs 301 and **045** are somewhat of an enigma; perfectly spherical they have a number of very thin concentric lines cut into their surface with small pits in their centres, giving the effect of six discs; the outer two lines of **CSB 045** have chevrons incised between them. In the past **CSB 045** has been geologically characterized as being made of fine-grained Sandstone with a Geoethite Enomotation; this surface coating has delaminated over approximately an eighth of its surface to reveal a lighter material underneath. **CSB 301** is similarly decorated with concentric lines and was recently geologically characterized for this research as being made from mudstone, there is no de-lamination of the surface and the raised stone surface between the incised lines is visually similar to that on other CSBs. The enigma is how the spacing of such 'perfectly' inscribed lines was achieved some 5000 years ago; today this could easily be explained by using dividers or a pair of compasses, using the pit in the centre as a swivel point. This decorative 'perfection' bears further research, particularly as they are similar in size and decoration to Victorian bowling jacks. Both **CSB 045** and **301** also appear as outliers on Map 8.9, the others with this style of decoration being more closely associated with Aberdeenshire.

Type 9g (Deliberately peck marked or pitted)

Figure 8.78: CSB 448, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.79: CSB 001, Hawick, Roxburghshire. Courtesy of Hawick Museum. C. Stewart-Moffitt 2015.

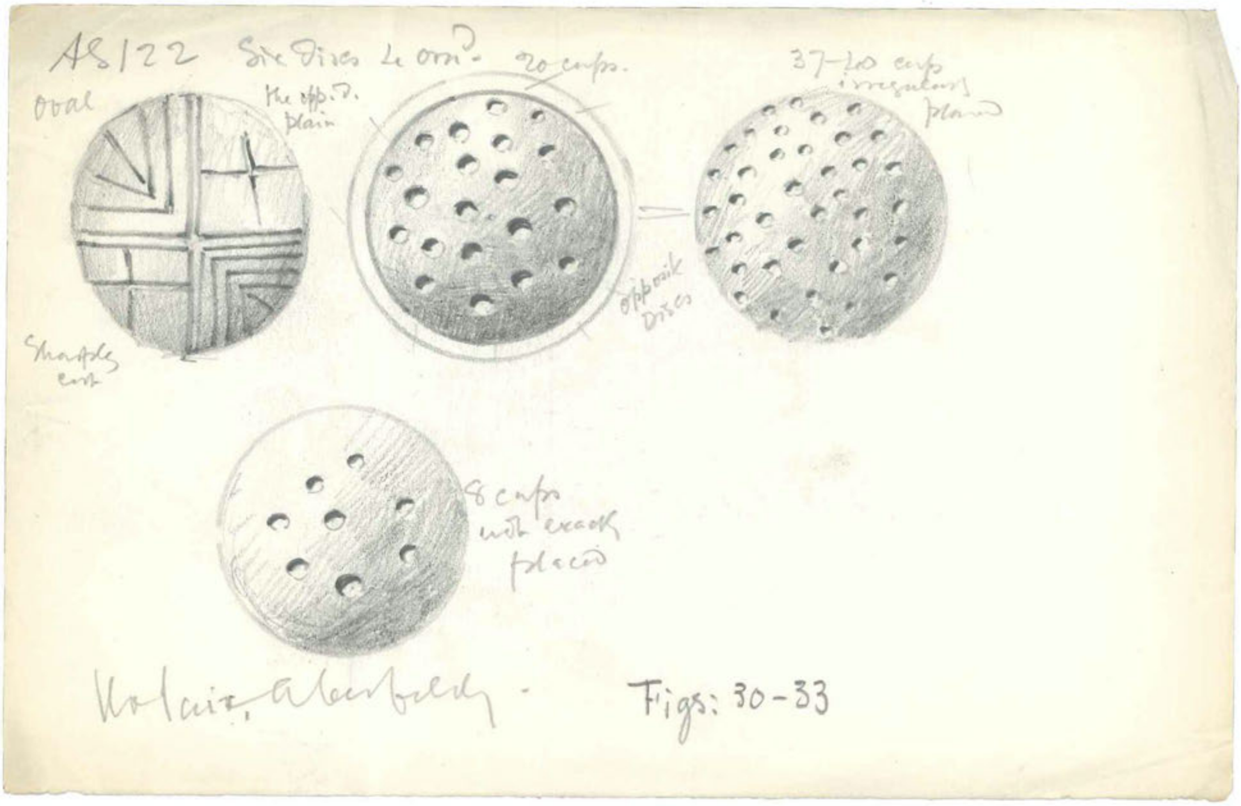


Figure 8.80: CSB 370, drawing by Frederick Coles (1908). Courtesy of National Museums Scotland.

Figure 8.81: CSB 154, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.82: CSB 476, Probably Burnhead, Aberdeenshire.Courtesy of Bromley Historic Collections. C. Stewart-Moffitt 2017.

Table 8.7: Type 9g Deliberately Peck Marked Cups or Pitted (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9g**		**Deliberately Peck Marked Cups or Pitted**			
CSB 370 **Fig 8.80**	4a (9g)	6	Three knobs have between eight and forty **cups** carved into their surfaces. Another knob has been divided into four quarters: two of which (opposing one another) have been **incised with nested triangles** with a vertical line in the triangle nearest the edge of the knob. The other two (again opposing one another) have a rough **cross** incised in each triangular space. The remaining two knobs are undecorated.	Urlar, Aberfeldy, Perthshire.	Amphibolite.	National Museums Scotland.
LM CSB 011 **Fig 8.84**	4e (9g)	6	Two large **pits** carved into opposing surfaces.	Hatton North Farm, Lowick, Northumberland.	Unknown.	Lost/Missing
CSB 154 **Fig 8.81**	4n (9g)	6	One interspace has been decorated with **tiny peck marks**.	Unknown.	Hornfels	Aberdeen University Museum.
CSB 444 **Fig 8.83**	9f	6	Two or **three stepped concentric rings** on each knob with nicely **pecked scalloped** interspaces.	Thought to be Nr. Dunfermline, Fife.	Meladiorite.	National Museums Scotland.
CSB 211	4c (9c – 9d – 9e – 9g)	6	Interspaces are decorated with various incised designs: **zigzag lines, concentric triangles, cross hatching and pits**. One knob has a partial, and probably unfinished off-centre zigzag marking.	Alford, Aberdeenshire.	Unknown.	Glasgow Museums.
CSB 306	4n (9c -9e – 9g)	6	Incomplete: Three knobs have a pecked surface. One has been inscribed with **nested V's** and the last has been inscribed with narrow **V shaped grooves and pecking**.	Newburgh, Fife.	Hornfels.	National Museums Scotland.

CSB 001 **Fig 8.79**	4b (9c – 9g)	6	Three plain knobs. Two knobs divided into four quadrants by deeply **incised grooves** with opposing quadrants filled with **peck marks** while the others are left undecorated. Final knob has similar **peck mark** decoration but is on opposing quadrants to the other two.	Hawick, Roxburghshire.	Unknown.	Hawick Museum.
CSB 476 **Fig 8.82**	4j (9b – 9g)	Originally 6	Incomplete CSB: The complete knob is incised with a ten grooved **right-handed spiral** across its surface. A partial knob is incised with a **twelve grooved spiral** across its surface. Two remaining knobs are decorated with multiple **pits**. The remaining interspaces are decorated with lightly incised **right -handed spirals**.	Keith Hall, Kinkell, Inverurie, Aberdeenshire.	Fine-grained Siltstone.	Bromley Library Museum.
CSB 452	9 (9b – 9f)	4	Symmetrical CSB with a plethora of decoration. The first knob left plain. Second knob is decorated with **concentric lines** which end in a left-handed spiral in the middle of the knob and incorporate **four small partial left-handed spirals** near its edge. Between the central spiral and inner of the concentric lines is an area of triangular and other **irregular incisions and lines**. Third knob has four **interlinked left-handed spirals** covering its surface and a **lozenge** shape in the middle of the knob. Last knob has a series of **concentric scalloped lines** across its surface which radiate from a central **three leaf clover shape** with a single ring and central **pit** making up the centre of each 'leaf' or Triqueta as Coles called it in 1908. One interspace has **three single Cup Marks in a triangular arrangement**.	Glaschul Hill or (Glass Hill), Towie, Aberdeenshire.	Fine-grained Siltstone.	National Museums Scotland.
CSB 388 **Fig 8.36**	2g (9b)	4	One knob is decorated with a **right-handed spiral** and part of another two **right-handed spirals** along with a series of lines at the edge of the knob and several small **pits** between the spirals. Another has an unfinished **spiral** while the other two are undecorated.	Nr. Elgin, Morayshire.	Hornfels.	National Museums Scotland.

CSB 095	8e	27	Appears to have two relatively symmetrical clusters of seven knobs on opposite sides as though it was made with a top/bottom or back/front with the remaining knobs between them…this is also noticeable on some other multi-knobbed balls. Three knobs are chipped. The surface is **finely pitted** in places which appears to be natural however there are **ten further pits** in the interspaces that seem to have been deliberately made. **One group of four in a diamond shape in one interspace between two knobs. One group of five in a polygonal shape in an interspace between four knobs and near to the previous group and the remaining knob on its own in another interspace between three knobs, again near to the other two groups.** Many thin, light coloured striations noticeable in the interspaces around each knob where it has been ground into shape.			Private Hands
CSB 071	9 (9d)	4	Fine-grained igneous (basalt), weathered, ornamented with four discs which project from the surface. **Four discs each decorated with diagonal cross hatching**. The cross hatching on one disc is unfinished. One interspace has two small **pits**.	Between New Scone and Murrayshall, Perth.	Fine-grained igneous basalt.	Perth Museum

Figure 8.83: CSB 444, Probably Nr. Dunfermline. Courtesy of National Museums Scotland 2015.

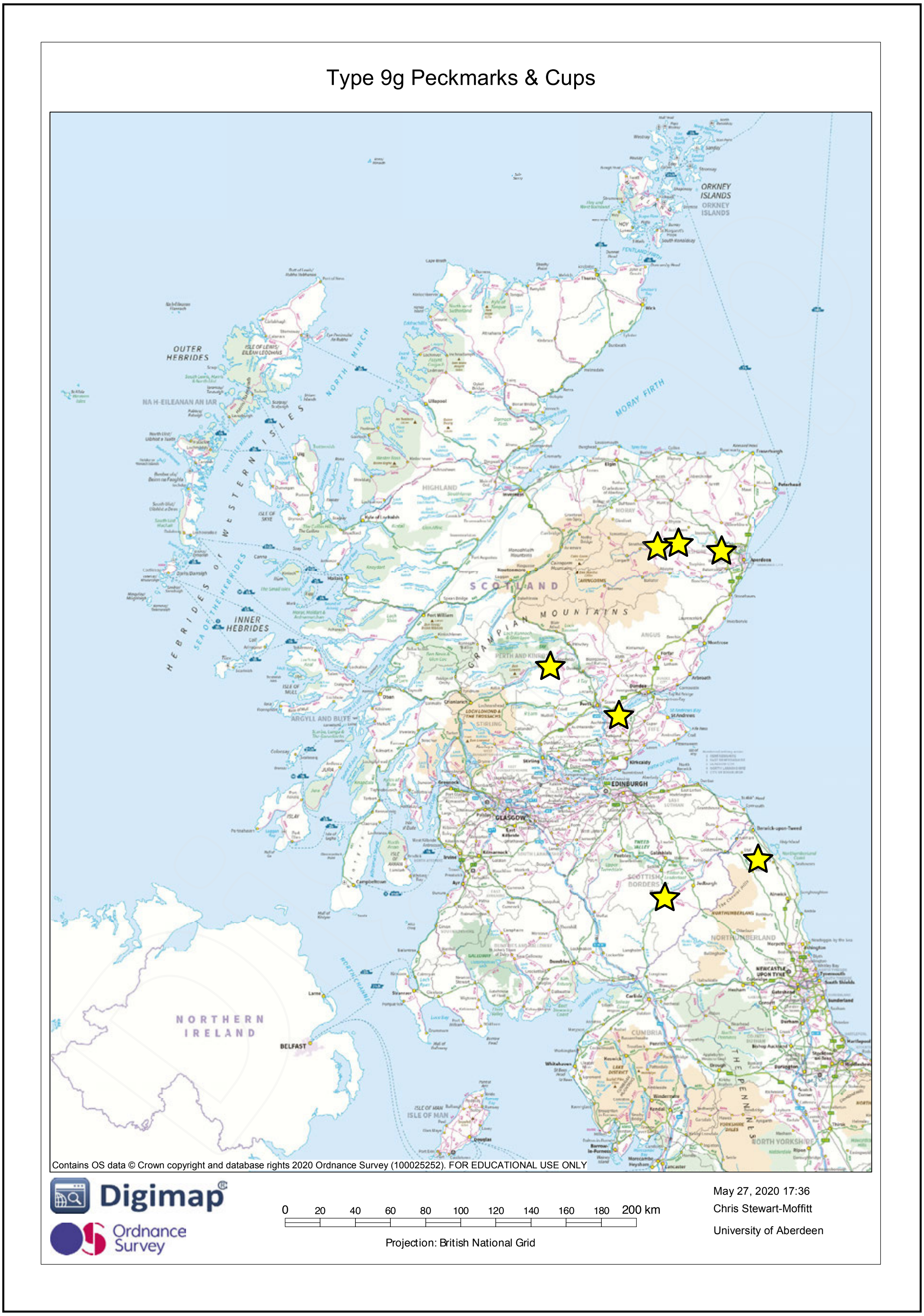
Figure 8.84: LM CSB 011, Lowick, Northumberland.

Type 9g Summary

These twelve CSBs, Table 8.7, have a variety of pits, cupules and pecked surface decoration as opposed to the random pecking that might be associated with the manufacture of the shape of the artefact itself. Map 8.10 shows their wide geographical range. To date large opposing pits have only been found on **LM CSB 011**, it's findspot in Northumberland suggesting it was inspired by Northumberland rock art and more especially as it was found near cup and ring marked rocks. However, they seem to have been a later addition as the cups have been cut through the discs. Other CSBs with single holes have been variously explained as natural, caused by geological/petrological sectioning or were mounting holes, made by collectors to display them on walls: at least one CSB still has the remains of an iron mounting bracket set into the hole. Not all these explanations are necessarily correct however, as when **CSB 064** (not illustrated) was found in 1998 it already had a 10 mm deep hole in one interspace; unfortunately, we will never know if the other examples were original as no records of the holes were made at the time of their discovery.

Small pecked, cups or pits, have also been used as decoration on **CSBs 370** which was found at Urlar, near Aberfeldy and which lies in an area where there are many cup marked rocks, it would therefore seem possible that the decoration on this CSB may be associated with them. Small pits can also be seen on **CSB 154**, **306** (not illustrated), **001**, **476**, **095** (not illustrated), **071** (not illustrated) and **452** (not illustrated); in some instances, they have been used singly, in others as part of a pattern. In a few cases they have been used to cover either the entire knob or a part of it.

CSB 444 has been beautifully decorated with scalloped shaped cups or cupules which obviously took a great deal more time and effort to make than a simple peck mark. Likewise, **CSB 476** has deep and carefully ground cups across the surface of two of its knobs, two more are decorated with spirals, while another two knobs have been lost.



Map 8.10: Known findspots of Type 9g CSBs. C. Stewart-Moffitt 2020.

Type 9 Misc Decoration

Figure 8.85: CSB 490, Bogmill, Premnay, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.86: CSB 283, Craig Bheag, Ballater, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.87: CSB 132, Insch, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.88: CSB 354, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.89: CSB 065, Southern Ireland? Courtesy The Hunt Museum, Limerick. C. Stewart-Moffitt 2016.

Table 8.8: Type 9 Misc, Miscellaneous Decoration (CSB Findspots, material and current location). C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
Type	**9 (9 Misc)**		**Miscellaneous Decoration**			
CSB 490 **Fig 8.85**	9 (9 Misc)	5 large knobs + decoration	Small **triangular knob in each of four interspaces** plus fourteen small round knobs where a sixth large knob would have been in a Type 4 CSB.	Bogmill, Aberdeenshire.	Unknown.	National Museums Scotland.
CSB 283 **Fig 8.86**	9 (9 Misc)	6 large discs + decoration	Six main discs plus three sets of smaller discs plus a **concave diamond shaped interspace**.	Craig Bheag, Ballater, Aberdeenshire.	Hornfels.	National Museums Scotland.
CSB 132 **Fig 8.87**	9 (9 Misc)	Plain with decoration.	Stone ball with a **trefoil depression enclosing six small flattish knobs**.	Insch, Aberdeenshire.	Unknown	Aberdeen University Museum.
CSB 354 **Fig 8.88**	9 (9 Misc)	4 + 6	Four large knobs and six small ones plus **four raised interspaces**.	Unknown.	Sandstone.	National Museums Scotland.
CSB 065 **Fig 8.89**	9 (9 Misc)	4 + 24	It has been suggested that three of the four large knobs have been carved however these marks look more like plough damage than having been made deliberately. Otherwise, it has **four large knobs surrounded by twenty-four smaller knobs in rings of nine (some of which are shared).**	Unknown.	Unknown.	The Hunt Museum. Limerick.
CSB 094	Possible Medieval Re-decoration	7	This CSB may have been found several centuries ago and subsequently modified. The carving of an **anthromorphic face** on its surface looks Early Medieval in form along with the **heart shaped motif** which was first seen during this period. These are almost impossible to see. See: Proceedings of the Society of Antiquaries of Scotland, 141 (2011), Pages 19-29 for discussion and detailed drawings.	Unknown.	Unknown.	Private Hands.

Figure 8.90: CSB 094, Location Unknown, private hands.

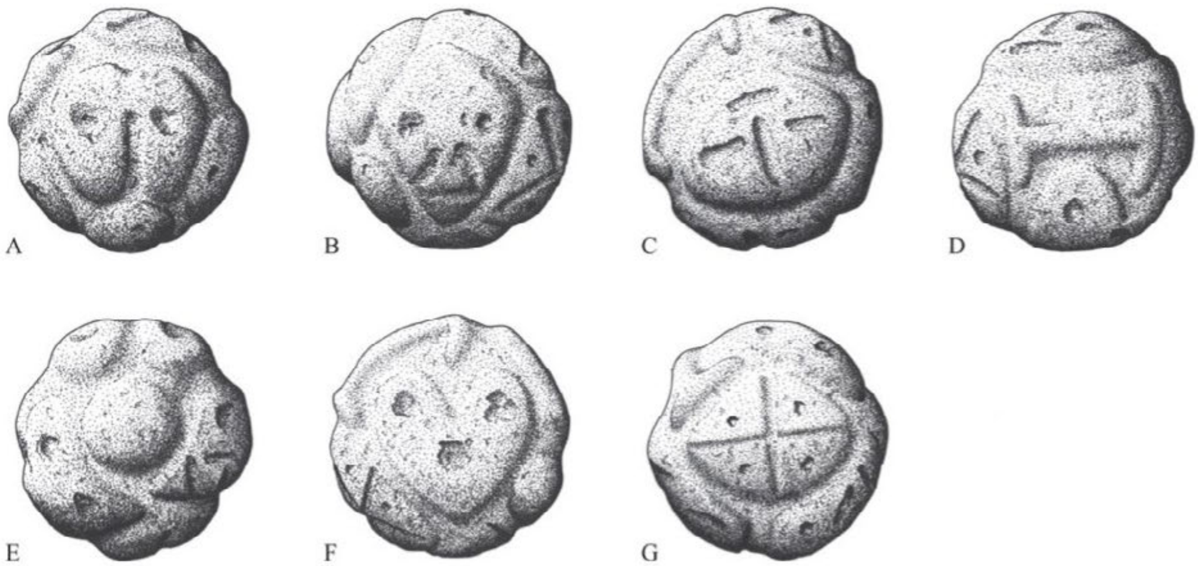


Figure 8.91: CSB 094, Sketch by Alan Braby, NMS Illustrator. Proceedings of the Antiquaries of Scotland 141 (2011), 19-29.

Type 9 Misc Decoration Summary

These six CSBs, Table 8.8, have a quite different style of decoration and those with findspots are all located in Aberdeenshire, Map 8.11; each has a series of small knobs which often replace or surround one of the larger knobs. It is possible that **CSBs 490**, **283**, **354** and **065** were made at around the same time as they all exhibit similar design characteristics and have combinations of both large and small knobs; in some instances, their maker appears to have replaced one large knob with several smaller ones. They are all well made, and attractive in their own right despite being very different to the majority of CSBs.

CSB 132 is unusual, and as Marshall commented in her 1977 paper: *'It has been suggested that this might be an unfinished ball but, compared with the unfinished balls already described, the very smooth, almost polished surface of the plain part makes it seem probable that the ball is as it was originally designed'* which seems to still be the case.

CSB 094 is thought to be an original CSB that was found and decorated later during the Medieval period (pers. comm: Grant); one knob has a carving of an anthromorphic face and another a heart shaped motif, both forms of decoration that were first seen during this period. The decoration is almost impossible to see without the use of strong lighting to produce shadows. It was first noticed by National Museums Scotland illustrator Alan Braby who drew the images shown in Figure 8.91; a link to the full report is provided in Table 8.8.

Map 8.11: Known findspots of Type 9 Misc CSBs. C. Stewart-Moffitt 2020.

Type 11 Orkney CSB Findspots

Table 8.9: CSBs found in Orkney. (CSB findspots, material and current locations). C. Stewart-Moffitt 2020.

CSB No:	Type	Findspot	Type & Number of knobs	Material	Current Location
045	9 (9f), 11	Hillhead, St Ola, Orkney.	Concentric Circles: None	Possibly fine-grained Sandstone with Goethite Enomotation or perhaps Mudstone.	Hunterian Museum, Glasgow.
046 **Fig 8.96**	9 (9c), 11	Hillhead, St Ola, Orkney.	Deep Groves and Pyramidical Knobs: Not counted	Unknown.	Hunterian Museum, Glasgow.
048 **Fig 8.92**	8e	Big Howe, Stenness, Orkney.	Pyramidical: 30	Possibly Diorite or Syenitic	Hunterian Museum, Glasgow.
051 **Fig 8.103**	8c	Sanday, Orkney.	27	Sandstone.	Hunterian Museum, Glasgow.
059 **Fig 8.101**	4m	Hillhead, St Ola, Orkney.	6	Dolerite.	Hunterian Museum, Glasgow.
238 **Fig 8.93**	8c	Holm, Orkney.	16	Unknown.	The Orkney Museum.
239	8c	Skara Brae, Sandwick, Orkney.	18?	Unknown.	The Orkney Museum.
242 **Fig 8.102**	4 Misc	Ness of Brodgar.	6	Possibly Camptonite.	The Orkney Museum.
253	11	Skara Brae, Sandwick, Orkney.	Many	Copy/Replica.	National Museums Scotland.
416 **Fig 8.94**	8f	Site of Broch, Hall of Rendall, Orkney	67	Unknown.	National Museums Scotland.
482 **Fig 8.98**	11	Links of Noltland, Westray, Orkney	Grooved: None	Unknown.	Historic Scotland.
493 **Fig 8.95**	8f	Skara Brae, Sandwick, Orkney.	67	Unknown	National Museums Scotland.
494	11	Skara Brae, Sandwick, Orkney.	Many	Unknown	?????
495	11	Skara Brae, Sandwick, Orkney.	22	Unknown	Skara Brae Visitors Centre.
496	11	Skara Brae, Sandwick, Orkney.	10	Unknown	?????
497	11	Skara Brae, Sandwick, Orkney.	Unknown	Unknown	National Museums Scotland
498 **Fig 8.100**	4f, 9 (9c)	Skara Brae, Sandwick, Orkney.	6	Dolerite.	National Museums Scotland.
LM CSB 022 **Fig 8.97**	8e	Ophir, Orkney	33	Unknown	Unknown
LM CSB 023 **Fig 8.99**	11	Birsay, Orkney	Grooved: None	Unknown	Unknown

Type 11 Summary

Type 11 CSBs from Orkney, Table 8.9, and Map 8.12, have been included in this Chapter due to their particularly unusual style of decoration which takes the form of pyramidical knobs. Of the eighteen CSBs in this Type all but two have findspots and are now lost/missing and only exist as sketches. CSBs made in Orkney are very different to those found on mainland Scotland and are particularly distinctive. They occur in a wide range of shapes and sizes, many of which do not fit into the classic shapes of those from northeast Scotland originally categorized by Coles and Marshall. It is probable that the majority of 'Orkney style CSBs' have no direct link with those from mainland Scotland and were created in a style typically unique to Orkney. Their overall morphology and distinctive pyramidical knobs can be seen in other Orkney 'novelties' which are quite unlike any artefacts found in mainland Scotland.

