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ARO4: The Late Neolithic pitchstone artefacts from Barnhouse, Orkney – an unusual assemblage from an unusual site

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Introduction

In the late 1980s, Colin Richards, University of Manchester, excavated an extensive Late Neolithic settlement at Barnhouse on Orkney (Richards 2005) (Figure 1). The excavation revealed a number of house structures of Skara Brae type (Clarke & Maguire 1989; Foster 2006), and in and around these houses a large lithic assemblage of 1,585 pieces was recovered (Middleton 2005). This assemblage consisted mainly of flint, but a surprisingly numerous sub-assemblage of pitchstone artefacts (23 pieces) was also retrieved.

Figure 1: Location map.

Present consensus is that all, or almost all, archaeological pitchstone derives from sources on the Isle of Arran in the Firth of Clyde (Williams Thorpe and Thorpe 1984), from where it was distributed across northern Britain by means of a wide-ranging exchange network. However, Williams Thorpe and Thorpe's pioneering research into this topic was carried out at a time when relatively little archaeological pitchstone had been retrieved. Since then much worked pitchstone has been recovered. This has altered the distribution patterns considerably, and as a consequence, a project was undertaken to look into archaeological pitchstone and its distribution (Ballin 2009b; 2011c). The aims of the Scottish Archaeological Pitchstone Project (SAPP) were to:

- examine and catalogue all archaeological pitchstone in Scottish museums;
- produce a computer database of these finds;
- re-interpret the distribution of archaeological pitchstone across northern Britain.

In total, 5,542 pieces of worked pitchstone were examined and characterised during the project, deriving from approximately 350 sites. In addition, 14,707 pieces were included in the database of none-examined artefacts, deriving from c. 125 sites. Approximately 13,300 of the latter were retrieved in connection with Glasgow University's Archaeological Research Division's work on Arran in 1999.

The results of the examination of the museum collections (supplemented by finds still with the excavating units) have been summarised, revealing an interesting distribution. Prior to this work, it was the author's subjective impression that Neolithic Scotland may have been sub-divided into a number of main zones or potential territorial units (I-IV), based on the average number of pitchstone artefacts in pitchstone-bearing assemblages. This impression is supported by the figures from the SAPP (Table 1; Figure 2; see zonation in Figure 4 below). With the future inclusion of further assemblages, these figures may change but the four numerically based groups are likely to remain.

In Table 1, the regions are sequenced according to their distance from Arran, the probable source of all archaeological pitchstone. The approximate area and location of each zone (see below, Figure 4).

Zones	Numbers
Arran	230
IIW	14
IISW	33
III	3
IV	2
Orkney	14

Table 1: Average number of pitchstone artefacts per pitchstone-bearing assemblage per region.

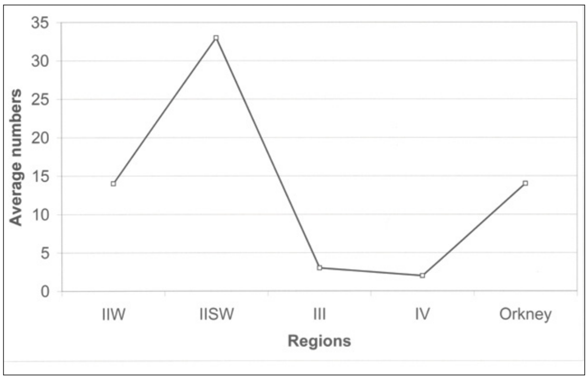

Figure 2: Average number of pitchstone artefacts per pitchstone-bearing assemblage per zone.

Referring to Table 1 and Figure 2, it is obvious that the Barnhouse finds represent a deviation from an otherwise logical distribution pattern. Forming part of Distribution Group IV ('peripheral' sites), approximately two pitchstone artefacts should have been expected from an Orcadian pitchstone-bearing assemblage - not 23 pieces! The aims of this paper are therefore to give a more detailed characterisation of this unusual group of lithic artefacts by allowing comparison with published pitchstone assemblages from southern Scotland, such as Auchategan, Blackpark Plantation and the Biggar sites (Ballin 2006; Ballin et al. 2008; Ballin & Ward 2008), and to place the Barnhouse pitchstone in its Scottish Neolithic context by drawing on the latest information gained via the SAPP and recent research into the Scottish Neolithic.

The Assemblage

From the excavations at Barnhouse, 23 pitchstone artefacts were recovered. (see Table 2).

	Type 1	Type 2	Total
Debitage			
Chips	2		2
Flakes	5	7	12
Blades	2		2
Crested flakes	1		1
Total debitage	10	7	17
Cores			
Levallois-like cores	1		1
Other discoidal cores	1		1
Bipolar cores	1		1
Cores total	3		3
Tools			
Blade-scrapers		1	1
Flakes with edge-retouch	2		2
Total tools	2	1	3
TOTAL	15	8	23

Table 2: General artefact list.

The pitchstone types are defined in the raw material section (below); the definitions of the main lithic categories are as follows:

Chips: All flakes and indeterminate pieces the greatest dimension (GD) of which is £ 10mm.

Flakes: All lithic artefacts with one identifiable ventral (positive or convex) surface, GD > 10mm and L < 2W (L = length; W = width).

Indeterminate pieces: Lithic artefacts which cannot be unequivocally identified as either flakes or cores. Generally the problem of identification is due to irregular breaks, frost-shattering or fire-crazing. '*Chunks'* is a popular term for larger indeterminate pieces.

Blades and microblades: Flakes where L ³ 2W. In the case of blades W > 8mm, in the case of microblades W £ 8mm.

Cores: Artefacts with only dorsal (negative or concave) surfaces – if three or more flakes have been detached, the piece is a core, if fewer than three flakes have been detached, the piece is a split or flaked pebble.

Tools: Artefacts with secondary retouch (modif cation).

Raw material

In order to characterise the Barnhouse pitchstone precisely, it is necessary to briefly summarise what pitchstone is, and to define its main components. Pitchstone is a volcanic glass, which is found as two main forms. One is obsidian (< 1% H_2O), whereas the other is pitchstone (typically 3-10% H_2O). Most pitchstone has > 5% H_2O, and most obsidian < 0.5%. Volcanic glass is known from igneous complexes throughout the world, but in Britain it is only found in western Scotland and Northern Ireland (the British Tertiary Volcanic Province; Emeleus and Bell 2005). All volcanic glass found in Britain is in the form of pitchstone, and it is generally accepted that only pitchstone from the island of Arran, immediately west of Glasgow (Figure 1), had the properties required to become widely used as a toolstone.

As explained in Ballin and Faithfull (2009), pitchstone may be described in terms of a number of components, such as:

- Glassy matrix.

- Phenocrysts: larger isolated or clustered crystals formed at depth during slow cooling.