Excavation at the Ness of Brodgar has suggested that three of the buildings used during the Neolithic were at least partially covered in stone slates (Card and Thomas 2012: 117). Although the exact shape and area covered by these

Figure 8.92: CSB 048, Big Howe, Stenness, Orkney. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 8.93: CSB 238, Holm, Orkney. Courtesy Orkney Arts, Museums and Heritage. C. Stewart-Moffitt 2015.

Figure 8.94: CSB 416, Hall of Rendall, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.95: CSB 493, Skara Brae, Sandwick, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.96: CSB 046, Hillhead, St Ola, Orkney. Courtesy of The Hunterian, University of Glasgow. C. Stewart-Moffitt 2015.

Figure 8.97: LM CSB 022, Orphir, Orkney, (Replica). C. Stewart-Moffitt 2020.

Figure 8.98: CSB 482, Links of Noltland, Orkney. Courtesy of Historic Scotland.

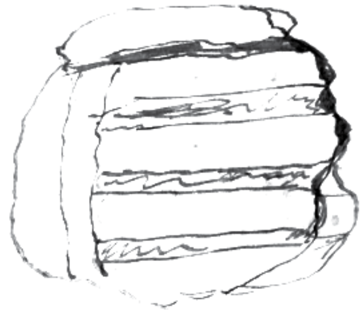


Figure 8.99: LM CSB 023, Sketch of probable CSB from Birsay, Orkney by J W Cursiter. Private Collection.

stone roofs is unknown, it appears from the recorded positions and variable size of the slates recovered that they may have been pyramidical in form (Ackerman 203: 1). This type of roof construction, to date only recorded at this significantly important site, would have been an extraordinary sight during the Neolithic when the average roof was more likely to have been made from turf or skin. The sight of these new and unique structures must have had a tremendous visual impact on those who saw them and perhaps provided the inspiration for some of Orkney's prestigious pyramidically decorated artefacts.

CSB 482 from the Links of Noltland appears to be a work in progress, the grinding of parallel grooves being the first stage in the production of the pyramidical knobs so typical of Orkney; it is likely that the next stage would have been to grind grooves in the opposite direction which would then have undoubtedly produced pyramidical knobs. Although **LM CSB 023** only exists as a sketch made in a notebook by Orkney archaeologist and antiquarian J. W. Cursiter, it once again appears to show the first stage of cutting or grinding single grooves and when completed, would probably have also been covered in similarly shaped knobs.

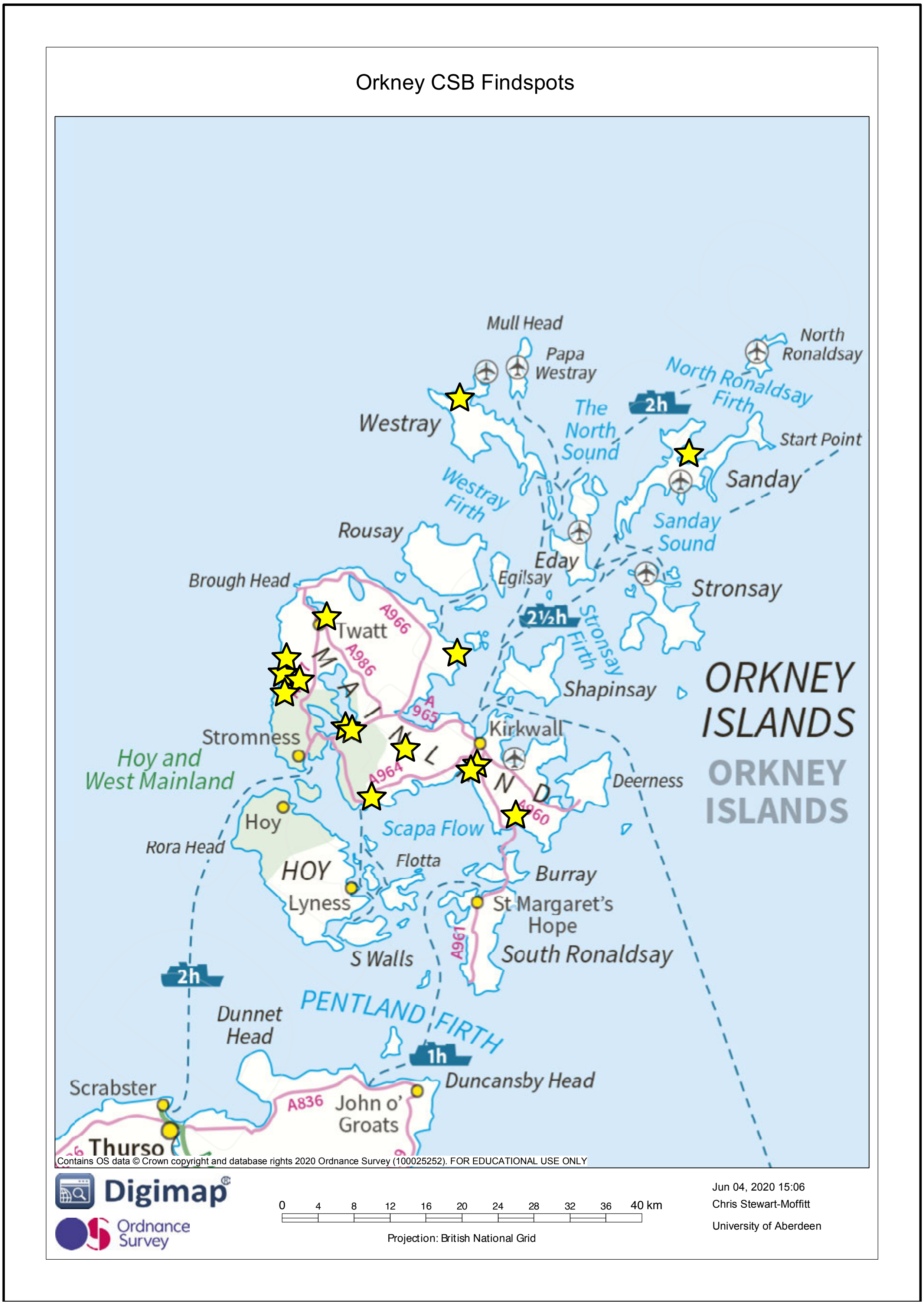
Not all CSBs found in Orkney were made in this unique style however, as the four listed in Table 8.10, and on Map 8.13, have similar styling to those commonly found on mainland Scotland. It is possible that these either originated on the mainland or were made nearby from locally available materials by visiting craftspeople. To investigate this theory further would require visual geological characterization by an experienced geologist/petrologist.

Figure 8.100: CSB 498, Skara Brae, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.101: CSB 059, Hillhead, St Ola, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.102: CSB 242, Ness of Brodgar, Courtesy Orkney Arts, Museums and Heritage. C. Stewart-Moffitt 2015.

Figure 8.103: CSB 051, Sanday, Orkney. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.



Map 8.12: CSB Findspots in Orkney. C. Stewart-Moffitt 2020.

Map 8.13: Potential Aberdeenshire CSBs found in Orkney. C. Stewart-Moffitt. 2020.

CSB No:	Type	Findspot	Number of Knobs	Material
051 Fig 8.103	8c	Sanday	27	Sandstone
059 Fig 8.101	4m	Hillhead	6	Dolerite
242 Fig 8.102	4 Misc	Ness of Brodgar	6	Possibly Camptonite
498 Fig 8.100	4f	Skara Brae	6	Dolerite

Table 8.10: Potential Aberdeenshire CSBs found in Orkney. C. Stewart-Moffitt 2020.

Possible origins of CSB Decoration

It is possible that some of the motifs used to decorate CSBs may have originated in the Boyne Valley in Ireland; the combination of both motifs and passage grave architecture illustrating the network of connections that existed between Ireland and Britain during the Late Neolithic. Similar motifs have been found at the tomb of Bryn Celli Ddu in Anglesey (Burrow 2010: 262), tombs and domestic structures at Skara Brae and at the 'settlement' at the Ness of Brodgar in Orkney (Bradley 2019: 102) showing that ideas were travelling far and wide during this time.

While spirals, saltires, triangles, parallel lines, concentric lines, cups, and cupules can all be found on CSBs, there are no lozenges, meanders, chevrons, or zigzags, with the exception of the zigzag motifs on CSB 211 from Alford in Ludovic Mann's collection, Figure 8.109f. Neither are there any instances of scalariform motifs (horizontal or vertical ladders) being used on CSBs despite them being used to decorate other Late Neolithic artefacts such as the chalk plaque from Hanging Cliff, Yorkshire which is approximately 15km from the findspot of the Folkton Drums and approximately 12km from Bridlington where CSB 475 was found.

While some researchers have suggested the use of geometric decoration stems from entoptic images, caused by optic and neurological disturbances (Lewis-Williams and Pearce 2009: 48), others think they may have been caused by the deliberate or accidental ingestion of natural hallucinatory substances such as black henbane (*Hyoscyamus niger* L.): although this has now been questioned (Long et al. 2015: 49-53). Another and perhaps more plausible theory is that they actually reflected the changes in the Neolithic worldview and environment; moving from one with a natural organic form to one that became in many ways more symmetrical (Waddington 2007: 11-19).

The most complicated motif, the spiral, is organic in form and can be readily seen in ferns and bracken, terrestrial snail shells, marine molluscs, and fossils such as ammonites, which occasionally crop up during excavation (David 2017: 93). Spirals would have been a common sight in pottery making, as coils of clay are known to have been used to form the base of pots. At a few locations in Orkney two spirals were joined together to form a 'horned spiral' which gives the impression of a pair of eyes or spectacles (Thomas 2016: 44-45), Shee Twohig noted this was an unusual motif in Ireland (1997: 387). But although the horned spiral motif has been used at Eday Manse, Figure 8.14; on the Pierowall Plaque, Figure 8.15; the Folkton Drums, Figure 8.16; rock art at Achnabreck in Mid Argyll, Figure 8.17; and the Macehead from Knowth in Ireland, Figure 8.18; it has not so far been used to decorate CSBs.

Generally simpler and more prosaic motifs were used to decorate CSBs. Parallel lines might be seen when laying fires, constructing animal traps, or even in the relatively common and quite noticeable metrological phenomenon we know today as cloud streets (Müller and Tsuji 2019: 31-32). Vertical, horizontal, and diagonal crosshatching may have been inspired by textiles, nets used to catch fish or animals or by wattle hurdles used to control animals and construct the walls of buildings. The idea of concentric circles may be seen in raindrops falling into a puddle or lochan on a still day. So, it seems that while it is possible some ideas for decoration may have originated in Ireland, they could have also been suggested by the simple observation of nature.

More difficult to explain is the decoration on the relatively few CSBs that have nested triangles or Vs. In terms of V decoration, it may have been derived from the open triangles or zigzags that seem to have been widely used throughout Britain at this time. The idea of nested triangles may well have originated in Orkney though where this type of decoration has been seen at the Ness of Brodgar (Card 2016: pers. comm). It's possible that they may have been suggested by a perspective view of the series of roof trusses needed to support a heavy stone roof such as those suggested in buildings at the Ness of Brodgar. Viewed from the ground they would look exactly like a group of nested triangles, providing an unusual and perhaps complex sight for those used to simpler roof supports such as simple poles.

The type and quality of much of the decoration seen on CSBs however seems quite simplistic and it is probable, that with a few exceptions were probably decorated by craftspeople, most were decorated expediently by their keeper or keepers over a period of time. In some instances, the decoration is obviously unfinished, while in others the quality of the decoration implies it may have been carried out by more than one person, one of whom was less skilled than the other. This is suggestive of at least some of the decoration being a 'work in progress' which was perhaps added to and augmented over time.

Case Study - The Towie Ball, Aberdeenshire.

CSB 452 or the 'Towie Ball', as it is more commonly known, was found while digging a drain on Glaschul Hill near the village of Towie, Aberdeenshire in 1860, Figures 8.104a to 8.104c. It quite rightly has the highest profile of all CSBs; its fine decoration has been expertly applied and it is arguably the most decorative of all CSBs. As such, National Museums Scotland often uses it to promote itself via its website, promotional literature, and guidebooks (MacGregor 1999: 268).

What is not generally appreciated is that the Towie Ball does not stand alone and may, from their very similar morphology and decorative style, have been the last in a series of earlier prototypes. The close similarity between the shape and style of decoration of CSBs 453, Figure 8.105, from Lumphanan and CSB 452, Figures 8.104a to 8.104c, from Towie was first observed by Frederick Coles in 1908 when he recorded a number of CSBs which were then in the hands of private collectors. At that time CSB 453, Figure 8.105, was in the collection of antiquarian collector Hugh Young from Burghead who, later in the year, donated a cast/replica, CSB 403, to the museum. Images of this replica, Figures 8.106a to 8.106c, show the decoration more clearly than that of the original which, in 1927, was finally presented to the National Museum of Scotland by Hugh Young's daughters, the Misses Young, late of Burghead.

Figure 8.104a: CSB 452, Glaschul Hill, Towie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.104b: CSB 452, Glaschul Hill, Towie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.104c: CSB 452, Glaschul Hill, Towie, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.105: CSB 453, Lumphanan, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.106a: CSB 403 Copy/Replica of CSB 453, Lumphanan, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.106b: CSB 403, Copy/Replica of CSB 453, Lumphanan, Aberdeenshire. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

Figure 8.106c: CSB 403, Copy/Replica of CSB 453, Lumphanan, Aberdeenshire.Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

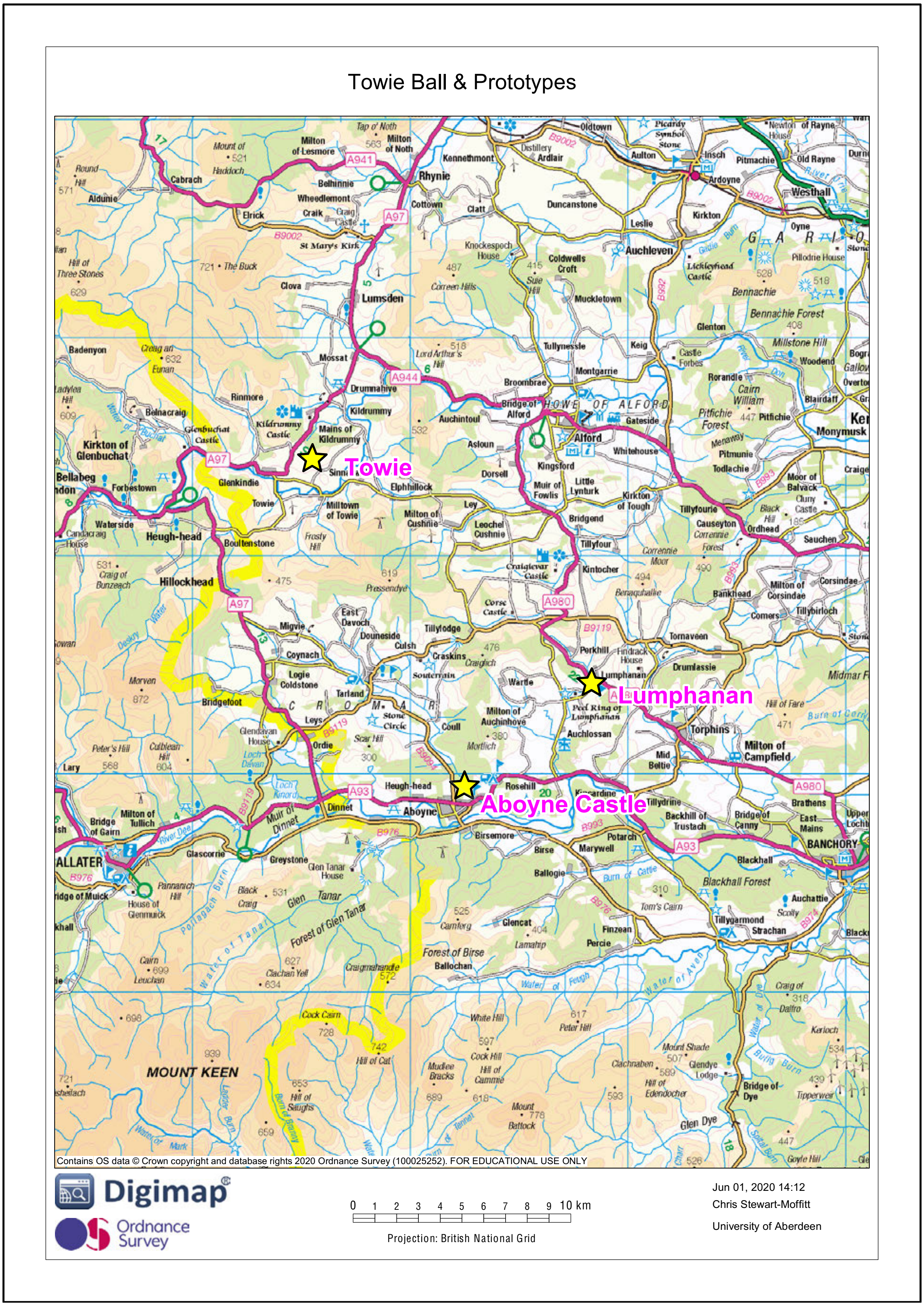
Figure 8.107a: CSB 104, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.107b: CSB 104, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 8.107c: CSB 104, Location Unknown. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

In the nineteenth century a similar ball, CSB 104, Figures 8.107a to 8.107c, was part of the Aboyne Castle collection; it was later transferred to the Aberdeen University Museum collection where it remains today. This CSB is again very similar in shape and decoration to CSB 452 from Towie and despite its actual findspot being unknown, its location in the Aboyne Castle Museum suggests that it may have been found locally. It therefore appears that all three, very similarly shaped and decorated CSBs, were found within a radius of approximately 8km. Lumphanan and Aboyne are approximately 8km apart and both are just 17km from Glaschul Hill where the Towie ball was found, Map 8.14.

Another potential prototype for the Towie ball, CSB 356, Figure 8.108a, is also similar to the previous ones



Map 8.14. Locations of possible Towie Ball prototypes. C. Stewart-Moffitt 2020

in both style and decoration, although once again it has no findspot. In 1908 Frederick Coles sketched the decoration on this CSB and captured, its otherwise difficult to see decoration, perfectly, Figure 8.108b.

Looking at Tables 8.11 and 8.12, we can see that CSB 104 is made from 2-Mica Granite and CSB 356 from Biotite Granite; CSB 453 seems to be made from a very similar material but is yet to be geologically characterized. Although both types of Granite are relatively fine-grained, it would have been difficult to incise any complex decoration onto their surface as the granular nature of the material would have prevented any really fine work being applied.

A comparison of the morphology and decorative elements of these four CSBs almost certainly shows that they were made by the same master craftsperson. It would appear that, after attempting to incise these complex decorative styles onto coarse granular stone, this individual finally located the fine-grained siltstone required to enable them to be used to maximum effect, finally producing the pièce de résistance that the Towie ball undoubtedly is.

Figure 8.108a: CSB 356, Location Unknown. Courtesy of National Museums Scotland. C. Stewart-Moffitt 2015.

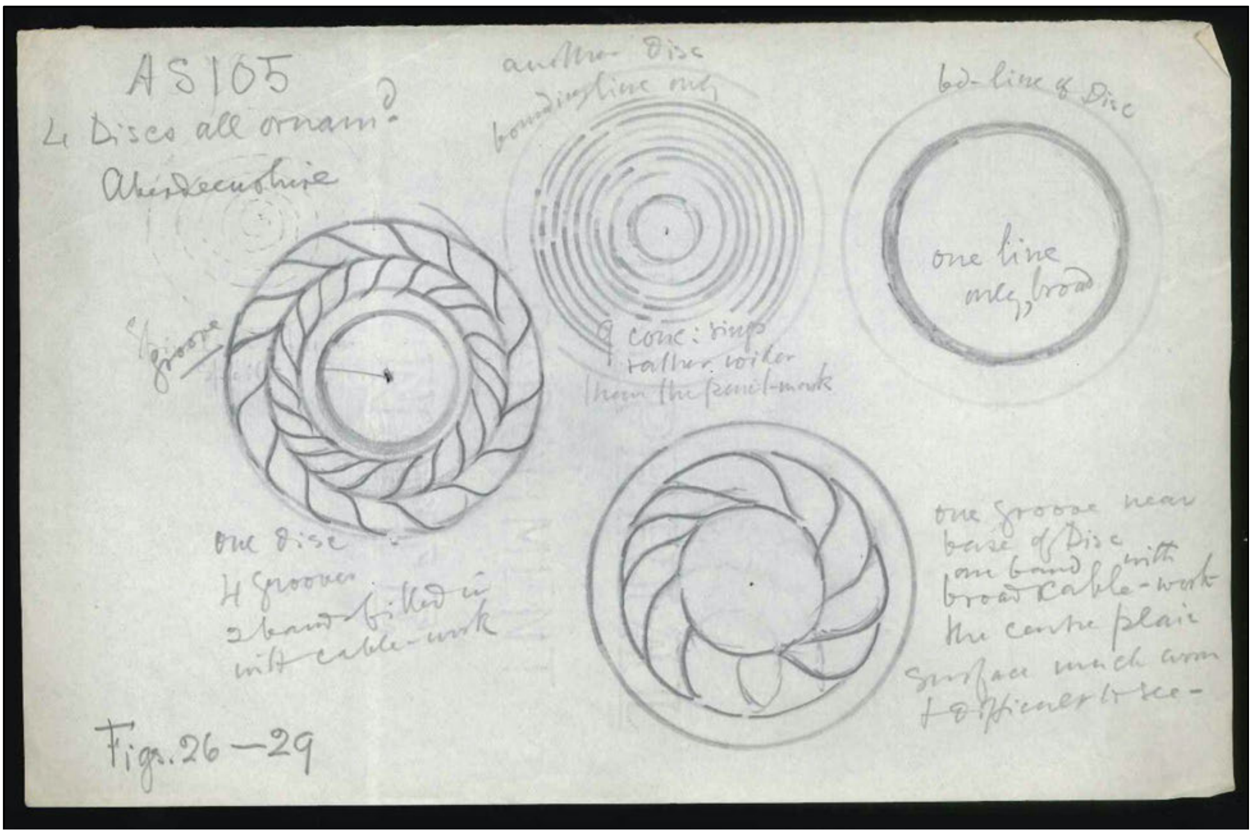


Figure 8.108b: CSB 356 Drawing by Frederick Coles (1908). Courtesy of National Museums Scotland.

Table 8.11: Towie CSB and possible prototypes. C. Stewart-Moffitt 2020.

CSB	Type	Number of Knobs	Type of Decoration	Findspot	Material	Current Location
452 **Fig 8.104 a-b**	9 (9b – 9f)	4	Symmetrical CSB with a plethora of decoration. The first knob left plain. Second knob is decorated with **concentric lines** which end in a **left-handed spiral** in the middle of the knob and incorporate **four small partial left-handed spirals** near its edge. Between the central spiral and inner of the concentric lines is an area of **triangular and other irregular incisions** and lines. Third knob has **four interlinked left-handed spirals** covering its surface and a lozenge shape in the middle of the knob. Last knob has a series of **concentric scalloped lines** across its surface which radiate from a **central three leaf clover shape with a single ring and central dot** making up the centre of each **'leaf' or Triqueta** as Coles called it in 1908. One interspace has **three single cup marks** in a triangular arrangement.	Glaschul Hill or (Glass Hill), Towie, Aberdeenshire.	Fine-grained Siltstone.	National Museums Scotland.
104 **Fig 8.107 a-c**	2e, 9 (9b – 9f)	4	The shape and decoration of this CSB are very similar to the Towie CSB which suggests it may have been an earlier version. First knob left plain. Second knob has **incised concentric scalloped lines** similar to that of CSB 452 but with the centre of the knob undecorated. Third knob has a **spiral**. Last knob has a **spiral design with segmented sections between spirals**.	Location Unknown.	2-Mica Granite.	Aberdeen University Museum.
453 **Fig 8.105**	2e, 9 (9b – 9f)	4	Symmetrical CSB decorated with **three spirals**, **concentric circles with chevron design**, one knob undecorated. Coles noted this was also decorated with a **triquetra**. (See CSB 452 from Towie which also has a triquetra).	Lumphanan, Aberdeenshire.	Unknown.	National Museums Scotland.
356 **Fig 8.108 a-b**	9 (9b – 9f)	4	Four knobbed CSB, one knob inscribed with **concentric rings**, one with a **single incised line**, one with a broad **cable work** design and plain central area, the fourth knob has a plain central area surrounded by an **inscribed line** which is in turn surrounded by **two contra bands of cable work**.	Location Unknown.	Biotite Granite.	National Museums Scotland.

Table 8.12: Towie Ball and possible prototypes, Findspots, Geological Characterization and Knob to Ball Ratio. C. Stewart-Moffitt 2020.

CSB No:	Findspot	Material	Average Diameter (A)	Average Knob Diameter (B)	Ratio of B to A
452 Fig 8.104 a-c	Glaschul Hill, Towie, Aberdeenshire.	Fine-grained Siltstone	73.23 mm	52.85 mm	1.39
104 Fig 8.107 a-c	Unknown.	2-Mica Granite	75.86 mm	50.60 mm	1.50
356 Fig 8.108 a-b	Unknown.	Biotite Granite	69.82 mm	53.67 mm	1.30
453 Fig 8.105	Lumphanan, Aberdeenshire.	Unknown	73.90 mm	51.85 mm	1.43

Case Study - The Alford CSB

Another highly decorated carved stone ball is CSB 211, Figures 8.109a to 8.109f. CSB 211 is but one of Mann's collection of CSBs which, following his death in 1955, he donated to Glasgow Museums. Despite Mann, introduced in chapter three, being noted for his enthusiastic but eccentric and idiosyncratic, or 'colourful personality', as it has been described, he fully understood the importance of scientific methods and made and used reconstructions and models to illustrate his many lectures.

The decorative elements of CSB 211 put it in a class of its own, although some aspects of its decoration give room for doubt over its authenticity. Unlike the majority of CSBs which generally have some signs of being buried for 5000 years, it is neither damaged nor discoloured. It also has some uncharacteristic decoration, in the form of zigzag patterns which are not generally found on CSBs, artefacts or architecture outside Orkney during this period. As the magnified images in Figures 8.110a to 8.110d show, the channels marking out the decoration seem to be exceptionally clear cut and have a square section, almost as though a mechanical engraving tool had been used to make them: the incising on other CSBs is generally less regular or clear-cut with V or U-shaped channels.

As noted above, Mann was well-known for his use of reconstructions and models during his lectures. Based on that evidence and the method of incising or engraving the decoration channels, it seems possible that CSB 211 may have been made for demonstration purposes and over time became absorbed into his antiquarian collection. Like so many antiquarian collections his enormous assemblage of artefacts suffered from a dearth of contextual information, which often left little worthwhile knowledge on which to base subsequent research: CSB 211 is unfortunately no different in that respect. If it is a genuine and original CSB then it should be considered alongside the Towie Ball as having been made and decorated by a master craftsperson, as its decoration is superb. I believe a separate study should be made of this unusual CSB, starting with a visual geological characterization of its materiality by an expert plus a close assessment of its decoration by scanning electronic microscope.

Figure 8.109a: CSB 211, Alford. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.109b: CSB 211, Alford. Detail of Nested Triangle, Curvilinear and V decoration. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.109c: CSB 211, Alford. Detail of Pit or Cupule and raised rectangle decoration. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.109d: CSB 211, Alford. Detail of Nested Triangles. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.109e: CSB 211, Alford. Detail of Curvilinear lines and zigzag decoration. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.109f: CSB 211, Alford. Apparently random zigzag decoration on left hand of knob. Reproduced courtesy of Glasgow Museums. C. Stewart-Moffitt 2015.

Figure 8.110a: CSB 211, Magnified detail of Incised Lines. C. Stewart-Moffitt 2020.

Figure 8.110b: CSB 211, Magnified detail of Nested Triangle. C. Stewart-Moffitt 2020.

Figure 8.110c: CSB 211, Magnified detail of Pits or Cupules. C. Stewart-Moffitt 2020.

Figure 8.110d: Magnified detail of Nested Triangles C. Stewart-Moffitt 2020.

Conclusion

During the Neolithic, tombs in Brittany and Iberia were being decorated with a range of abstract, geometric, and representational motifs. At least some of the ideas behind the artwork on both monuments and portable artefacts found in Brittany and Iberia had been transferred by sea to the Boyne Valley in Ireland. Despite contact between the Boyne Valley and Orkney only a limited range of these geometric motifs travelled further north, subsequently finding their way onto buildings and Grooved Ware pots. Other than those involving linear grooves, which may be more closely associated with mainland Scotland, no Orkney CSBs have been decorated, apart from those with pyramidical knobs.

So far, decorated CSBs have mostly been found in mainland Scotland with the majority in the northeast around Aberdeenshire. It seems probable this was due to differences in ideologies and social structures between Orkney and mainland Scotland; had they been aligned or affiliated in any way I believe it would be reasonable to expect to find more evidence of similar decoration in their material culture.

As might be expected the decoration used on Grooved Ware pots in Orkney is similar to that found on local architecture but does not appear to have transferred to CSBs either in Orkney or mainland Scotland. Several CSBs might show signs of being inspired by rock art; that from Northumberland has two possible Cup Marks, one from Urlar has similar minute cups ground on to one knob while another two from Aberdeenshire have concentric stepped knobs which could be likened to Cup and Ring rock art.

Finally, two case studies were presented: The first suggested that several early prototypes of the Towie Ball may have been made from a granular granitic material, before the craftsperson finally found and used a fine grained slate or mudstone. The other questioned the authenticity of a CSB from Alford, due to the type of decoration used and the way in which it had been applied.

Chapter Nine

Origin, skill, lifecycle, use and demise

In this chapter I will illustrate how plain stone balls were in all probability the precursor of the more symmetrical and well-made CSBs and consider how much skill would have been involved in their manufacture. I will also investigate the possible time scale of their introduction, how their styling changed due to innovation, and the changing requirements of their owners or keepers. Finally, I will offer some new and intriguing ideas regarding their potential lifecycle, use and possible reasons for their eventual demise.

The Origin of CSBs: were plain stone balls the precursor of CSBs?

Despite not setting out to record plain stone balls during the compilation of the original CSB Master Database in 2015, some were inevitably offered to me as part of CSB collections and most were subsequently recorded. The list in Table 9.1 is neither large nor comprehensive, and is heavily weighted towards Aberdeenshire, as Aberdeen University Museum provided most examples. Identifying prehistoric stone balls was undertaken with some difficulty as collections occasionally included cannon balls and grain rubbers and in one case half of a 'prehistoric ball' in the British Museum turned out to be a fossil after further research into its morphology and findspot.

The final tally was Aberdeen University Museum six; British Museum five (four from Scotland and one from Antrim); Montrose Museum two; Perth Museum and Art Gallery two, Glasgow Museums three, National Museums Scotland two, Orkney Museum two and the Museum of Archaeology and Anthropology in Cambridge one. Recently Glasgow Museums identified a further five possible candidates, giving an overall total of twenty-eight plain stone balls; the majority of which are in the same size range as CSBs and have an average diameter of 69mm. Twelve have an Aberdeenshire provenance, three are from Kincardineshire, and three are from further south in the general area of, Perthshire, Stirlingshire, and Lanarkshire. The results of this, albeit rather brief and possibly skewed survey, currently shows that the greatest number of plain stone balls, in a similar size range to CSBs, have been found in Aberdeenshire, perhaps lending additional weight to the argument they were the first stage of

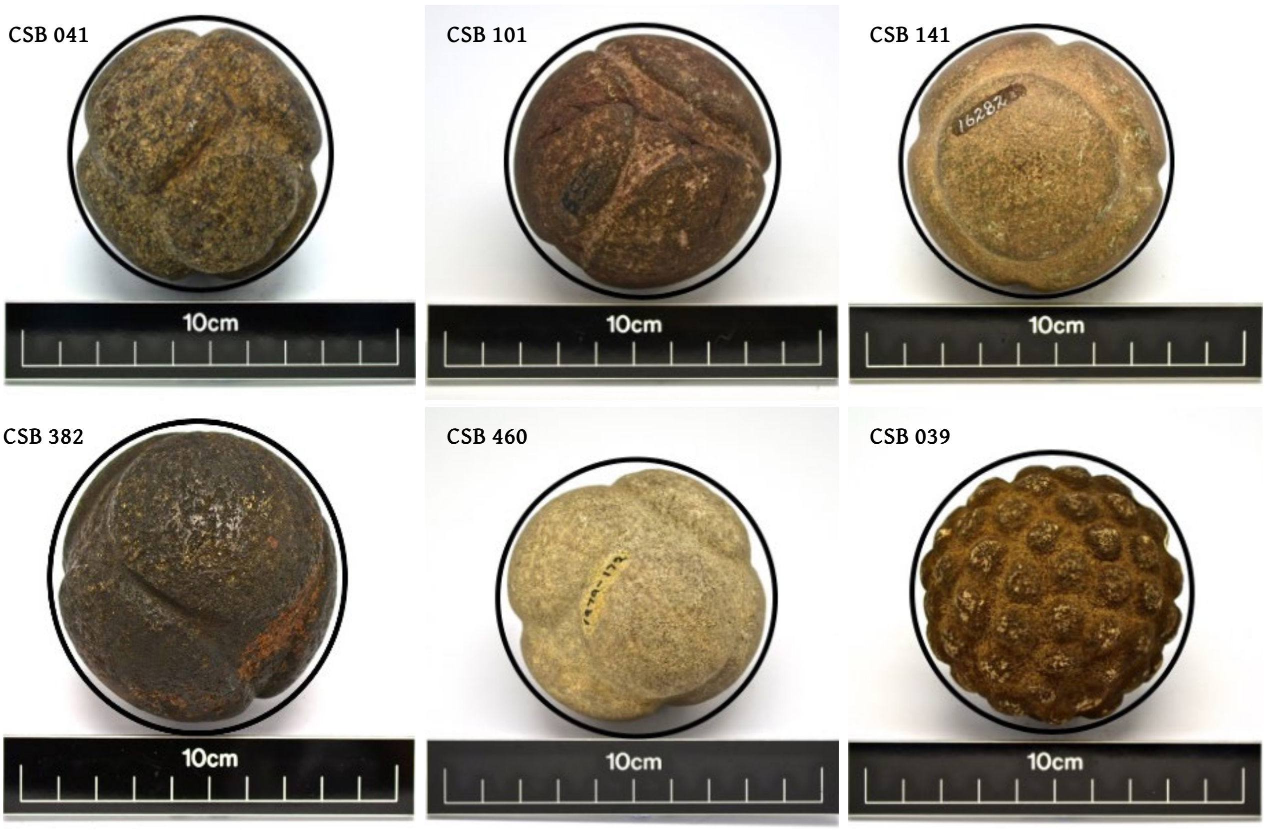


Figure 9.1: Sample of symmetrical CSBs probably formed from plain undecorated balls. C. Stewart-Moffitt 2020.

Table 9.1: Plain Stone Balls. C. Stewart-Moffitt 2020.

Plain Stone Ball Findspots	County	CSB Findspots	Museum
Kintore	Aberdeenshire	X	British Museum
Kintore	Aberdeenshire	X	British Museum
Fyvie	Aberdeenshire	X	University of Aberdeen Museum
Kildrummy	Aberdeenshire	X	Glasgow Museums
Inverurie	Aberdeenshire	X	British Museum
Pitcaple	Aberdeenshire	X	Aberdeen University Museum
Udny	Aberdeenshire	X	Aberdeen University Museum
Brimmond Hill	Aberdeenshire		Aberdeen University Museum
Towie	Aberdeenshire	X	Glasgow Museums
Skene	Aberdeenshire		British Museum
Aberdour	Aberdeenshire		Aberdeen University Museum
Skelmuir	Aberdeenshire	X	Aberdeen University Museum
Balbeggie	Perthshire	X	Perth Museum
Stirling	Stirlingshire	X	Perth Museum
Montrose (x2)	Kincardineshire	X	Montrose
Letham	Forfarshire		Museum of Archaeology and Anthropology Cambridge
Knock Hill	Kincardineshire	X	NMS
Ness of Brodgar	Orkney	X	The Orkney Museum
Crantit	Orkney		The Orkney Museum
Carnwath	Lanarkshire	X	Glasgow Museums
Antrim	Northern Ireland	X	British Museum
Eilean Domnhuill	Benbecula	X	NMS

CSB fabrication, with discs, knobs and decoration being later developments. A more comprehensive survey of additional museums could well alter the figures and of course the difficulty in identifying them as prehistoric must also be borne in mind. Further evidence of doming and the potential for plain stone balls being the prototype for CSB manufacture can be seen in many of the images in the Gazetteer, (Appendix Two); a small selection of which can be seen in Figure 9.1.

While the majority of CSBs give an impression of being perfectly symmetrical a closer study can suggest otherwise. When Jim Pattison photographed CSBs from the Scottish Islands for his book *'Models of the Mind: Carved Stone Balls from the Islands of Scotland'* (2012), he comprehensively photographed the silhouette of each of the CSBs studied from thirty different angles; the results of which can be seen in Figures 9.2, 9.4 and 9.6. While most CSBs appear to have some degree of

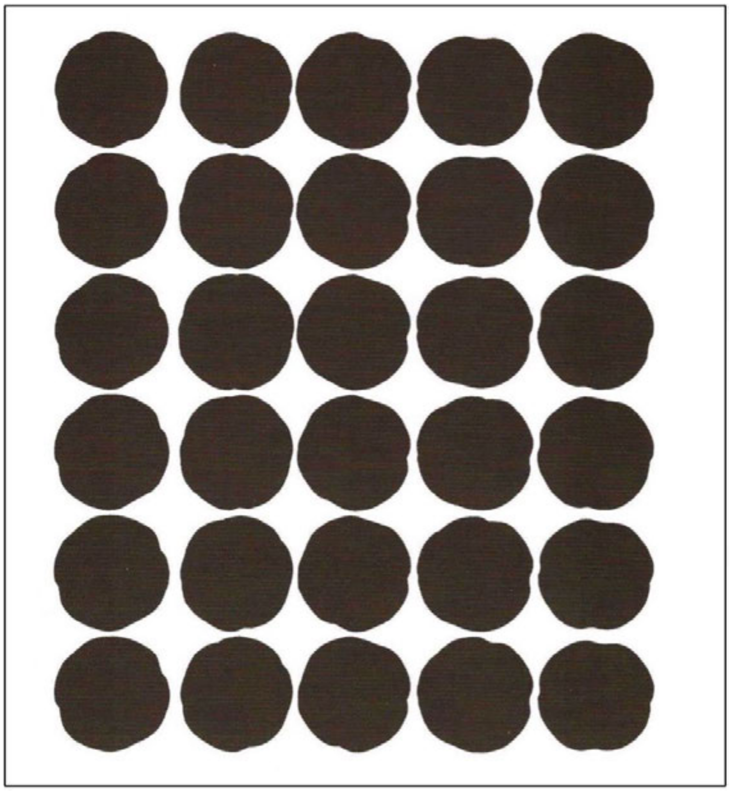


Figure 9.2: Multi-angle image of 6 knob CSB 070 from Bernera. © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

Figure 9.3: CSB 070 from Berneray (6 Knobs). © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

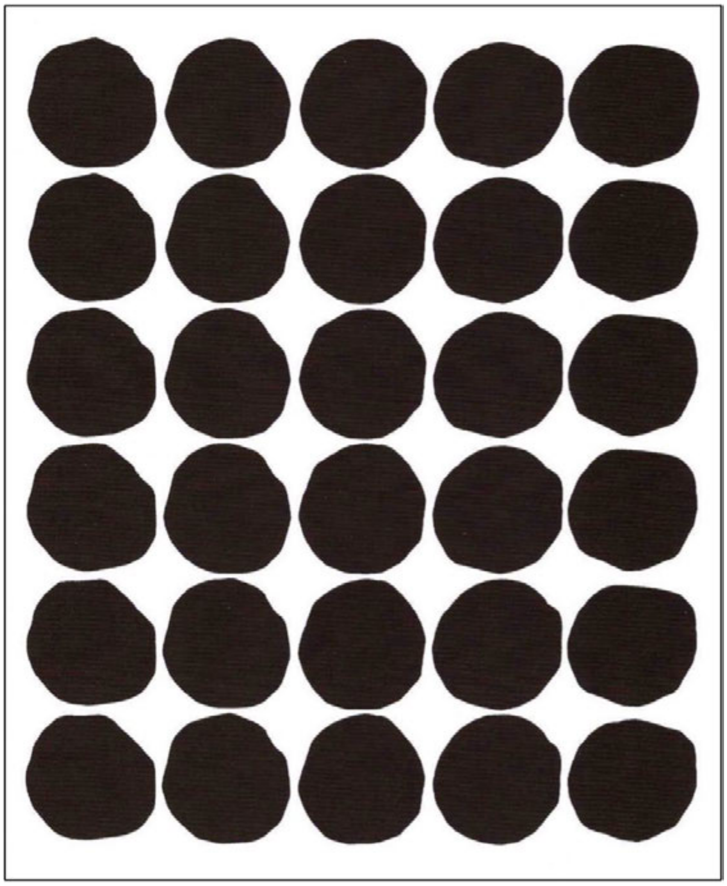


Figure 9.4: Multi-angle image of 4 knob CSB 436 from Lochboisdale. © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

Figure 9.5: CSB 436 from Lochboisdale (4 Knobs). © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

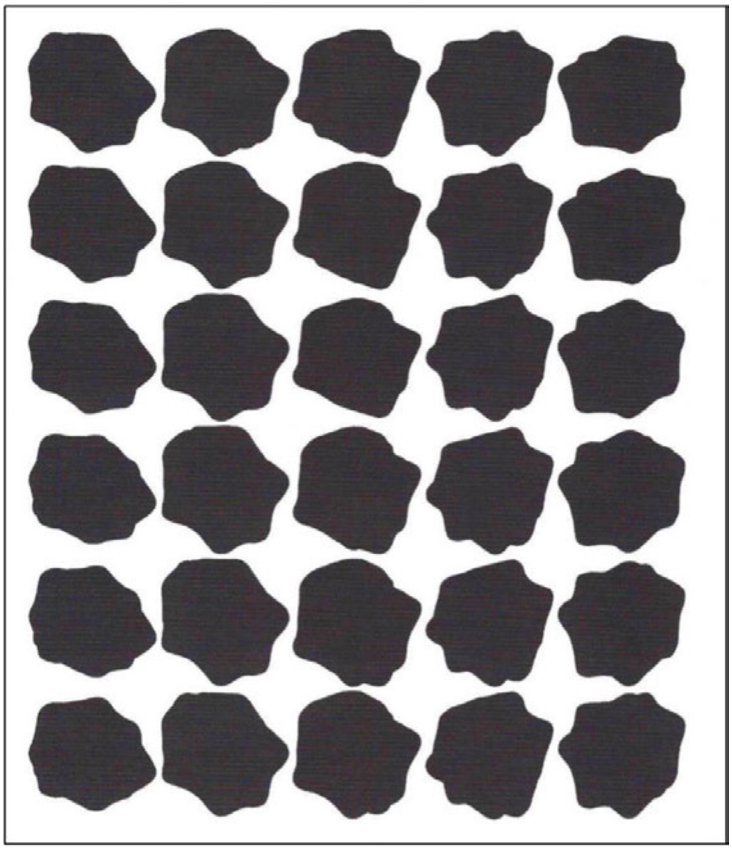


Figure 9.6: Multi-angle image of 16 knob CSB 238 from Holm, Orkney. © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

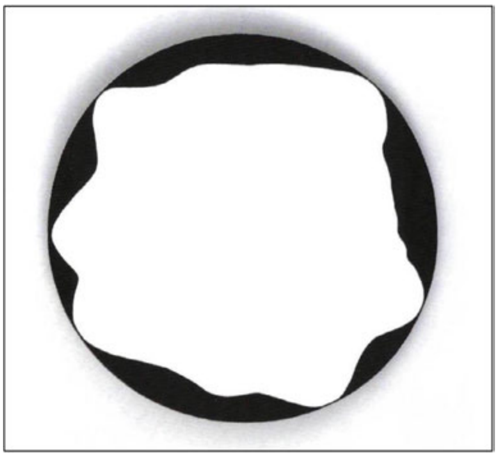


Figure 9.7: CSB 238 from Holm, Orkney (16 Knobs). © Models of Mind: Carved Stone Balls from the Islands of Scotland. J. Pattison 2012.

asymmetry, many would fit surprisingly well within a sphere, see Figures 9.3 and 9.5, and it seems probable they were made from an already prepared plain stone ball roughout. Further weight to this argument is suggested by the curved tops of the knobs which closely follow the outer edge of an enclosing sphere. When viewing the artefacts themselves it's clear that the curved surface is two dimensional, producing a slight domed effect suggesting the outer surface of a plain stone ball. This can be seen in a large number of CSBs and an apparent lack of further modification on the surface of some knobs suggests it could be the smooth outer surface of the original plain ball or CSB roughout. It also suggests that noticeably asymmetric CSBs, such as that shown in Figures 9.6 and 9.7, may have been formed from multi-dimensional cobbles.

Evidence of skill and innovation in CSBs

To more accurately define how each of the separate types identified may have evolved, the typologies of Frederick Coles and Dorothy Marshall were revised in chapters seven and eight, leading to the suggestion that some at least may have been the creation of individual craftspeople. It is important to understand that a range of apparently subtle variations exist within the types and to further facilitate our understanding of these variations a skill assessment was undertaken to see if individuals could be identified. Even a cursory look at any of the major CSB collections will show that a wide range of styles, finishes and abilities clearly exist within this enigmatic corpus and as has been previously suggested, some of this apparent styling may have been the work of craft specialists. Others have suggested that many of the variations seen are simply due to some CSBs being unfinished (Jones and Diaz-Guardamino 2019: 111-119). I would argue that while some are undoubtedly a work in progress, overall, this suggestion is far too simplistic and does not consider progressive, creative, artistic, or developmental innovation, emulation by others and/or production by less skilful craftspeople relegating an otherwise important group of artefacts to relative insignificance.

To assess potential 'skill' it was first necessary to have access to a large dataset of similar artefacts (Kuijpers 2018: 10). As noted in chapter one the first Master Database and Photographic Database was compiled in 2014 for an undergraduate dissertation and by the end of 2015, 98% of all museums with collections throughout Scotland and England, had been visited. Over the ensuing five years, following extensive research into those in private hands, obscure museum collections, those processed through Treasure Trove Scotland, and those auctioned or now lost/missing, additional CSBs were subsequently added to the database which to date, currently consists of 548 artefacts.

A study carried out by Kuijpers' suggested that the simplest way to assess the potential 'skill or skills' involved in making an artefact was to explore the similarities and differences between it and similar artefacts, using careful observation or 'eyeballing' (2018: 54). By considering factors like symmetry, finish, creativity and styling, decoration, material, traces of manufacture and even potential mistakes, he advocated it would be possible to gain an indication of how skilful craftspeople were and the level of skill achieved. These variables, which may often be quite slight, can be caused by a combination of the type and quality of the material used and human agency, which can express itself in the form of experience/inexperience, physical ability/inability, and a pre-conceived perception of how something should look (Kuijpers 2018: 125). They also often manifest themselves as 'repetitive signatures' which not only help identify skill, but occasionally the craftsperson themselves. However, in the case of a 5000 year old stone artefact, which has spent most of its life underground and has perhaps been damaged or degraded by several centuries of farming activity, we must be aware of, make allowances for, and attempt to see through physical damage such as abrasion or erosion. Although subjective, after physically handling, recording, photographing, comparing, and researching the nuances of the entire corpus their similarity and individuality has become intuitive, and I believe allowed me to make a plausible assessment of 'skill'. Kuijpers' book '*An archaeology of Skill: Metalworking Skill and Material Specialisation in Early Bronze Age Central Europe*' is, as the title suggests, a study of metalworking skills relating to Bronze Axes. He suggested that the makers of Bronze Axes had a range of ability or skill that could be graded into four principal levels:

1. *The Amateur.*
2. *The Crafts(wo)man.*
3. *The Master Crafts(wo)man.*
4. *The Virtuoso.*

The basic methodology used by Kuijpers' can be readily adapted to assess the ability or skill required by Neolithic craft specialists when making CSBs, which allows us a valuable insight into why some are clearly superior to others in terms of symmetry, finish, stylistic creativity, decoration, and innovation. However, for the purpose of assessing CSBs Kuijpers' overall skill levels have been modified as follows.

1. *The Amateur.*
   Has a very basic knowledge of CSB manufacture and an underdeveloped skill set; showing a distinct lack of subtlety or finesse and/or a potentially poor material choice, such as heavily crystalline or soft materials which are difficult to peck, grind and finish.
   (Note: This category also includes a number of incomplete, unfinished, and badly abraded CSBs that cannot easily be assessed).

2. *The Craftsperson.*
   Has mastered the craft to an adequate standard, although CSBs may be left with a rough finish or small design/symmetry faults. Makes CSBs to a 'good enough' standard which is acceptable to most, with occasional signs of innovation.

3. *The Master Crafts Specialist/Innovator.*
   Fully understands the opportunities and limitations of the material they are working with and has developed their craft to a very high aesthetic standard. These higher standards suggest the quantity of CSBs produced may have been less, but the finished artefact was exceptional, with a wider range of styles and decoration offered.

4. *The Artistic Specialist/Innovator.*
   Is exceptionally skilled, capable of exploiting the material to its limitations and producing original, unique, and highly sought after CSBs. Innovation is a common factor, and the type of decoration is often unique and of top quality. As Kuijpers notes '*skill brings about diversity*' (2018: 263).

The Oxford English Dictionary tells us that the word innovate comes from the Latin word *innovare*: to renew and *in + novare*: to make new (Oxford English Dictionary 2018). Innovation can therefore mean changes made to something already established, or the introduction of completely new ideas or artefacts. It also suggests a quality associated with creative and inventive originality and artistic innovation reveals itself through the creation of both new designs and older designs that are reinvented.

Despite the levels of skill involved, if we consider the comparatively small number of CSBs that might have been made and the relatively short time a CSB would take to make, it appears that CSB fabrication was probably not a full-time activity (Kuijpers 2018: 44) and the makers habitual daily occupations may have been more prosaic and routine. Making well-crafted CSBs would not have been an occupation that everyone was capable of and the craftspeople making them would almost certainly have been recognised by others as having a special value and position in society (Kuijpers 2018: 42). It is probable that craftspeople and innovators would have also made CSBs from previously formed plain stone balls thus guaranteeing a more successful and symmetric outcome, especially when using harder types of stone.

Methodology for assessing CSB skill levels

Following the format used by Kuijpers' an initial assessment of the variables that could be utilized to assess levels of ability or skill in the manufacture of CSBs, suggested that the most important were Symmetry, Finish, Style/Creativity and Material. Although, as only around 33% of the corpus have been geologically visually characterized to date, the inclusion of less than 100% materiality would have skewed the results, leading to inconsistences and ambiguity. This variable was therefore not included in the current assessment; should the remaining 67% be visually characterized at some point in the future this assessment could easily be revisited. The final list of variables chosen to assess CSB skill were Symmetry, Finish, Creativity and Styling and Decoration; all of which could be suitably assessed allowing a consistent result overall. To avoid an overly complex scoring the following four grades from **0-3** were chosen to score each variable, see Table 9.2.

Table 9.2: System for scoring CSB variables. C. Stewart-Moffitt 2020.

Symmetry	**None**	**0**
	Poor	**1**
	Fair	**2**
	Excellent	**3**
Finish	**Very Rough**	**0**
	Rough	**1**
	Smooth	**2**
	Polished	**3**
Creativity & Styling	**None**	**0**
	Slight	**1**
	Stylised	**2**
	Highly Stylised	**3**
Decoration	**None**	**0**
	Basic	**1**
	Decorated	**2**
	Expertly Decorated	**3**

Having completed the initial assessment, the results were checked for overall accuracy and a further refinement was made by re-assessing the potential for 'Master Craftpersons' and 'Innovators'. The individual results of each CSB assessment can be seen in Appendix Three, with master craftsperson (marked 'M') and innovator (marked with a **'+'** sign).

Results of this Skill Assessment

The overall results of this skill assessment are plotted in Chart 9.1 and suggest that 16.94% of CSBs were either made by amateurs or were unfinished. The majority, 48.26%, were made by craftspeople with good spatial skills and were well enough finished to be acceptable

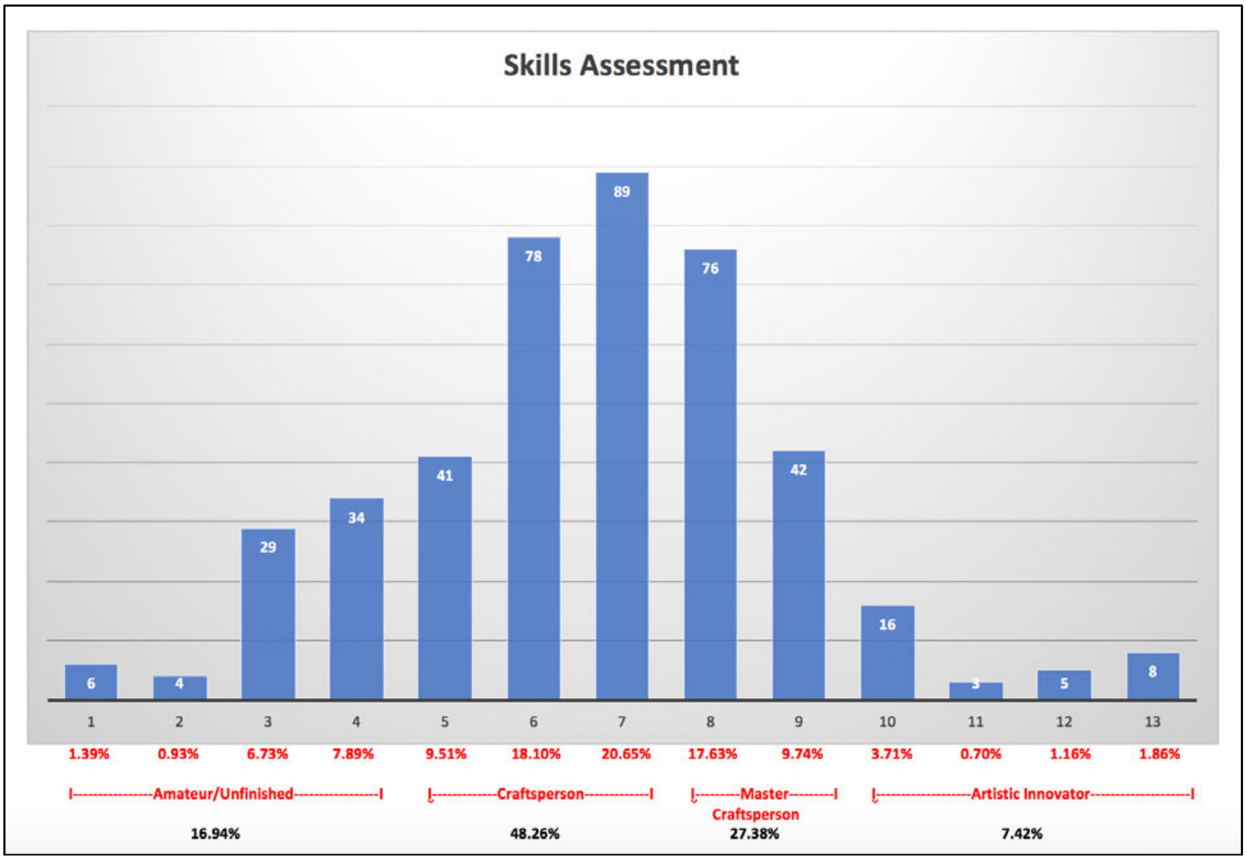


Chart 9.1: Skill Levels: Amateur 1-4, Craftsperson 5-7, Master Craftsperson 8-9, Artistic Innovator 10-13. C. Stewart-Moffitt 2020.

to most people. Master craftspeople were fewer in number at 27.38% and artistic innovators, the people who produced the highest quality, innovative and decorated CSBs, were in the minority at 7.42%. The results from Kuijpers' study of Bronze Axes showed similar results. He found that the majority of artefacts in his study fell into the second category, 'good enough to be acceptable', while the smallest number fell into the fourth group which he called the 'virtuoso'(Kuijpers 2018: 236, 264), or in this study an 'artistic innovator'.

I have suggested above that a range of people with very different skill sets were involved in the manufacture of CSBs. Although some were made by individuals with only a limited ability, the majority appear to have been made by craftspeople skilled enough to produce CSBs to an acceptable standard, with some so well finished as to have been made by master craftspeople. Additionally, a lesser number of CSBs stand out for their artistic and innovative design qualities; these were almost certainly made by people who were not only masters at their craft, but had the ability to visualise and produce new and modified designs to suit the specific requirements of prominent individuals within an extended family group or community. It is probable that master craftspeople and artistic innovators were among the more mature members of 'society' and had many years of crafting experience. These individuals may have been introduced to new ideas through extensive travel, having witnessed and experienced alternative values and traditions, all of which must have broadened their knowledge of the world and alternative 'cultures'. The 'otherness' of artistic or charismatic people has been responsible for influencing all of us for millennia and it is not un-reasonable to suppose that it was similar during the Late Neolithic.

A suggested stylistic evolution of CSBs

Earlier it was suggested that plain stone balls may have been the first stage in the manufacture of many CSBs. This was illustrated in the ability of many to fit closely within a three-dimensional sphere and it was noted that the outer surface of some knobs appears to have remained unaltered by the later grinding and polishing of the interspaces and were probably the original outer surface of the plain ball, see Figures 9.8 and 9.9. This can be seen clearly in the following two examples, which appear to be unfinished, although there are others that show similarly unaltered knob surfaces.

The style of most artefacts can be seen to change over time from simple to more complex and CSBs are probably no different. Utilising this simple evolutionary concept, along with the 'types' identified in chapter seven, makes it possible to suggest a potential stylistic developmental sequence, as shown

Figure 9.8: CSB 224 found in Norway. Photograph courtesy of Åge Hojem and Trondheim Museum of Natural History and Archaeology 2015.

Figure 9.9: CSB 487 from the Broch of Yarhouse, South Yarrows, Caithness. Courtesy of National Museums Scotland C. Stewart-Moffitt 2018.

in the Flow Chart 9.2, from the early 'prototype' of a plain stone ball to that of the most complicated of CSBs, the multi-knobbed Type 8f. Unfortunately, a lack of chronological dating does not allow proof of this, or the rate of change from one style or type to another and so it therefore remains theoretical until more dating evidence is acquired.

Potential dating of CSBs

We are now finally able to locate CSBs temporally thanks to radiocarbon dating and Bayesian modelling. At the Ness of Brodgar in Orkney these techniques suggested that the radiocarbon date of organic deposits closely associated with CSB 242, found underneath a remodelled buttress of Structure 10, was *2900 cal. BC* (pers. comm. Card; Card et al. 2017; Jones and Diaz-Guardamino 2019: 104). At another Orkney site the use of Bayesian modelling has also suggested that CSB 482, found at the Links of Noltland on Westray, which was recently excavated by EASE Archaeology, falls somewhere between the start of the site *3160-2870 cal. BC* (95% probability) and its end *2859*-2640 BC (95% probability), (Jones and Diaz-Guardamino 2019: 104). Jones and Diaz-Guardamino also cite a decorated ball

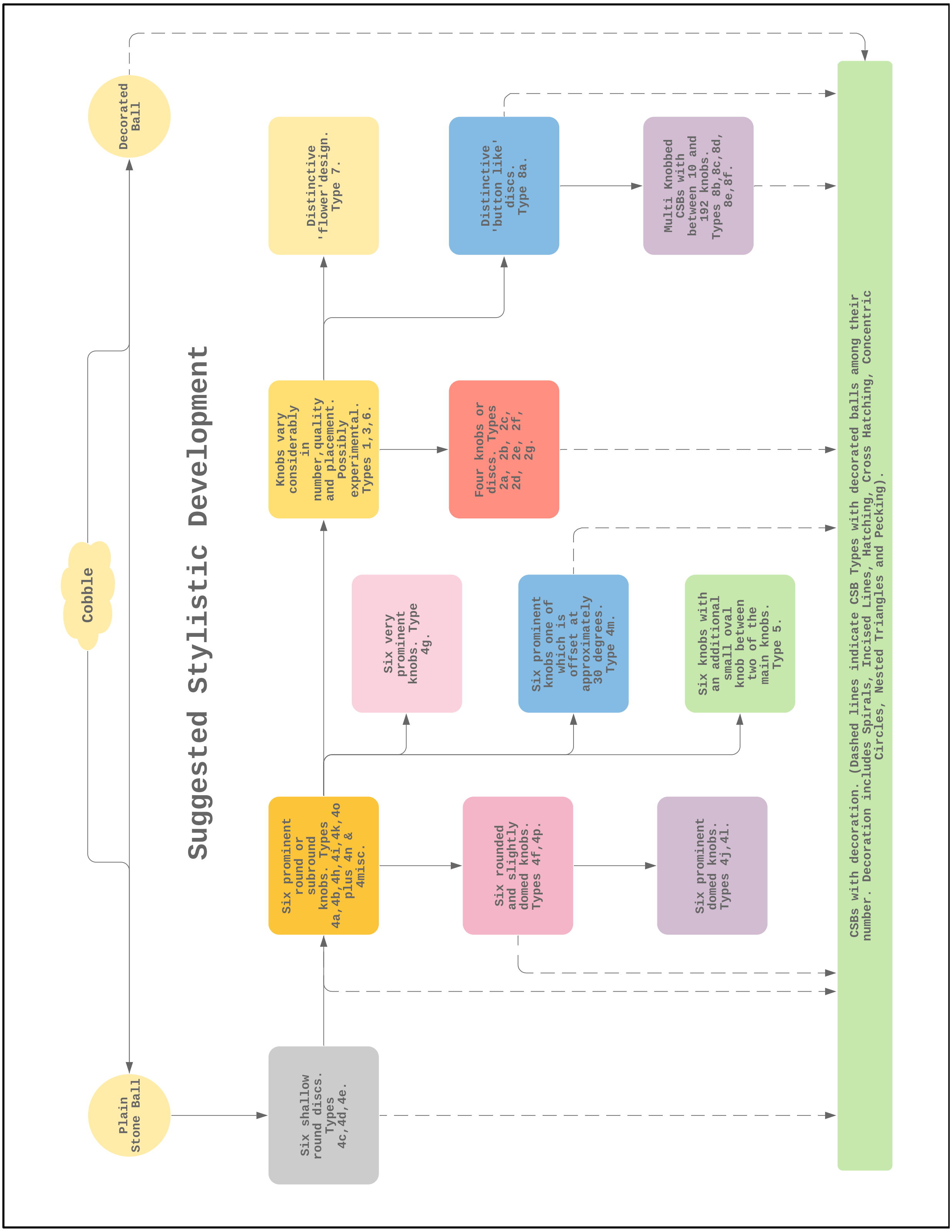


Chart 9.2: Suggested Stylistic Evolution of CSBs. C. Stewart-Moffitt 2020.

from Eilean Domhnuill, Loch Olabhat in the Western Isles which Ian Armit, its excavator, has suggested may date to around c. 2800 BC. This last ball does not fit well within the commonly accorded description of a CSB however. Rather than being carved overall, only a small area was lightly incised, causing curators at National Museums Scotland to label it as a decorated grain rubber. Despite this, it does indicate that decorating plain stone balls seems to have been a Late Neolithic cultural activity. Although the dates from Ness of Brodgar and Links of Noltland still do not allow us to suggest a definitive date range for CSB use, their fairly close approximations do currently suggest that they were in use between the twenty-ninth and twenty-eighth centuries BC.

It is difficult to say how long this tradition may have lasted, but it could have been relatively short – perhaps as little as two centuries or less. Given the relative coherence of the CSB tradition and its geographical focus, it is possible that their currency may have been as little as three or four generations, which at 35/40 years per generation, would equate to between a hundred to a hundred and fifty years. This period would fit within the span of dates from Link of Noltland, giving us a time scale in the region of c. 2950 BC to c. 2800 BC for their fabrication, although probably longer for their use or longer-term curation. This is of course based on limited evidence and our ideas on the chronology of this tradition may change as and when more secure dating becomes possible.

Potential uptake and design changes over time

Based on the current assemblage and using an S-shape diffusion curve, Chart 9.3 shows the suggested uptake, spread and subsequent decline of the main CSB types. Propounded by Everett M. Rogers in his 1962 book '*Diffusion of Innovation*', the diffusion curve was designed to explain how, why and at what rate new ideas might spread in any given 'social system', considering product and communication channels over a period of time (2003: 23). Rogers suggests that a successful product, object, or idea must be widely adopted to reach critical mass before it becomes self-sustaining. He further suggested that it would inevitably reach a plateau at some point and interest in it would gradually wane unless it was innovatively re-invented with the introduction of design variations. Following this it would either continue its upward trend, or more slowly decrease in popularity, before interest in it eventually ceased altogether. Although S-shaped diffusion curves may vary according to the speed of uptake, it is possible that the uptake of CSBs would have been relatively quick and have increased steadily, due to their enigmatic appearance, tactile nature, and the ideological concept behind them.

If we accept the suggestion that plain stone balls were the predecessors of CSBs it is possible that the earliest carved versions were lightly inscribed with six discs, requiring little modification. Lightly incised Type 4 CSBs (Discs) seem to have been made with a high level of care and attention, most of which may have been made by a craftsperson or master craftsperson. Like the majority of CSBs they are centred on an area to the northwest of Aberdeen and, although they have a wider distribution throughout Scotland, they are not found further north than Caithness, northwest of the Great Glen or the Western Isles, as can be seen in Map 9.1.

The greatest number and therefore perhaps the longest lasting CSBs are Type 4 (Knobbed), which have much more prominent knobs and deeper interspaces. While many of these have been made by skilled people, a small proportion seem to have been made by those who were less skilled or were skilled enough for the finished object to be acceptable to the end user, while those in the master craftsman and skilled innovator category are exceptionally well made. Map 9.2 shows that while the greatest number of these are centred on the area to the northwest of Aberdeen, they are also scattered throughout Scotland and the Isles, with outliers in England and Ireland. The ubiquity of this type may have been responsible for its upsurge in popularity, perhaps prompting others to attempt to make their own. Two other types might have emerged around the same time. Both were subtly different and could have been designed to define differential status; one had an additional oval or pear-shaped knob squeezed in between two of the usual six knobs and the other had one of its six knobs offset at around thirty-five degrees. Both types were too distinctive to have been accidental or poorly made.

As the appeal of Type 4 knobbed CSBs plateaued more complicated multi-knob forms appear to have evolved. Initially they were probably more difficult to layout and prototypes can perhaps be seen in the asymmetrical oddities that exist within the corpus. Several noteworthy types seem to have been developed during this period and perhaps arose through experimentation. Type 7 CSBs with between seven and fourteen knobs are particularly distinctive and look remarkably like a flower head. This type could have developed in the vicinity of the River Ythan, having been found at several places along its length and that of rivers connected to it, and further afield in Perthshire and the Western Isles. Type 8a CSBs were also distinctive, with low flat discs, these had a smaller geographical range and a fairly tight grouping to the northwest of Aberdeen. The second most popular type was the Type 2 CSB with five knobs; it required considerably more spatial skills than the simpler six knob type and was sufficiently different to its predecessor to revive the enigmatic status of

CSBs, while remaining suitably tactile. Centred on the area to the northwest of Aberdeen, it had widespread distribution throughout Scotland, but in terms of numbers does not seem to have been as popular as its predecessor, Map 9.3.

Developmental apogee

It is probable that the final stage of CSB development may have been the multi-knobbed 'hedgehog' type. This seems to have been the developmental apogee of the CSB as the number of knobs on its surface reached the point at which no more could be practically added. It is clear, looking at Map 9.4, that they were more popular to the northwest of Aberdeen and around the Moray Firth and perhaps less so throughout the rest of Scotland. Those in Orkney, while still multi-knobbed, belonged to a different tradition as discussed earlier.

The potential Origin and Use of CSBs in the Social Landscape of Late Neolithic Scotland

It is generally believed that Neolithic people in Scotland lived in a kin-based, segmented society (ScARF 6.1). The Oxford Concise Dictionary of Archaeology defines kin as '*a group of people related by blood*', and segmented societies as '*a social system comprising numerous relatively small autonomous groups who generally regulate their own affairs, but who periodically come together to form larger groups and who, in some senses, may collectively appear to be a single large community*'. It further defines them as '*agricultural societies living in small discrete areas of a larger identifiable territory*' (2008: 230, 411). These scattered, consanguineal and affinal kinship groups were, in all probability, clan based (Marshall 1977: 63; Fowler 2004: 114-115), with long standing lineages originating in earlier Neolithic societies (Edmonds 1992: 191; Creese 2016: 15).

Like the Boyne Valley and Orkney, Aberdeenshire appears to have been a core area during the Neolithic and one which, judging by the high proportion of brown earth soils, was probably agriculturally wealthy and capable of sustaining a relatively high population: the type of place in which social change was likely to occur and where the adoption of symbols of familial or clan status might be found (Bradley 1987: 63). It's possible that a concentration of family groups such as these led to the formation of a powerful and persuasive ethos, which eventually presented itself to the outside world ideologically as a metaphor for success. While Orkney arguably had a greater range of material culture, distinctive architecture and unusual and enigmatic artefacts, the high concentration of CSBs in Aberdeenshire shows

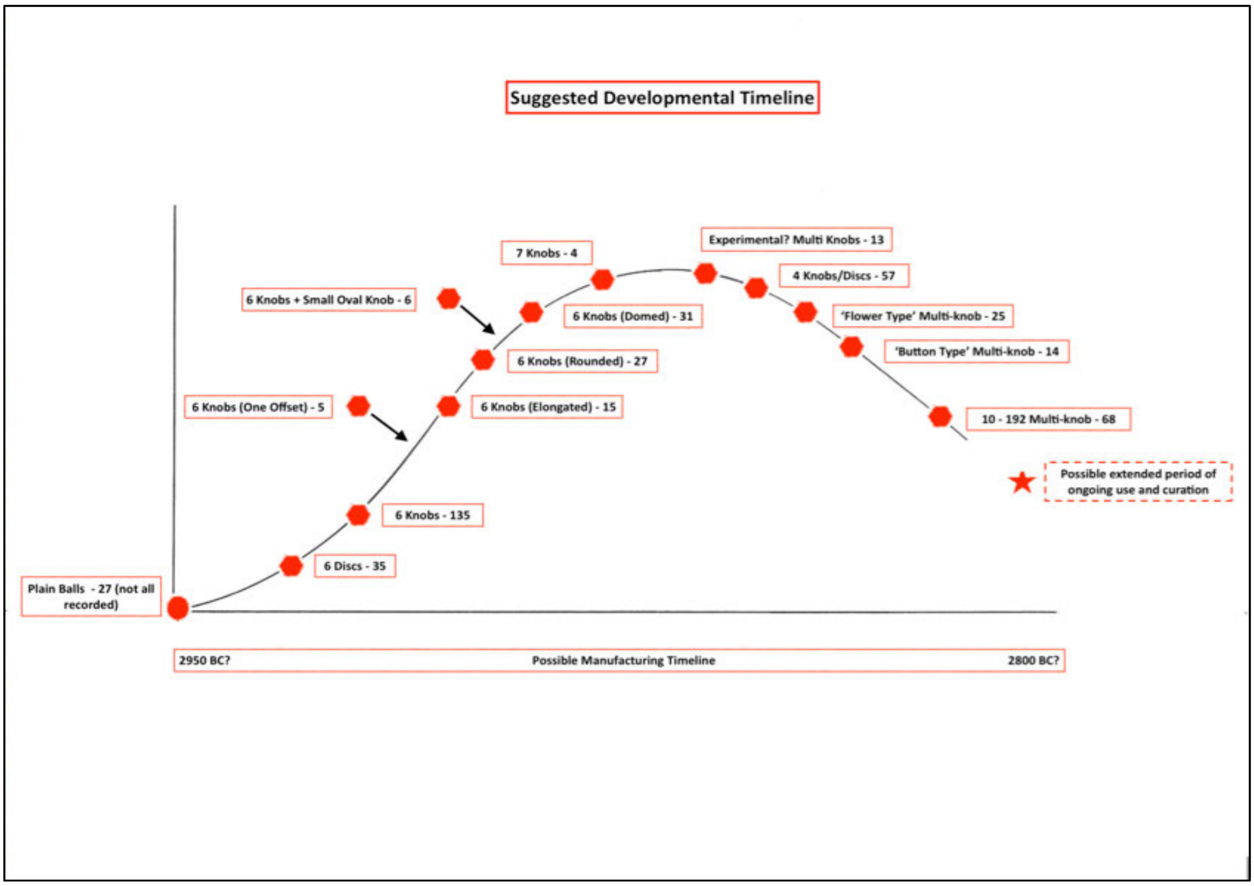
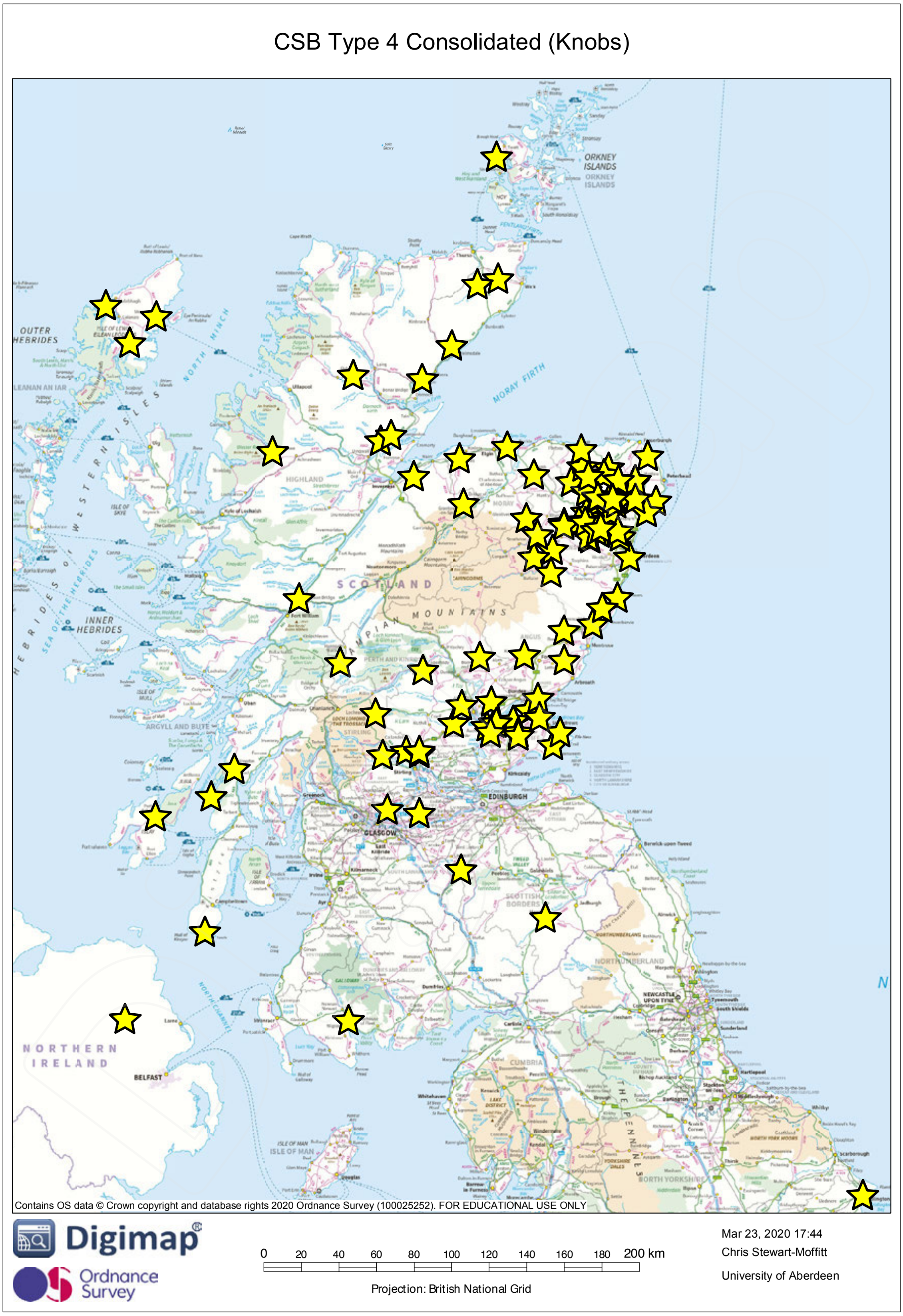
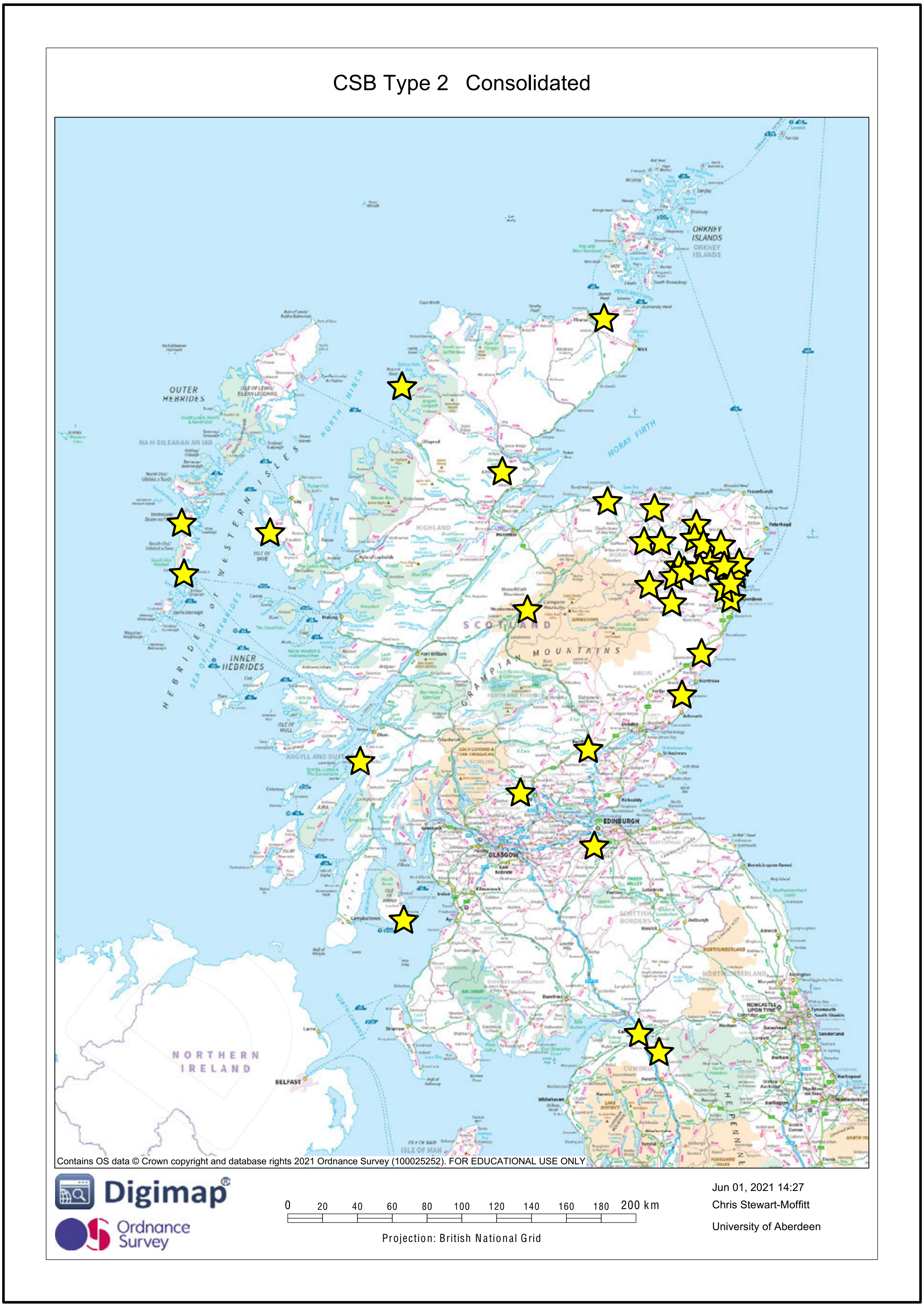


Chart 9.3: Suggested Developmental Timeline and uptake for CSB Manufacture. C. Stewart-Moffitt 2020.

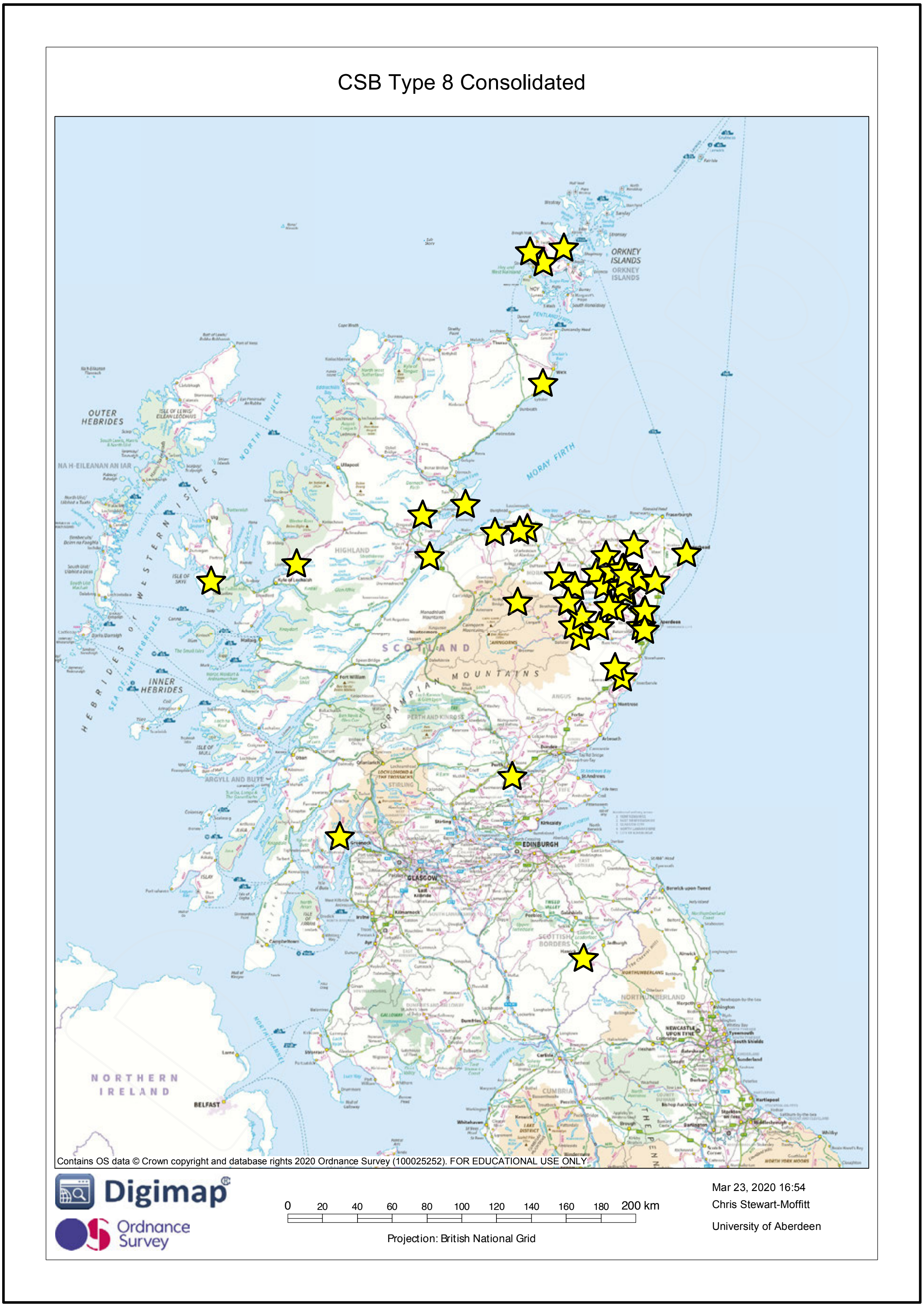
Map 9.1: CSB Type 4 Consolidated (6 Discs). C. Stewart-Moffitt 2020.



Map 9.2: CSB Type 4 Consolidated (6 Knobs). C. Stewart-Moffitt 2020.



Map 9.3: CSB Type 2 (5 Knobs/Discs) Consolidated. C. Stewart-Moffitt 2020.



Map 9.4: CSB Type 8 Consolidated. C. Stewart-Moffitt 2020.

that this area was also undoubtedly significant in its own right (ScARF 5.2.4) and I would argue that a dense concentration of homologous artefacts such as CSBs shows that a strong communal identity was being developed in northeast Scotland.

CSBs as a sign of a wider Communal Identity

The high concentration of CSBs in northeast Scotland appears to indicate that Aberdeenshire, like Orkney, was a significant location in terms of 'innovation and fashion', and despite its eccentric location in the northeast of Scotland seems to have been extremely influential, providing a degree of cultural homogeneity previously unseen. It is possible that the widespread distribution of CSBs we see today is indicative of other groups of people in Scotland aspiring to an ideology similar to that held by those in the northeast which, over time, led to the formation of stable relationships and alliances between many disparate groups (Wason 2004: 112-113). The extensive spread of CSBs that we see today may be the only visible sign left of what eventually became a much more extensive and geographically connected group of communities, who had similar worldviews. Judging by the wide spread of CSBs, co-residence with other groups within this alliance does not seem to have been a requirement (Harris 2014: 89; Mac Sweeney 2011: 30). Perhaps the most important thing was the uptake of the ideology which was demonstrated to others in the possession of a CSB. The creation and development of an extensive network of contacts and alliances would have probably been especially important for people in remote communities. Adopting artefacts and ideologies associated with a larger group would permit communities on the edge to become part of something more substantial, allowing them to interact with others more readily within their global community (Harris 2014: 91). The acquisition of particularly distinctive objects and ideas from distant sources would have enhanced their social identity, while helping to maintain a consensus on social order within the group, shaping ideas about the way they thought about themselves and how they were seen by others (Helms 1993: 95, 101, 161, 198; Edmonds 1995: 15-18). Ideologies and identities shared and perpetuated over space and time could also act as pivots or anchors between a central group and those on its periphery (Harris 2014: 89; Knappet 2014: 105, 122, 169) and would almost certainly have helped mould Late Neolithic communities, both socially and politically, creating bonds and obligations between them and others in their global community (Edmonds 1995: 56, 95).

How might CSBs facilitate cohesiveness

What might have made CSBs so special or popular during the Late Neolithic? I would suggest that there are three reasons for their popularity: the first lies in their particularly enigmatic and aesthetic personality, the second is the concept behind their distinctive morphology and the third is due to their undoubtedly tactile nature. To use a modern analogy, CSBs have the same appeal as a modern smartphone. This was suggested to me in 2015 by a museum curator in Glasgow and I must confess to not taking the analogy seriously at the time, but although I may have misinterpreted her meaning then, I have gradually become aware of the concept she was describing. Like smartphones, CSBs are, to use an unfortunate but perhaps apt modern expression, '*Cool*' which according to the Concise Oxford English Dictionary means '*fashionably attractive or impressive*' (2011: 314); nothing like them had been seen before, they felt good in the hand and their enigmatic, '*difficult to interpret or understand, mysterious*' (Concise Oxford English Dictionary 2011: 473), appearance would have undoubtedly provoked many questions from members of a society more used to practical or useful objects. Although often black and relatively unattractive today, they still have an allure and it's not difficult to imagine how much more appealing they would have been before 5000 years of burial dulled their natural colouration and eroded their surface.

It's interesting to note that the initial reaction people have to CSBs is to think about them teleologically (Knappet 2005: 44, 57), asking what they were used for, closely followed by numerous suggestions for their use. National Museums Scotland has a large file of letters from members of the public offering their own ideas. Everyone wants to hold them, and having held them in their hand, are captivated by them and are often reluctant to return them. So, what is their enduring fascination?

The Smartphone Connection

From a psychological viewpoint it has long been recognised that when an object is novel or distinctive its owner, or in this case perhaps its 'keeper', also looks distinctive by default, its unique character provides an identity (Sundar et al. 2014: 171, 174, 177, 179; Chun et al. 2012: 475-477, 479). CSBs like smartphones have presence, they are stylish, aesthetically pleasing, and fashionable, providing instant user gratification from the tactile sensations they impart. They contain many of the necessary ingredients and potential to support a growing ideology or culture and their possession would have undoubtedly been socially influential. CSBs would have presented people with a stunning symbol of identity, which enabled them to stand out against others, providing them with the ability to connect with or recognise those in a similar position (Sundar et al. 2014: 172; Kuijpers 2018: 265-266). They would undoubtedly have had a positive and desirable effect on their users or keepers and would have provided the ability to be associated with a particular ideology, which in turn would enable acceptance by their local community, peer group or global community. The fashions of today are associated with originality, novelty and distinctiveness, all qualities which are inherent in CSBs (Sundar et al. 2014: 171). Continuing in the same vein for a moment, it is interesting to note that the uptake of fashions can also become diluted as the object becomes mainstream (Sundar et al. 2014: 172, 174, 179), and it's possible that we can see signs of this in the eventual peak and subsequent decline of the popular Type 4 CSBs as can be seen in Chart 9.3.

CSBs may also have been copied or used by people we might today term 'nouveau riche or social climbers' who, having come from an unknown lineage or having achieved great personal power through other means, reached elite status (Fowler 2004: 113; Roscoe 2012: 51). Although such people may have aspired to being part of a burgeoning 'community', it is possible that their non-traditional rise in society may have diluted the exclusivity of CSBs in much the same way as would the introduction of poorer quality imitations, which might have a detrimental effect, weakening the intrinsic value of the originals (Wason 2004: 107). They may also have found it difficult to achieve social approval without having acquired a CSB with a known provenance, or from a recognised craftsperson and this in turn may well have prompted new and more distinctive styles, such as the Type 5a, to be designed (Wason 2004: 113). Perhaps this was the point at which new, more fashionable, or restricted styles of CSB were created to maintain exclusivity (Edmonds 1992: 192; Cannon 1998: 24). It may have encouraged craftspeople to offer new and unique styles like Type 4d, Type7 and Type 8f to local or select groups, enabling them to express personal and cultural ideas, affiliations, and individuality within the overall ideology of CSB use: style being the physical embodiment of these ideas (Capel 2006: 9).

Semiotics and Material Metaphors

Semiotics, the use of symbols to communicate ideas at a glance, are a key form of visual communication. In the Late Neolithic the use of novel artefact types such as CSBs and Grooved Ware pottery would have been particularly distinctive methods of signalling difference or status (Caple 2006: 9). Metaphors are similarly expedient: according to Ray material metaphors are '*a representation or group of representations that encapsulate, in material form, certain kinds of moral, social or ritual relationships, or certain kinds of interaction by means of either a simple metaphorical or complex proverbial portrayal of objects or creatures*' and '*are associated with material culture expressions of social codes and conventions*' (Ray 1987: 67). In archaeology metaphor is used in the latter sense and indicates a solid object acting as a material metaphor or symbol for a specific concept or ideology (Preucel 2010: 142-145). I would therefore suggest that CSBs are metaphors in material or solid form and are, like semiotics, an effective way of expressing often complex ideas through a common language (Cohen 2015: 21). In this respect CSBs work as 'gestalts', sensory images with attached meaning, allowing previously transmitted ideas to be immediately understood based on stylistic recognition. The ideas encoded in them can be recognised unconsciously and instinctively by third parties, thus avoiding the need to explain the ideas they contain each time they are seen (Adams and Adams 2008: 42-43; Mac Sweeney 2011: 52). The particularly distinctive morphology of CSBs would easily have allowed people to recall the meaning behind them, which may have otherwise been impossible in just a few words (Tilley 1999: 267). CSBs were ideal objects to use as solid or material metaphors; even when used at a distance from their origin they were both capable of evoking association with other places, people and ideologies and could act as symbols to represent the ideology behind them (Appadurai 1988: 48-49; Mac Sweeney 2011: 39). They allowed the transmission of ideas to be symbolised and articulated, in turn encouraging mutual support over considerable distances (Mac Sweeney 2011: 15-16).

The Distinctive Morphology of CSBs

The second point relates to the particularly distinctive morphology of CSBs and questions what might have suggested it. Earlier in this chapter I proposed that many CSBs probably originated from plain stone balls. These objects are often found in Neolithic domestic settings and are generally considered to have been used as food grinders; a few have been enhanced with simple incised lines, as can be seen from examples in the National Museums Scotland collection in Edinburgh, which has decorated plain stone balls from Kincardineshire and Eilean Domnhuill in the Western Isles: the latter dated to c. 2800 BC (Jones and Guardamino 2019: 104). Both are perfectly round and show no appreciable signs of use.

Although plain stone balls have been found at a number of locations across Scotland, very few have either provenance or context and at least some have been incorrectly categorised as cannon balls or grain rubbers. While used cannon balls may have signs of burning, unused ones are often in otherwise pristine condition, making it difficult to determine exactly what they were made for, although historical investigation will often help separate prehistoric from historic. Also, those plain stone balls categorized as grain rubbers will often be asymmetric and exhibit signs of wear.

As noted earlier the compilation of the first iteration of the CSB Master Database in 2014/15, with later visits to reported find spots and CSBs in private hands, involved a considerable amount of travel in and around northeast Scotland and throughout the Aberdeenshire countryside. From a phenomenological point of view, it became more and more noticeable over time how the varying landforms of Aberdeenshire resembled the undulating surfaces of CSBs. Low gently rolling hills near the coast, gave way to higher rounded hills further inland in the west and north: the same shapes repeatedly presenting themselves. Unlike the irregularly shaped hills in the north and west of Scotland, the hills of Aberdeenshire have been subjected to considerable glacial weathering and have been ground down into the truncated and rounded profiles we see today. One hill in particular stands out and can be seen across Aberdeenshire from Kildrummy to the coast. In contrast to the majority of hills in Aberdeenshire the prominent Granite tor of Mither Tap on Bennachie, Figure 9.10, withstood glaciation and, from a distance, might be likened to a roughly hewn CSB.

It gradually became evident that both the shallow discs and more prominent knobs we see on CSBs may in fact be a metaphorical microcosm of the landscape, as seen through the eyes of the people who knew it, inhabited its hills and valleys, and journeyed through it (Ingold 1993: 156; 2011: 193). When Tilley described the landscape as '*surrounding the people with a sense of shared history rooted in the past and memorialised.....through shared symbols, providing a focus for common identity and a charter for social action*' he was making the same point. These geographical features were in all probability the mnemonic pegs that embodied and symbolised '*the social construct and moral character of the people who lived there*' (Basso 1984: 45, in Tilley 1999: 182). I would therefore suggest that it was the landscape of Aberdeenshire that made CSBs such a powerful and important metaphor, as they embodied the very places in which the ideology was present '*embodying the emotions, associations and interpersonal shared experience*' of those who lived there (Tilley 1999: 177-178). Even today we can still see this same landscape through our own phenomenological experience; despite it having been altered by anthropomorphic development; its 'bones' as Tilley calls the hills and valleys and other topographical features, all remain the same as they were then (Tilley 2008: 268).

It is possible that, having lived in such a distinctive hilly landscape, craftspeople were inspired by other interesting or unusual topographic features seen during their travels, especially those that were very different to the ones they were used to; possibly inspiring new CSB designs. One in particular deserves a mention, CSB 127, Figure 9.11, has distinctive rounded knobs with flat tops and looks identical to Cnoc na Airig and Cnoc na Cuagaich in the vicinity of Roag, on the Isle of Skye, another CSB findspot: both hills have unusually wide, flat, and truncated summits which might have produced the mental template for this CSB, Figure 9.12.

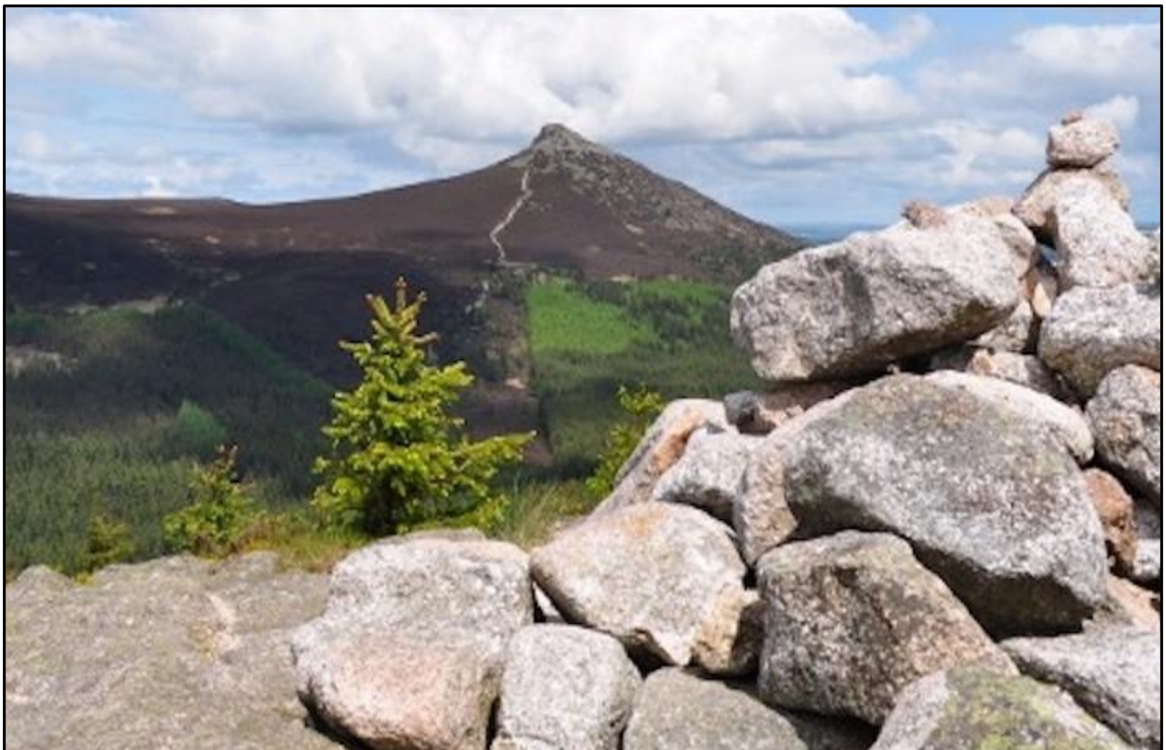


Figure 9.10: Mither Tap, Bennachie, Aberdeenshire. C. Stewart-Moffitt 2020.

Figure 9.11: CSB 127, from Kinkell, Nr. Inverurie, Aberdeenshire. Courtesy of Aberdeen University Museum. C. Stewart-Moffitt 2015.

Figure 9.12: Cnoc na Airig and Cnoc na Cuagaich, Roag, Isle of Skye. C. Stewart-Moffitt 2019.

It would appear that itinerant craftspeople from northeast Scotland were not only travelling to geographically distant places making CSBs from unusual and non-local materials, but may have been replicating unusual landscape features like Cnoc na Airig as a way of conveying new knowledge to members of their own society (Helms 1993: 42).

Loss of influence and their Final Demise

At some point CSBs eventually seem to have reached the end of their useful lives. They may have been discarded or destroyed when affiliations came to an end (Edmonds 1992: 132), lost their meaning as leadership styles changed (Lillios 1999: 257), or simply reached their apogee with the Type 8 multi-knobbed CSBs. Their mutation through the many different forms may have left little scope to improve or modify their design and an alternative symbol was found to replace them. Nevertheless, it seems more likely that their demise was finally due to changes in the social structures or ideology that they supported and having lost their original significance, were finally discarded, and returned to the earth in favour of an alternative symbol.

Conclusion

In this chapter I have presented evidence which suggests that many CSBs may have been made from a plain stone ball, proposed how different types might have evolved stylistically and suggested a theoretical model for their uptake and spread. I have also presented evidence for skill and innovation with the proposal that, while some CSBs were made by amateurs, the majority were made by craftspeople and master craftspeople; of whom a small number were artistic innovators and perhaps drove stylistic change. The social landscape of the Late Neolithic was discussed and CSBs were proposed to be the symbol of a wider communal identity and cohesiveness. Their semiotic value as material or solid metaphors, with the ability to represent a constellation of ideas that could immediately be understood by those who saw them, was described and it was intimated that their unusual morphology was derived from the distinctive landscape of central Aberdeenshire, where they originated from. It was further suggested that their unique form and enigmatic and aesthetically pleasing character made them ideal symbols for promoting and supporting a growing ideology. It was finally suggested that their loss of influence and eventual demise may have been due to a combination of changing affiliations or ideology at which time they were returned to the earth.

Chapter Ten

Conclusions and Future Research

As mentioned in chapter one my first engagement with CSBs was in 2014/15 when I recorded almost all CSBs held in museum collections in Scotland, England, Ireland, and Norway to create the first Master Database and Master Photographic Database for my undergraduate dissertation. During this time, I asked many questions of experts in the field but received few answers and it quickly became clear that, not only was very little known about them, what was known was fragmentary and often incorrect. By the time I had completed my dissertation I began to realise that I was not only the first person to see almost the entire corpus, but that I had repeatedly seen a number of individual design features elsewhere. Many of these seemingly repetitive features had never been noticed previously as they were widely scattered around the country in different collections. Two years later, when I was given access to Frederick Coles' archives, I found that he had also recognised many of the same features: despite this very few had been commented on by other researchers. It was this overall lack of information and knowledge, coupled with the aura of mystery surrounding these artefacts that subsequently inspired this research. This final chapter will evaluate the results of my current study in the light of the original research questions outlined in chapter one. I will consider the points raised by Mark Edmonds in his 1992 review of Carved Stone Balls to evaluate the degree of success I have achieved and finally offer some suggestions regarding the possible direction of future research.

Unanswered Questions c.1992

In 1992 Dr Mark Edmonds, then of Corpus Christi College, University of Cambridge wrote '*Their Use is Wholly Unknown*' (Edmonds 1992: 179 -193) in '*Vessels for the Ances*tors' (Sharples and Sheridan 1992). Edmonds explored the discussion of CSBs to date commenting widely on Dorothy Marshall's 1977 paper, noting that it was the most comprehensive and detailed study to date. He proposed that '*objects often played important roles in directing the interpretation of formal or ritual events and might refer to specific practices, group affiliation or more abstract concepts*' and suggested that these offered potential for understanding CSBs (Edmonds 1992: 187). He stated that the '*range and character of items like CSBs cannot simply be subsumed under the category of 'prestige goods'* and proposed that '*objects like these acted as distinctive media that communicated and sustained a variety of ideas related to the social identity of individuals*' (Edmonds 1992: 189). He also pointed out that '*it still remained difficult to assess the variability between different balls as they showed no clear correlation with distribution or context*' and questioned if the number and type of knobs were in any way significant, noting that the decoration on some CSBs might also suggest the movement of ideas, if not objects. His comments set the scene for this thesis and suggested several research questions that might be asked.

Research Questions

In **Chapter One** I listed eight key research objectives based on the work I had carried out during the previous two and a half years along with the questions raised by Mark Edmonds in his 1992 paper. To recap, the research questions were:

1. Carry out a complete and detailed re-analysis of the corpus to consider the striking similarities between CSB materiality and decorative/ constructional elements and investigate the possibility that individual craftspeople might be identifiable within the corpus. Following this re-analysis; to update and revise Dorothy Marshall's 1977 Classification/Typology by adding new types where necessary.
2. Re-analyse CSB decoration and compare with other Late Neolithic decorative motifs to establish when and why the decoration on some CSBs may have been made and what it might have meant to those who made and saw it.
3. Initiate an expert visual geological characterisation of as many CSBs as possible to reveal more about both the artefacts and their origin as very little serious geological or mineralogical characterisation/identification work had been carried out on CSBs in the past. Most work on CSB materiality appeared to have been carried out by people with a very rudimentary knowledge of these disciplines.
4. Following characterisation, a comparison was to made between the newly identified materiality and the geology surrounding the findspot of individual CSBs. This was required to distinguish between CSBs that may have been made from locally available materials and those that may have been made elsewhere.
5. The landscape context of each CSB was also identified as an integral part of this research and aimed to study the overground geology and agricultural potential of the area along with any contemporary artefacts or monuments

found in the area immediately surrounding CSB findspots. This attempted to identify any contextual links that may have existed between them. An assessment of why some areas seemed to be 'hotspots' for finds was also considered necessary along with the potential use of overland, riverine, or coastal routes for their distribution.

6. Analysis of those CSBs with findspots both by type and other identifying features, such as the number of knobs or discs or decoration, to understand if local or regional connections may have existed.
7. Investigate CSB manufacturing techniques and tools used and examine any suspected nineteenth and twentieth century forgeries.
8. Finally, to interpret and contextualise the above findings to attempt to identify the reasons behind the creation of CSBs and understand how and why they were used to further our knowledge of the Late Neolithic in Scotland.

Have the above objectives been met?

In **Chapters Seven and Eight** Dorothy Marshall's original Classification/Typology was re-evaluated in the light of subsequent research resulting in a number of additional types being identified; their distinctive characteristics suggesting that some of these may have been made by individual craftspeople. Without splitting Marshall's original types unnecessarily, a further six types were identified within those CSBs with five knobs, and thirteen types within those with six knobs along with another, particularly distinctive type, with between seven and fourteen knobs in a 'flower or star' configuration. While some of these characteristics could be random, it is suggested that some may indicate stylistic change over time or innovation by some individual master craftspeople. Additionally, Marshall's multi-knobbed types were split into six separate types based on individual style and number of knobs. As Orkney CSBs clearly followed a very different stylistic development to those from mainland Scotland, they were allocated to a separate type of their own.

The motifs used to decorate some CSBs, discussed in **Chapter Eight**, were compared to those seen on tombs in the Boyne Valley in Ireland, on architecture in Orkney and on othertypes of material culture. While similarities did exist between some types of decoration, they did not appear to have been inspired by that from any particular area or type of material culture, but instead correlated with the general range of decorative elements circulating more widely throughout Britain during the Late Neolithic. It is suggested that most of the simple motifs found on CSBs were commonplace both in the natural world and the social environment, and it may have been these everyday elements that provided the inspiration for CSB decoration. The quality of some decorative motifs also suggested that, while some may have been applied by craftspeople at the time of manufacture, most were probably applied later by their owners or keepers and, in some instances, may have been built up over time. In particular, the variable or inconsistent quality of the decoration on some CSBs suggested that more than one person with varied levels of skill had been involved in the decoration.

The visual geological/mineralogical characterization of CSBs, **Chapter Four**, was the key to unlocking much of their previously hidden 'history' and for the first time since their re-discovery approximately 33% of the corpus have now been accurately characterized. Despite not being able to characterize all CSB collections, due to both lack of time and the availability of professional expertise, those that were characterized have provided us with new insight into the types of stone used and, in some cases, its origin. This new information has made it possible to suggest that craftspeople seem to have been seeking out new and more exotic stone resources outwith Aberdeenshire. Additionally, from the quality of CSBs fashioned from stone only available in the Western Isles and on the west coast of Scotland, it appears that Aberdeenshire craftspeople were travelling to distant locations to make CSBs. To identify those CSBs made from non-local stone the geology surrounding their findspots was also investigated in **Chapter Four**. This found that many CSBs were made from material only available in northeast Scotland and which was not available in the area where they were found, once again pointing to their northeast origin.

Researching the climate and soil conditions of CSB findspots showed, perhaps unsurprisingly, that the majority were in places well suited to animal husbandry, while a few were found in areas of exceptionally fertile brown earth soils enabling both animals and crops to thrive. A more general landscape study in **Chapter Five**, also showed that the majority of CSB findspots were located very near to rivers and their tributaries, not only offering all important access to water for humans, animals, and crops, but also contact and trade with other groups. This led to the suggestion that rivers and inshore coastal trading was the way in which many CSBs, or the ideas behind them, were transported from their central core in Aberdeenshire to locations elsewhere; in some instances, making considerably longer sea journeys, as in the case of those found in the Western Isles.

Chapter Eight considered the manufacture of CSBs and suggested that, while some may have been made using suitably sized cobbles from both rivers and the shore, those that were more skilfully made may have been created from pre-formed plain stone balls, signs of which could be seen in both their symmetry and finish. The skill levels of craftspeople were investigated and, while it seems clear that a percentage of CSBs were made by amateurs, the majority were made by skilled craftspeople and a small number of master craftspeople, who may have also been responsible for innovative change. Proposals were also made regarding the possible stylistic development of CSBs, their uptake by the population and the period during which they were in vogue, which it was suggested may have been as little as a hundred to a hundred and fifty years.

In combining these new strands of knowledge, it became clear that CSBs were more likely to be a social tool, rather than having any practical use and were representative of something much more profound. It was suggested that they were a symbolic representation of an idea or ideology of the people who inhabited Aberdeenshire during the Late Neolithic, and were used as an aide memoire, gestalt or solid or material metaphor of the concepts that their ideology epitomised. The distinctive shape of these artefacts not only embodied the circular archetype which was a feature of homes and public architecture during the Late Neolithic (Bradley 2012: 7-8, 55-56, 66, 126, 210 - 215; Fowler 2013: 180) but the knobs and interspaces cut into their surface were also redolent of the hills and valleys that make up so much of the topography of central Aberdeenshire in all its varied forms. It seems they may have encapsulated the ethos and spirit of a burgeoning communal identity, providing a model for social action and commitment, which drew together disparate groups from across Scotland.

We can only guess at their demise but, as has happened with numerous cultures over the millennia, the ideology that sustained this particular community spirit would have eventually been replaced with an alternative way of living and a different set of symbols more representative of the new society. Being such distinctive symbols of an earlier ideology or culture, it is possible they may have eventually been considered toxic and, with the introduction of new ideas, were deliberately put beyond use through burial in the ground or placed in inaccessible places such as bogs, rivers, and mountaintops. As they were no longer required to maintain the ideology or cultural image they had originally been created to represent, it is probable that they were simply discarded.

In answer to Mark Edmonds

In the light of the new information revealed by this research it is now possible to re-evaluate the comments made by Mark Edmonds in 1992. Edmonds proposed that, '*objects often played important roles in the interpretation of formal or ritual events that might refer to group affiliation'*. I believe the results of this study show that CSBs are the tangible remains of a period of communal identity and *group affiliation* that originated in northeast Scotland during the Late Neolithic and as such played an important role in the maintenance of that identity.

Edmonds also suggested that subsuming CSBs under the heading of 'prestige goods' was not sufficient explanation for their existence and that '*they were a distinctive media that communicated a variety of ideas related to the social identity of individuals'*. As I argued earlier CSBs are particularly distinctive and, as such provide an obvious choice to mediate and visually represent the ideas and aims of a new and influential ideology.

In commenting that it '*still remained difficult to assess their variability or clear correlation with distribution or context'* we have a mixed result; in terms of distribution there are few actual signs of regionality apart from northeast Scotland where, judging by the number of finds and their materiality, they almost certainly originated. Despite that it is still possible to link two Types of CSB more specifically to the areas just north of Aberdeen and along the River Ythan and its tributaries. Context is still a problem however, as although two CSBs have been dated, the vast majority are random finds. That found at the Ness of Brodgar seems to have been used ceremonially since it was found at the base of a remodelled buttress and is believed to have been a foundation deposit.

The potential for future retrieval

Without knowing the likely levels of the Late Neolithic population, the level of ownership among the population, and the period of time over which CSBs were made, especially within the northeast around Aberdeenshire, it is impossible to say with any certainty how many remain to be found in the future. The fact that so many relatively small objects have already been found is surprising as they could so easily have been missed. The reason they were found at all during the nineteenth century is undoubtedly due to a combination of their unique shape, the volume of excavation work carried out by hand, and the digger or ploughman's awareness of his immediate surroundings. With their eyes between 0.5mtr to 1.5mtrs from the surface of the ground discovery would undoubtedly have been much more likely. We can see this in the many stories of eighteenth and nineteenth century ploughmen and ground workers who collected prehistoric artefacts during their daily toil. In comparison, the agricultural worker of today sits in an enclosed cab high above the ground, eyes focused on cultivation and GPS equipment; while construction workers may be controlling digging equipment some meters distant, always having to remain conscious of the safety of other workers. With their minds concentrating on operating complex equipment, it is unlikely they would notice anything as small as a CSB.

A relevant example of how these shortcomings might disadvantage the discovery of CSBs today is in the construction of the Aberdeen bypass. Over the last few years, a 58km stretch of a two and three lane highway, with associated slip roads, drainage ponds and other infrastructure has been built around the City of Aberdeen, Map 10.1 (Dingwall et al. 2019: 1-2). While archaeologists excavated many features along its route no CSBs were found.

It is true that very few CSBs have been found in the past between Stonehaven and Westhill as in the 1880s it was a wild rock-strewn heather moor (Carter 1997: 21). The stony underlying soil which is composed of *humus-iron podzol*, along with an area of uninhabitable *basin peat* on the Hill of Muchalls, would have been less favoured by Late Neolithic people (Tipping 2019: 9, in Dingwall et al. 2019). The southern link section passed through a similar landscape between Kirkton of Maryculter and Charlestown. Further north the section between Westhill and Blackdog runs through an area where a scatter of CSBs have been found in the past, particularly around Dyce and more specifically where the road passes through a landscape of *brown earths* south of Red Moss: this is an area which might have been expected to yield one or two examples, but still none were found.

Hearsay suggests that several CSBs were sold privately by their finders, especially in the late nineteenth century, and not all to the better known Scottish antiquarian collectors mentioned earlier. For instance, when the foundations were excavated at the site of Monymusk School, a cache of eight CSBs were reportedly found, although the location of only two of them are currently known. The account goes on to say that the remainder were pocketed by workmen on site and were probably sold on to collectors (pers. comm. Monymusk). Also had Monymusk School been built a few feet either side of its current location this cache would probably have remained buried beneath its floors or playground. As such more may remain undiscovered in similar circumstances beneath buildings, roads, railway embankments and stone dykes and may never be discovered.

Furthering Carved Stone Ball Research - Going forward

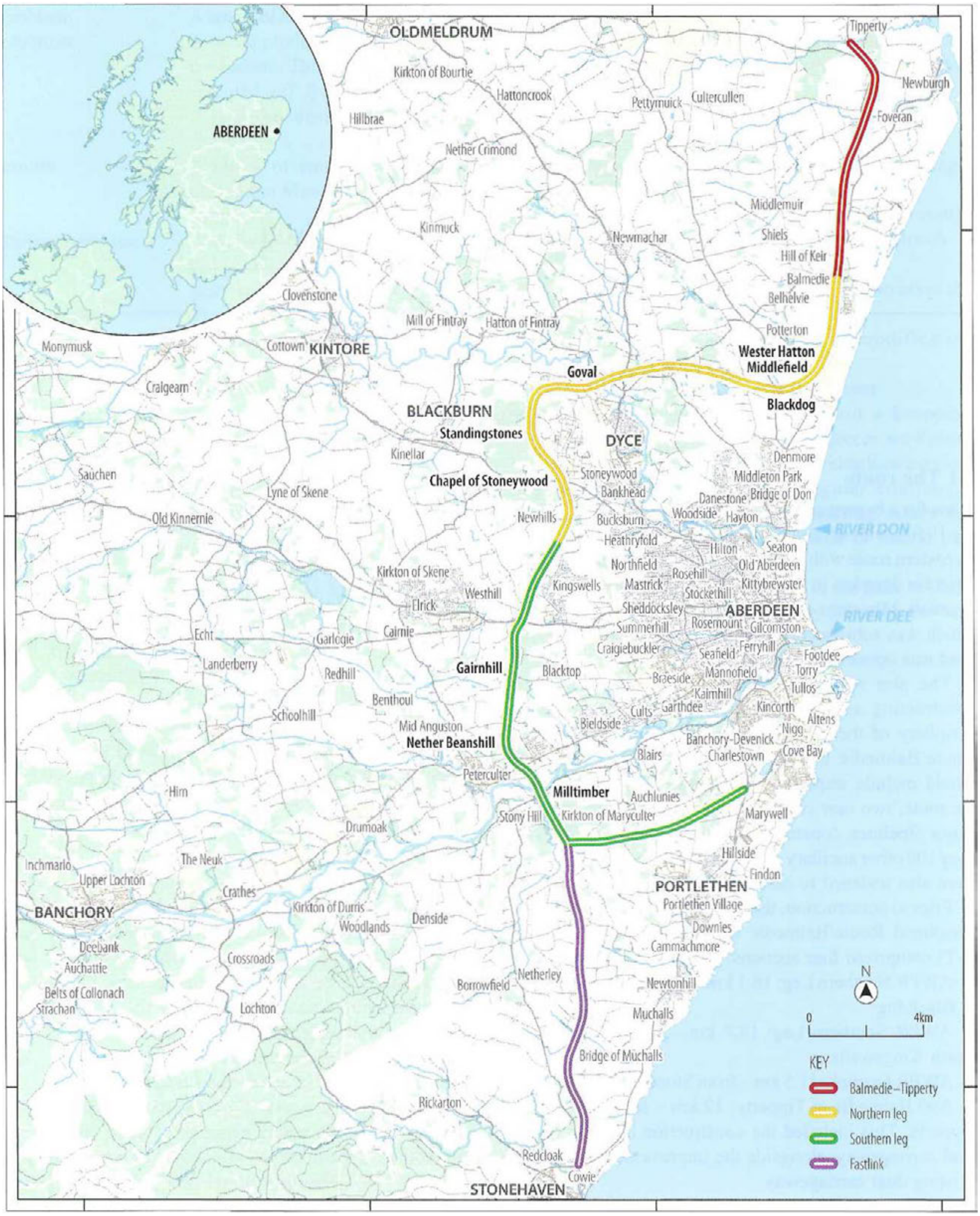
Much work remains to be carried out on these artefacts. Probably the most important task for future research would be the visual geological/mineralogical characterization of the remaining CSBs in museums, especially those in the smaller Scottish and English collections. This would allow a wider and more detailed understanding of them as a whole and might provide a more nuanced evaluation of their overall distribution and geological origin.

However, it comes with the caveat that such characterisation should only be carried out by a geologist/mineralogist with considerable experience of a wide range of Scottish geology. It is simply not enough to label CSBs with igneous, sedimentary, or metamorphic labels: these are unsophisticated all-encompassing categorisations without the detail required to enable ongoing progression of this research. Any future research would require either a geologist or mineralogist with a thorough grounding and in-depth knowledge of the geology and mineralogy of Scotland.

Finally, at least nine forged CSBs have been identified to date and although I have been unable to look at these closer than 40x magnification, I am confident of my judgment in each case. Confirmation of these diagnoses is also available in some instances through comments recorded in museum accession registers and visual evidence. One other CSB that appears to be suspicious is CSB 211 and I believe it would be worth making a separate study of it. Firstly, a visual geological/mineralogical characterization by an expert would be required, followed by a closer assessment of its decoration by scanning electronic microscope to ascertain if the decoration had been made by a stone tool, or by metal engraving equipment. Although it is possibly genuine, I remain unconvinced without a more detailed study. There could of course be CSBs in other collections that may have been forged, especially during the last century, but a detailed methodology would need to be devised to be able to isolate suspected forgeries.

A Final Thought

In **Chapter Three**, I outlined how Carved Stone Balls were originally thought by early commentators to be weapons of war, a concept rarely raised in twentieth century discussions; however this idea has recently surfaced once again. We have no actual proof that they were used offensively or defensively, apart from occasional reports of depressed skull fractures, which could as easily have been caused by means other than being hit with a CSB (Schulting and Wysocki 2005: 107-138). In the event of domestic or territorial disputes there would have undoubtedly been no shortage of ammunition in the form of hand sized stones which, even today lie on the ground throughout Scotland. In the event of the loss of a CSB during an interpersonal conflict plenty of suitably sized stones could be easily



Map 10.1: Route of Aberdeen Bypass. © Dingwall and Wilson 2019.

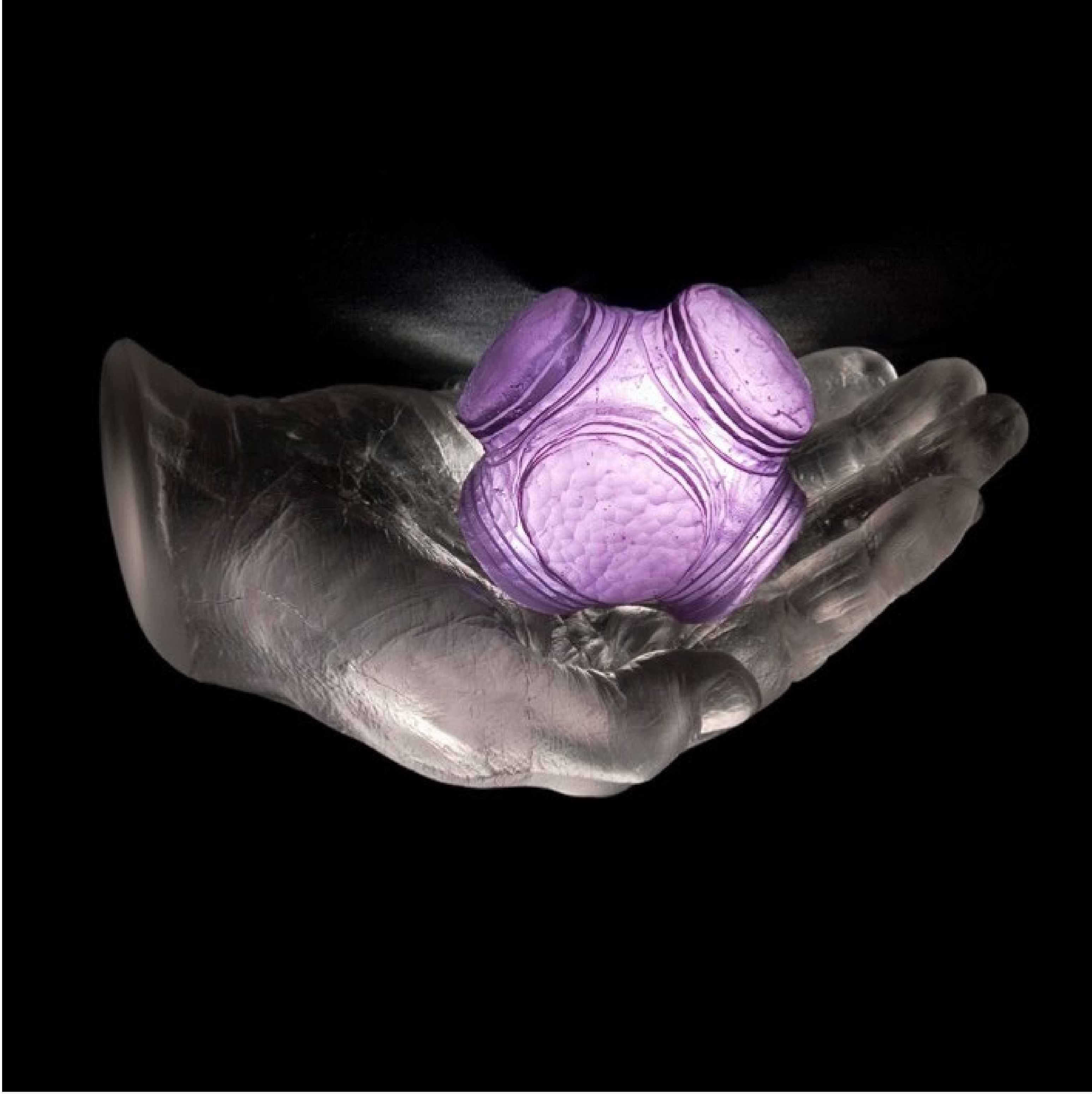


Figure: 10.1: Inverted image of 'Mine' by Scottish Glass Sculptor Louise Tait (my apologies to Louise for the inverted image).

acquired. I therefore believe it is time we stopped propagating the idea that Carved Stone Balls were 'fancy weapons', an idea resurrected in ScARF despite no actual evidence of this being the case (ScARF 2020: 5.2.4). It is an easy way to pass off a difficult question and I believe it fails to recognise the intelligence of our ancestors, or to address their ability for progressive social development.

Archaeology and its many associated disciplines have come a long way since people considered CSBs to be weapons and while it might not be possible to fully comprehend these amazing objects as intimately as Late Neolithic people did, it is important that we use the complete range of our accumulated knowledge, rather than making what are often uninformed and unconsidered assumptions.

To consider them to be weapons is to seriously miss the point and I believe that we should instead be acknowledging that our ancestors had reached a new and important phase in their social development.

Coda

In 1977 Dorothy Marshall wrote '*There must be more carved stone balls than I have on my cards. There are balls described by Smith, Bulmer and Coles and reported in the early volumes of Proceedings of the Society of Antiquaries of Scotland which are now in no known Museum. I would be most grateful for information about balls in private collections or in Museums not on my list'.* In 1983 Marshall listed a further twenty-four CSBs in both private hands and museums as a result of her request.

While more CSBs have emerged since that date there are undoubtedly others in private collections that have not yet been recorded. Although some are known to have been sold at auction in recent years many older regional auction houses have fallen by the wayside since the sale of CSB collections began in the late nineteenth century and few of their sale catalogues still exist. Added to these, there will almost certainly be individual CSBs curated as family heirlooms, while others may lie hidden in attics or outbuildings still awaiting rediscovery. This research has been made possible not only by museums, but also by the generosity of a number of private individuals who wished to know more about their treasured possessions and to those people I am extremely grateful.

I know of at least one other private collection in the south of Aberdeenshire that would add greatly to our knowledge of The Mearns during the Late Neolithic and would welcome the opportunity to add it to the database and gazetteer. Over the past few years at least two balls have been sold to collectors in Europe and it may well be that these are not the only examples they have. At least one other went missing in Scotland during the second world war, when a museum disseminated its collection to local inhabitants for safekeeping: it was seemingly never returned at the end of hostilities.

I am not concerned how these were acquired and it is not my intention to deprive their current keepers of them. My only interest is to record them so that we can learn more about the artefacts themselves, the people who used them and to further our knowledge of Late Neolithic Scotland. Although it would be good to record these personally it may also be possible to record them remotely with a few good quality images, their weight, and overall dimensions. I can be contacted using the details below and I guarantee that everyone's privacy will be absolutely respected.

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Appendix One (Online)

Master Carved Stone Ball Database 2021

Introduction

The Master Database and Gazetteer contain all currently known examples of Carved Stone Balls, including cast/replicas and potential forgeries in both museum collections and private hands in Scotland, England, Ireland, and Norway. It also includes original CSBs that have been auctioned and a number that are now lost/missing. There are undoubtedly more in private hands.

Most of the artefacts in the database were recorded by the author between 2014 and 2015 for a BA (Hons) Archaeology degree with Leicester University. Since that date continuing research has added approximately 60 additional CSBs.

1. Each carved stone ball has been allocated a unique reference number prefixed with the letters CSB, Auctioned CSB (sold at auction) or LM CSB (lost/missing).
2. The numbering system used for this database grew from information originally provided by museums with carved stone ball collections. The museums were not visited in the order they are listed on the database but as and when they could accommodate a research visit. On visiting museum collections, some 'CSBs' were found to be grain rubbers, cannon balls and fossils. As a result of this, and the prior allocation of CSB numbers on the basis of stated collection numbers, the following CSB numbers remain unallocated: 023, 024, 030, 076, 081, 082, 106, 206, 492, 494, 496. The numbering of the database does not therefore run consecutively.
3. Replicas are clearly recorded on the Master Database in **red** as **Cast/Replica**. In some cases, they represent the only example of an original ball that was lost or sold at auction: this information is detailed in the description section of both the Master Database and the Gazetteer. Recording cast/replicas provided a more accurate representation of the entire corpus as a whole.
4. **Stewart-Moffitt Type:** This refers to the type number of individual CSBs in the revised typology produced by this author (based on the original categorisation compiled by Dorothy Marshall in her 1977 paper).
5. **Marshall Type:** This refers to the original type number of each CSB as allocated by Dorothy Marshall. In the case of CSBs not recorded by Marshall this will be listed as N/A or un-recorded.
6. **Material:** This indicates the type of stone each CSB was manufactured from. In many cases this was taken from the original acquisition records, however it must be noted that these records are potentially inaccurate. In the past many CSBs were recorded as 'Greenstone', a generic name for a wide variety of stone, often based on its colour. Their original identification was made by both antiquarians and museums, and it is clear that many people had a limited or amateur knowledge of geology. To date 33.33% have been visually characterised; material in black type indicates the original characterisation, while that in red type has been visually characterised by Dr John Faithfull, curator (mineralogy and petrology) at the Hunterian Museum in Glasgow.
7. **Weight:** All CSBs were weighed using portable digital scales with a capacity of 1,000g. Any listed as 'Overweight' means the artefact was over the capacity of the portable scales and that higher capacity scales were unavailable. Where higher capacity scales were available weights of over 1000g are accurate.
8. **Average Diameter:** In the case of six knobbed balls the diameters were taken three times across the highest point of the three pairs of knobs, these were subsequently totalled and divided by three to obtain the maximum average diameter. The diameters of multi-knobbed CSBs were taken randomly across the highest points of the ball six times and were again totalled and divided by six to obtain an average. All dimensions were taken in millimetres using Carbon Fibre Electronic Digital Callipers to avoid damage to the artefact.
9. **Average Diameter of Knobs:** The diameter of each knob was taken once and added to those of the remaining knobs. This total figure was divided by the number of knobs to give an average. Where the knobs were different sizes, they were divided into small, medium, and large knob groups or recorded individually.

10. **Approximate Findspot:** In most cases this was taken from museum records: it should be noted that several museum records were found to be inaccurate when compared to original accession documents. Some accession registers were not available; in one instance having been lost in a fire. The information in these registers was at best sketchy, with just the name of the donor or collector and, in most instances, did not record the findspot beyond naming the parish or town. Despite this shortcoming, in a handful of cases, research among online and paper records has brought additional information to light.
11. **Description:** Some descriptions have been taken from museum records where it existed; others have been supplemented by this author, particularly in cases where noteworthy material or decoration was evident.
12. **History:** This is the history of individual CSBs and has been mostly gathered from museum record cards and accession registers. Additional information has been gathered from online and paper records outwith museums to supplement often sparse records.

The Master Database is otherwise self-explanatory. In many cases additional information can be found in the Gazetteer which has a list of Neolithic and Bronze Age artefacts and features found within a three square kilometre area surrounding the approximate CSB findspot, along with a map of that area.

http://doi.org/10.32028/9781803271262-database

Appendix Two (Online)

Introduction to Gazetteer

The gazetteer contains all currently known examples of Carved Stone Balls, including Cast/Replicas and potential forgeries in both museum collections and private hands in Scotland, England, Ireland, and Norway. It also includes original CSBs that have been auctioned and a number that are now Lost/Missing. Many more are undoubtedly in private collections.

Most of the artefacts in the database were recorded by the author between 2014 and 2015 for a BA (Hons) Archaeology degree with Leicester University. Since that date continuing research has added approximately 60 additional CSBs.

1. Each carved stone ball has been allocated a unique reference number prefixed with the letters CSB, Auctioned CSB (sold at auction) or LM CSB (lost/missing).
2. Each datasheet has a unique number on the top left hand side of the first page, repeated on the bottom left hand side (for easy access in a paper file).
3. The following notes explain the methodology used in the production and presentation of the information contained within the Gazetteer.
4. The numbering system used for this database grew from information originally provided by museums with carved stone ball collections. The museums were not visited in the order they are listed on the database but as and when they could accommodate a research visit. On visiting museum collections, some 'CSBs' were found to be grain rubbers, cannon balls and fossils. As a result of this, and the prior allocation of CSB numbers on the basis of stated collection numbers, the following CSB numbers remain unallocated: 023, 024, 030, 076, 081, 082, 106, 206, 492, 494, 496. The numbering of the database does not therefore run consecutively as a result of the re-allocation of previously unused numbers. Unallocated datasheets have been included in the attached Gazetteer for the sake of continuity.
5. Replicas are clearly recorded on the Master Database in **red** as **Cast/Replica.** In some cases, they represent the only example of an original ball that was lost or sold at auction: this information is detailed in the description section of both the Master Database and the Gazetteer. Recording cast/replicas provided a more complete and historically accurate representation of the entire corpus of these artefacts.
6. Auctioned carved stone balls were added only when proven from auction catalogues. As many auction houses have been amalgamated or ceased trading over the years there will undoubtedly be many more CSBs in private hands.

Following comprehensive research of entries on the Historic Environment Scotland website Canmore and the Proceedings of the Society of Antiquaries of Scotland, a further category was added, that of Lost/Missing (but proven/believed to exist through extensive research).

Each Gazetteer sheet contains the following information:

1. **Number of Knobs:** These are the total number of deliberately raised areas on the surface of each Carved Stone Ball. Whilst generally known as 'knobs' they may also be referred to as 'discs' in the text where they are exceptionally low. Where no knobs exist an alternative explanation of decoration will be given. ie. Spiral. In the few cases where the knobs were very worn, museum records were used; those with numerous knobs were recorded using elastic bands to divide the knobs into segments: in a few cases this led to a revision of the museum record.
2. **Stewart-Moffitt Type:** This refers to the type number of individual CSBs in the revised typology produced by this author (based on the original categorisation compiled by Dorothy Marshall in her 1977 paper).
3. **Marshall Type:** This refers to the original type number of each CSB allocated by Dorothy Marshall. In the case of CSBs not recorded by Marshall this will be listed as N/A or un-recorded.
4. **Material:** This indicates the type of stone each CSB was manufactured from. In many cases this was taken from the original acquisition records, however it must be noted that these records are potentially inaccurate. In the past many CSBs were recorded as 'Greenstone', a generic name for a wide variety of stone, often based on its colour. Their original identification was made by both antiquarians and museums, and it is clear that many people had a limited or amateur knowledge of geology. To date 33.33% have been visually characterised; material in black type indicates the original characterisation, while that in red

type has been visually characterised by Dr John Faithfull, curator (mineralogy and petrology) at the Hunterian Museum in Glasgow.

5. **Weight:** All CSBs were weighed using portable digital scales with a capacity of 1,000g. Any listed as 'Overweight' means the artefact was over the capacity of the portable scales and that higher capacity scales were unavailable. Where higher capacity scales were available weights of over 1000g are accurate.
6. **Average Diameter:** In the case of six knobbed balls the diameters were taken three times across the highest point of the three pairs of knobs, these were subsequently totalled and divided by three to obtain the maximum average diameter. The diameters of multi-knobbed CSBs were taken randomly across the highest points of the ball six times and were again totalled and divided by six to obtain an average. All dimensions were taken in millimetres using Carbon Fibre Electronic Digital Callipers to avoid damage to the artefact.
7. **Average Diameter of Knobs:** The diameter of each knob was taken once and added to those of the remaining knobs. This total figure was divided by the number of knobs to give an average. Where the knobs were different sizes, they were divided into small, medium, and large knob groups or recorded individually.
8. **Approximate Findspot:** In most cases this was taken from museum records: it should be noted that several museum records were found to be inaccurate when compared to original accession documents. Some accession registers were not available; in one instance having been lost in a fire. The information in these registers was at best sketchy, with just the name of the donor or collector and in most instances did not record the findspot beyond naming the parish or town. Despite this shortcoming, in a handful of cases, research among online and paper records has brought additional information to light.
9. **Administrative Areas:** This was taken from the Historic Environment Scotland Canmore database (http://canmore.org.uk) or local authority databases.
10. **National Grid Reference:** This information also comes mainly from Canmore except in the few instances where a more accurate location is known to this author from the finder. Where the exact location is unknown, the Canmore NGR entry is located at the southwest corner of the nearest 1km grid square.
11. **Canmore ID**: Taken from CSB entries on the Canmore database. This relates to the unique record identity for the site.
12. **Canmore Site Number:** Taken from CSB entries on the Canmore database and again relates to the Canmore unique record identity for the site.
13. **Canmore url (2016):** This is the location for the individual CSB record in the Canmore database.
14. **Description:** Some descriptions have been taken from museum records; others have been supplemented by this author, particularly in cases where noteworthy material or decoration was evident.
15. **History:** This is the history of individual CSBs and has mostly been gathered from museum record cards and accession registers. Additional information has also been gathered from online and paper records outwith museums to supplement often sparse records.
16. **Current Location:** This is the location that each CSB was reported to be from.
17. **Museum Acquisition Number:** This is the individual artefact acquisition number from museum collections.
18. **Photographs:** At least one photograph was taken of each CSB using a Nikon D5200 Digital Camera with AF-S Nikkor 18-55 mm 1:3.5-5.6G lens, in conjunction with a Hard Case Light-box, permanently fitted with two 240v Daylight Lamps and a professional 10m Scale Bar. While the lightbox helped greatly with light levels in a variety of often, less than ideal and occasionally pressurised photographic locations, the photos unfortunately vary in quality.
19. **Past Map Database of Neolithic/Bronze Age Features:** This represents all recorded Neolithic/Bronze Age artefacts recorded on Past Map (www.pastmap.org.uk) within a 3km square centred on the approximate location of the individual Carved Stone Ball.
20. **Map:** Where sufficient findspot information is available for individual CSBs, a map is provided by (http://digimap.edina.ac.uk/roam/os) to show the approximate CSB location and associated Neolithic/Bronze Age features. In recording these features the map also provides an impression of landscape occupancy during the Neolithic and Bronze Age periods.

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Appendix Three

CSB Skill Assessment

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
001	1	2	2	2				7
002	2	2	1	0				5
003	2	2	1	0				5
004	3	2	1	0				6
005	3	1	1	0				5
006	3	2	1	0				6
007	3	2	1	0				6
008	3	1	3	0		+		7 +
009	2	2	2	0	M			6 M
010	2	1	1	0				4
011	3	1	3	0		+		7 +
012	2	1	0	0				3
013	2	1	3	0		+		6 +
014	3	1	2	0	M			6 M
015	3	2	3	0	M			8 M
016	--	--	--	--			Cast	--
017	3	2	1	0				6
018	2	2	1	0				5
019	1	1	0	0				2
020	3	2	3	0		+		8 +
021	3	2	1	0	M			6 M
022	3	2	0	0				5
023	--	--	--	--			Unallocated	--
024	--	--	--	--			Unallocated	--
025	3	3	2	0	M			8 M
026	3	3	2	0	M			8 M
027	--	--	--	--			Not a CSB?	--
028	3	2	2	0	M			7 M
029	3	1	3	0	M			7 M
030	--	--	--	--			Unallocated	--
031	3	1	2	0				6
032	1	1	0	0			Unfinished ?	2
033	3	2	3	0		+		8 +
034	2	2	1	0				5
035	3	3	3	3	M			12 M
036	3	2	2	0	M			7 M
037	3	1	2	0		+		6 +
038	1	1	1	0				3
039	3	1	3	0		+		7 +
040	3	1	3	0		+		7 +
041	3	1	3	0		+		7 +
042	3	1	3	0		+		7 +

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
043	3	1	3	0		+		7 +
044	2	2	3	0		+		7 +
045	3	3	3	3		+	Not CSB ?	12 +?
046	3	3	3	3	M			12 M
047	3	3	3	0	M			9 M
048	3	3	3	0		+		9 +
049	3	2	2	0	M			7 M
050	3	2	1	0				6
051	1	1	0	1			Eroded ?	3
052	3	3	3	0		+		9 +
053	2	2	1	0				5
054	1	1	0	0				2
055	3	1	2	0	M			6 M
056	2	1	0	0				3
057	2	1	2	0				5
058	3	1	2	0			Unfinished ?	6
059	3	1	3	0		+		7 +
060	3	2	1	0				6
061	2	1	0	0				3
062	2	1	1	0				4
063	2	2	1	0				5
064	3	2	2	0	M			7 M
065	2	1	3	0		+		6 +
066	0	0	0	0			Degraded ?	0
067	2	2	1	0				5
068	2	2	1	0				5
069	2	2	1	0				5
070	3	2	2	0				7
071	2	1	1	2				6
072	3	2	1	0				6
073	3	3	3	3		+		12 +
074	3	3	2	0	M			8 M
075	3	2	2	0	M			7 M
076	--	--	--	--			Unallocated	--
077	3	2	0	0				5
078	3	1	3	0	M			7 M
079	3	2	3	0		+		8 +
080	2	1	0	0				3
081	--	--	--	--			Unallocated	--
082	--	--	--	--			Unallocated	--
083	3	1	3	2	M			9 M
084	2	1	1	0				4
085	3	3	2	0	M			8 M
086	3	1	2	0		+		6 +
087	3	2	2	0	M			7 M
088	3	1	0	0				4
089	3	2	3	2	M			10 M
090	2	1	2	0				5 M

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
091	2	2	0	0				4
092	2	2	0	0				4
093	3	2	0	0				5
094	2	2	0	3			Medieval Decoration ?	??
095	2	2	1	0				5
096	1	1	1	0				3
097	1	1	1	0				3
098	2	2	1	0				5
099	3	1	1	0				5
100	3	1	2	0		+	Abraded	6 +
101	3	2	1	0				6
102	2	2	2	0		+		6 +
103	1	1	1	1				4
104	3	3	3	3		+		12 +
105	--	--	--	--			Lost/Missing	--
106							Rephotograph ?	
107	2	2	1	0				5
108	0	2	0	0				2
109	3	3	3	3		+		12 +
110	3	3	1	0				7
111	3	3	3	0		+	Additional Knob	9 +
112	3	2	0	0				5
113	3	2	0	0				5
114	2	2	2	0				6
115	3	2	0	0				5
116	3	1	3	0		+		7 +
117	3	2	2	0				7
118	1	2	0	0				3
119	3	2	1	0				6
120	3	2	0	0				5
121	1	2	1	0				4
122	2	1	0	0				3
123	3	2	1	0				6
124							Missing ?	
125	3	2	3	0	M			8 M
126	--	--	--	--			Location Unknown ?	--
127	3	2	3	0	M			8 M
128	3	1	3	0		+		7 +
129	2	1	1	0				4
130	3	2	1	0				6
131	3	2	3	0		+		8 +
132	3	3	3	0		+		9 +
133	1	1	0	0				2
134	3	2	1	0				6
135	2	1	3	0				6
136	3	2	3	0	M			8 M
137	2	1	0	0				3
138	3	2	1	0				6

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
139	2	2	0	0				4
140	3	2	3	0		+		8 +
141	3	2	1	0				6
142	3	2	1	0				6
143	3	2	1	0				6
144	3	2	1	0				6
145	2	1	0	0				3
146	3	1	3	0		+		7 +
147	3	1	1	0				5
148	1	2	1	0				4
149	3	1	3	0		+		7 +
150	3	2	2	0	M			7 M
151	3	1	2	0	M			6 M
152	2	2	1	0				5
153							To be recorded ?	
154	3	2	1	0				6
155	3	1	2	0		+		6 +
156	3	2	1	0				6
157	2	1	0	0				3
158	1	1	0	0				2
159	0	1	0	0				1
160	3	3	3	0	M			9 M
161	1	1	0	0				2
162	3	2	3	0		+		8 +
163	3	2	1	0				6
164	1	1	0	0				2
165	3	1	2	2	M			8 M
166	3	2	1	2				8
167							Missing ?	
168	3	2	1	2				8
169	2	3	1	2				8
170							Missing ?	
171	3	2	3	0		+		8 +
172	3	2	1	0				6
173	2	1	0	0				3
174	0	0	0	0			Not a CSB ?	0
175	--	--	--	--			Not available/missing	
176	--	--	--	--			Unallocated	--
177	2	1	0	0				3
178	3	2	1	0				6
179	2	2	0	1				5
180	3	2	1	0				6
181	0	0	0	0			Not a CSB ?	0
182	3	2	1	0				6
183	2	2	1	0				5
184	3	2	1	0				6
185	3	2	1	0				6
186	3	1	2	3		+		9 +

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
187							Missing ?	
188	3	1	1	2			CSB or Grain Rubber ?	7
189	1	1	0	0				2
190	0	0	0	0				0
191	3	2	1	0				6
192	2	2	1	0				5
193	1	2	2	0				5
194	--	--	--	--			Not CSB ?	--
195	2	1	0	0				3
196	2	1	2	0		+		5 +
197	3	1	3	0		+		7 +
198	3	1	3	0		+		7 +
199	2	1	3	0		+		6 +
200	3	1	2	0		+		6 +
201	2	1	0	0				3
202	0	0	0	0				0
203	2	1	1	0				4
204	--	--	--	--			Cast	--
205	--	--	--	--			Cast	--
206							Unallocated	
207	3	1	3	0		+		7 +
208	1	1	0	2				4
209	1	1	0	0				2
210	3	2	3	0	M			8 M
211	3	2	3	3	M			11 M
212	3	2	0	0				7
213	2	1	3	0		+		6 +
214	1	1	1	0				3
215	3	1	1	0				5
216	1	1	2	0				4
217	0	2	0	0				2
218	3	2	3	0	M			8 M
219	3	2	3	0	M			8 M
220	1	1	0	0				2
221	3	1	2	0	M			6 M
222	1	2	2	2				7
223							Missing	
224	2	1	0	0				3
225	3	2	2	0	M			7 M
226	2	1	1	0				4
227	3	1	3	0		+		7 +
228	2	2	3	3	M			10 M
229	2	1	1	0				4
230	3	3	2	0	M			8 M
231	2	2	1	0				5
232	3	2	1	0				6
233	3	3	1	0				7
234	2	2	1	0				5

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
235	3	2	1	0				6
236	1	0	1	0				2
237	1	1	1	0				3
238	0	3	2	0				5
239	0	0	0	0				0
240	3	2	3	0	M			8 M
241	3	1	3	0		+		7 +
242	2	2	3	0		+		7 +
243	2	1	1	0				4
244	2	1	0	0				3
245	1	1	0	0				2
246	1	3	1	0				5
247	2	2	1	0				5
248	3	2	1	1				7
249	1	2	0	0				3
250	2	2	1	0				5
251	2	2	0	0				4
252	3	1	2	0				6
253	--	--	--	--			Cast	--
254	2	1	0	0				3
255	3	2	2	0				7
256	1	2	2	0		+		5 +
257	1	1	2	1		+		5 +
258	3	2	1	0				6
259	2	1	0	0				3
260	1	1	0	0				2
261	1	1	0	0				2
262	3	1	2	0		+		6 +
263	1	1	0	0				2
264	3	1	2	0	M			6 M
265	3	2	3	0		+		8 +
266	1	1	0	0				2
267	1	1	0	0				2
268	3	3	3	1		+		10 +
269	3	2	1	0				6
270	1	1	0	0				2
271	2	2	1	0				5
272	3	1	3	0		+		7 +
273	--	--	--	--			Forgery ?	--
274	3	2	1	0				6
275							Forgery?	
276							Forgery?	
277	--	--	--	--			Forgery?	--
278	--	--	--	--			Cast	--
279	1	1	0	0				2
280	1	1	0	1				3
281	2	1	0	0				3
282	3	1	3	0		+		7 +

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
283	3	2	3	3		+		11 +
284	3	0	2	0		+		5 +
285	--	--	--	--			Cast	--
286	3	2	1	0				6
287	3	2	2	2	M			9 M
288	3	2	2	0	M			7 M
289	--	--	--	--			Cast	--
290	3	2	1	0				6
291	--	--	--	--			Cast	--
292	--	--	--	--			Cast	--
293	--	--	--	--			Cast	--
294	--	--	--	--			Cast	--
295	--	--	--	--			Cast	--
296	--	--	--	--			Cast	--
297	--	--	--	--			Cast	--
298	1	3	1	2				7
299	2	1	0	0				3
300	3	1	2	0		+		6 +
301	3	3	3	3		+	Forgery ?	?
302	2	1	2	0		+		5 +
303	3	2	2	0				7
304	--	--	--	--			Cast	--
305	--	--	--	--			Cast	--
306	1	2	2	2				7
307	2	2	1	0				5
308	--	--	--	--			Cast	--
309	--	--	--	--			Cast	--
310	--	--	--	--			Cast	--
311	--	--	--	--			Cast	--
312	1	1	0	0				2
313	--	--	--	--			Cast	--
314	--	--	--	--			Cast	--
315	--	--	--	--			Cast	--
316	--	--	--	--			Cast	--
317	--	--	--	--			Cast	--
318	--	--	--	--			Cast	--
319	2	2	1	0				5
320	--	--	--	--			Cast	--
321	--	--	--	--			Cast	--
322	--	--	--	--			Cast	--
323	--	--	--	--			Cast	--
324	3	2	3	0	M			8 M
325	--	--	--	--			Cast	--
326	3	2	3	0	M			8 M
327	3	1	3	0	M			7 M
328	1	2	1	0				4
329	3	3	1	0				7
330	3	2	2	0	M			7 M

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
331	2	2	3	0		+	Additional Knob	7 +
332	2	2	2	0	M			6 M
333	2	2	1	1				6
334	3	3	3	0		+		9 +
335	3	3	2	0	M			8 M
336	3	2	2	0	M			7 M
337	3	2	2	0	M			7 M
338	3	2	3	0		+		8 +
339	3	2	2	0				7
340	3	2	2	0	M			7 M
341	--	--	--	--			Cast	--
342	2	2	1	0				5
343	3	2	2	0	M			7 M
344	3	2	2	0	M			7 M
345	2	2	0	0				4
346	3	2	2	0	M			7 M
347	2	2	1	0				5
348	1	1	1	0				3
349	3	1	0	0				4
350	2	1	2	0				5
351	3	2	1	0	M			6 M
352	1	2	1	0				4
353	3	2	1	0				6
354	2	2	2	1		+		7 +
355	3	2	0	0				5
356	3	1	2	2	M			8 M
357	3	1	2	0				6
358	2	2	0	0				4
359	2	0	0	0				2
360	3	2	2	0	M			7 M
361	3	2	3	0		+		8 +
362	3	2	0	0				5
363	3	2	0	0				5
364	2	2	2	0	M			6 M
365	2	2	1	0				5
366	3	2	3	0	M			8 M
367	2	2	1	0				5
368	1	2	0	0				3
369	3	2	1	0				6
370	3	2	1	3	M			9 M
371	1	2	0	0				3
372	3	2	2	0				7
373	3	2	1	0				6
374	3	2	1	0				6
375	3	3	1	0				7
376	3	3	1	0				7
377	3	2	0	0				5
378	3	2	0	0				5

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
379	3	2	0	0				5
380	3	2	0	0				5
381	1	2	0	0				3
382	3	3	1	0	M			7 M
383	3	2	1	0	M			6 M
384	2	2	0	0				4
385	3	2	1	0				6
386	1	1	0	0				2
387	--	--	--	--			Cast Replica	--
388	3	3	3	3		+		12 +
389	3	1	0	0				4
390	3	2	0	0				5
391	3	2	2	0	M			7 M
392	1	2	1	0				4
393	3	3	1	0	M			7 M
394	2	2	0	0				4
395	3	2	2	0		+		7 +
396	1	1	0	0				2
397	3	2	2	0	M			7 M
398	2	2	3	0	M			7 M
399	--	--	--	--			Cast Replica	--
400	--	--	--	--			Cast Replica	--
401	--	--	--	--			Cast Replica	--
402	--	--	--	--			Cast Replica	--
403	--	--	--	--			Cast Replica	--
404	0	1	0	0				1
405	2	2	0	0				4
406	3	2	0	0				5
407	1	2	1	0				4
408	3	2	0	0				5
409	3	2	1	0				6
410	0	1	0	0				1
411	3	2	2	0	M			7 M
412	3	2	3	0	M			8 M
413	3	3	3	0	M			9 M
414	3	3	3	0		+		9 +
415	--	--	--	--			Cast Replica	--
416	2	2	3	0		+		7+
417	3	2	1	0				6
418	3	2	0	0				5
419	2	2	3	0		+		7 +
420	3	2	3	0	M			8 M
421	0	2	1	0				3
422	3	3	3	0	M			9 M
423	3	2	0	0				5
424	3	2	0	0				5
425	3	2	0	0				5
426	2	2	1	0				5

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
427	3	2	1	0				6
428	2	3	1	0				6
429	1	2	0	0				3
430	2	2	2	0				6
431	2	2	0	0				4
432	1	1	2	0				4
433	3	2	0	0				5
434	3	2	0	0				5
435	1	2	3	0		+		6 +
436	3	2	0	0				5
437	--	--	--	--			Cast Replica	--
438	3	3	1	1				8
439	3	2	0	0			Unfinished	5
440	3	2	1	0				6
441	3	2	0	0				5
442	1	1	0	0				2
443	2	2	0	0				4
444	3	3	3	0		+		9 +
445	2	1	2	0		+		5 +
446	2	2	0	0				4
447	1	2	1	0	M			4 M
448	3	3	3	3		+		12 +
449	2	2	2	2	M			8 M
450	--	--	--	--			No Data	--
451	1	1	2	0	M			4 M
452	3	3	3	3	M			12 M
453	3	2	3	3	M			11 M
454	2	2	2	0	M			6 M
455	3	1	2	0	M			6 M
456	2	2	2	0	M			6 M
457	3	2	0	0			Unfinished	5
458	3	2	2	0	M			7 M
459	0	2	0	0				2
460	3	2	1	0	M			6 M
461	3	2	1	0	M			6 M
462	2	2	0	2	M			6 M
463	--	--	--	--			Cast Replica	--
464	--	--	--	--			Cast Replica	--
465	--	--	--	--			Cast Replica	--
466	3	2	2	0		+		7 +
467	1	1	1	0				3
468	--	--	--	--			Cast Replica	--
469	2	3	1	0	M			6 M
470	3	2	0	0				5
471	3	2	1	0	M			6 M
472	--	--	--	--			Forgery/Replica	--
473	3	2	3	0	M			8 M
474	3	2	3	0		+		8 +

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
475	2	1	0	0				3
476	3	2	3	3	M			11 M
477	3	2	0	0				5
478	2	0	0	0				2
479	2	2	1	0				5
480	3	2	2	0	M			7 M
481	3	2	0	0				5
482	2	2	3	0	M		Unfinished	7 M
483	--	--	--	--			Unfinished	--
484	2	2	2	0	M			6M
485	2	2	0	0				4
486	3	1	2	0	M			6 M
487	3	2	2	0	M		Unfinished	7 M
488	3	2	0	0				5
489	2	2	2	2	M			8 M
490	3	2	3	3	M			11 M
491	3	3	0	0				6
492	--	--	--	--			Unallocated	--
493	3	3	3	0	M			9 M
494	--	--	--	--			Unallocated	--
495	0	1	1	0				2
496	--	--	--	--			Unallocated	--
497	--	--	--	--			No image available	--
498	2	1	0	0				3
499	3	2	1	0				6
500	2	2	1	2				7
LM 001	--	--	--	--			No image available	--
LM 002	3	2	2	0	M			7 M
LM 003	--	--	--	--			No image available	--
LM 004	2	2	2	1	M			7 M
LM 005	--	--	--	--			No image available	--
LM 006	--	--	--	--			No image available	--
LM 007	2	2	0	0				4
LM 008	--	--	--	--			No image available	--
LM 009	--	--	--	--			No image available	--
LM 010	--	--	--	--			No image available	--
LM 011	3	2	0	0				5
LM 012	--	--	--	--			No image available	--
LM 013	2	1	2	3	M			8 M
LM 014	2	2	0	0				4
LM 015	--	--	--	--			No image available	--
LM 016	--	--	--	--			No image available	--
LM 017	2	3	0	1				6
LM 018	--	--	--	--			No image available	--
LM 019	3	2	1	0				6
LM 020	--	--	--	--			No image available	--
LM 021	--	--	--	--			No image available	--
LM 022	2	2	3	0	M			7 M

CSB No:	Symmetry	Finish	Stylistic Creativity	Decoration	Master Craftsperson & Above	Signs of Innovation	Comment	Score
LM 023	--	--	--	--			No image available	--
LM 024	--	--	--	--			No image available	--
LM 025	1	2	1	0				4
LM 026	--	--	--	--			No image available	--
LM 027	--	--	--	--			No image available	--
LM 028	1	2	0	0				3
LM 029	1	2	0	0				3
LM 030	3	2	0	0				5
LM 031	--	--	--	--			No image available	--
LM 032	--	--	--	--			No image available	--
LM 033	1	2	1	0				4
LM 034	--	--	--	--			No image available	--
LM 035	--	--	--	--			No image available	--
LM 036	--	--	--	--			No Image available	--
LM 037	3	2	1	0	M			6 M
AUC 01	3	3	2	0	M			8 M
AUC 02	1	1	0	0				2
AUC 03	3	2	0	0				5
AUC 04	3	2	3	0	M			8 M
AUC 05	3	2	1	0				6
AUC 06	2	1	0	0				3
AUC 07	--	--	--	--			No Image available	--
AUC 08	--	--	--	--			No Image available	--
AUC 09	--	--	--	--			No image available	--
AUC 10	3	2	0	0				5
AUC 11	1	1	0	0				2
AUC 12	3	2	0	0				5
AUC 13	3	2	0	0				5
AUC 14	2	2	0	0				4

Appendix Four

Cast/Replica Carved Stone Balls

Number	Cast/Replica Held By	Accession Number	Original Held By	Details
CSB 016	National Museums Scotland	NMS X.AS 38	Hunterian Museum	Cast/Replica of CSB 046 in the Hunterian Museum numbered GLAHM B.1914.357.
CSB 204	Cambridge Museum of Archaeology and Anthropology	Z 21546/ Record 2	Dunrobin Castle Collection	Cast/Replica of CSB 471 in Dunrobin Castle Collection.
CSB 205	Glasgow Museums	ARCHNN.1303	National Museums Scotland	Probable Cast/Replica of CSB 455 in NMS numbered NMS X.AS 111.
CSB 253	National Museums Scotland	NMS X.AS 32	National Museums Scotland	Cast/Replica of CSB 494 in NMS numbered NMS X.HA 658.
CSB 278	Elgin Museum	ELGNM 1957.12.1	National Museums Scotland	Cast/Replica of CSB 388 in the NMS numbered NMS X.AS 217.
CSB 285	National Museums Scotland	NMS X.AS 8	Aberdeen University Museum	Probable Cast/Replica of CSB 136 in Aberdeen University Museum numbered ABDUA 16277.
CSB 289	National Museums Scotland	NMS X.AS 11	National Museums Scotland	Cast/Replica of CSB 388 in the NMS numbered NMS X.AS 217.
CSB 291	National Museums Scotland	NMS X.AS 17	Perth Museum	Cast/Replica of CSB 073 in Perth Museum numbered 1290B.
CSB 292	National Museums Scotland	NMS X.AS. 19	Aberdeen University Museum	Probable Cast/Replica of CSB 127 in Aberdeen University Museum numbered ABDUA 16268.
CSB 293	National Museums Scotland	NMS X.AS 20	N/A	Possible Cast/Replica of CSB 116 in Aberdeen University Museum numbered ABDUA:16257.
CSB 294	National Museums Scotland	NMS X.AS 21	N/A	There may be another Cast/Replica similar to this numbered CSB 463 or A1455 in the Stirling Smith Museum, Stirling.
CSB 295	National Museums Scotland	NMS X.AS 22	N/A	N/A
CSB 296	National Museums Scotland	NMS X.AS 24	National Museums Scotland	Cast/Replica of CSB 444 in the NMS numbered RSM 1905-950.
CSB 297	National Museums Scotland	NMS X.AS 25	National Museums Scotland	Cast/Replica of CSB 445 in the NMS numbered RMS 1905-947.
CSB 298	National Museums Scotland	NMS X.AS 26	Montrose Museum	Cast/Replica of CSB 228 in Montrose Museum numbered M1977.84.
CSB 304	National Museums Scotland	NMS X.AS 87	Ashmolean Museum	Cast/Replica of CSB 013 in Ashmolean Museum, Oxford. numbered AN 1927.2730.
CSB 305	National Museums Scotland	NMS X.AS 33	Skara Brae Visitors Centre	Cast/Replica of CSB 493 in the NMS numbered HA 657.
CSB 308	National Museums Scotland	NMS X.AS 47	Aberdeen University Museum	Original is probably CSB 144 in Aberdeen University Museum numbered ABDUA 16286.
CSB 309	National Museums Scotland	NMS X.AS 48	Hunterian Museum	Cast/Replica of CSB 047 in the Hunterian Museum numbered GLAHM B.1951.1.
CSB 310	National Museums Scotland	NMS X.AS 49	N/A	N/A
CSB 311	National Museums Scotland	NMS X.AS 51	Aberdeen University Museum	Probable Cast/Replica of CSB 115 in Aberdeen University Museum numbered ABDUA 16256.

CSB 313	National Museums Scotland	NMS X.AS 53	National Museums Scotland	Probable Cast/Replica of CSB 412 in the NMS numbered NMS X.AS 176.
CSB 314	National Museums Scotland	NMS X.AS 54	Glasgow Museums	Probable Cast/Replica of CSB 220 in Glasgow Museum numbered 1892.106.l.
CSB 315	National Museums Scotland	NMS X.AS 55	National Museums Scotland	Cast/Replica of CSB 435 in the NMS numbered NMS X.AS 204.
CSB 316	National Museums Scotland	NMS X.AS 56	Aberdeen University Museum	Cast/Replica of CSB 132 in Aberdeen University Museum numbered ABDUA:16273.
CSB 317	National Museums Scotland	NMS X.AS 57	N/A	N/A
CSB 318	National Museums Scotland	NMS X.AS 59	Hunterian Museum	There are two Cast/Replicas of this in the NMS. The original is in the Hunterian Museum numbered GLAHM B.1914.355.
CSB 320	National Museums Scotland	NMS X.AS 64	N/A	N/A
CSB 321	National Museums Scotland	NMS X.AS 65	N/A	N/A
CSB 322	National Museums Scotland	NMS X.AS 66	Aberdeen University Museum	Cast/Replica of CSB 151 in Aberdeen University Museum numbered ABDUA:16294.
CSB 323	National Museums Scotland	NMS X.AS 67	Aberdeen University Museum	Cast/Replica of CSB 139 in Aberdeen University Museum numbered ABDUA 16280.
CSB 325	National Museums Scotland	NMS X.AS 69	N/A	Cast/Replica of CSB 218 in Glasgow Museums numbered A.1995.96.so.
CSB 341	National Museums Scotland	NMS X.AS 89	N/A	Cast/Replica of CSB 484 in the Pitt-Rivers Museum numbered PRM 1892.60.13.
CSB 387	National Museums Scotland	NMS X.AS 50	National Museums Scotland	Cast/Replica of CSB 394 at the NMS numbered NMS X.AS 155.
CSB 399	National Museums Scotland	NMS X.AS 161	N/A	N/A
CSB 400	National Museums Scotland	NMS X.AS 162	Montrose Museum	Cast/Replica of CSB 229 in Montrose Museum numbered M1977.85.
CSB 401	National Museums Scotland	NMS X.AS 163	National Museums Scotland	Cast/Replica of CSB 405 in the NMS numbered NMS X.AS 167.
CSB 402	National Museums Scotland	NMS X.AS 164	Glasgow Museums	Cast/Replica of CSB 211 in Glasgow Museums numbered A.1995.96.sq.
CSB 403	National Museums Scotland	NMS X.AS 165	National Museums Scotland	Cast/Replica of CSB 453 in the NMS numbered NMS X.AS 165a.
CSB 415	National Museums Scotland	NMS X.AS 179	National Museums Scotland	Cast/Replica of CSB 405 in the NMS numbered NMS X.AS 167.
CSB 437	National Museums Scotland	NMS X.AS 207	Hawick Museum	Cast/Replica of CSB 001 in Hawick Museum numbered 4055.
CSB 463	Stirling Smith Museum	A 1455	Glasgow Museums	The original is probably CSB 218 in Glasgow Museums numbered A.1955.96.so.
CSB 464	Stirling Smith Museum	A 1458	Aberdeen University Museum	Cast/Replica of CSB 139 in Aberdeen University Museum numbered ABDUA:16280.
CSB 465	Stirling Smith Museum	A 1456	Aberdeen University Museum	Probably a Cast/Replica of CSB 151 in Aberdeen University Museum numbered ABDUA:16294.
CSB 468	Museum of Islay Life	IMT xx.xxx	National Museums Scotland	Cast/Replica of CSB 376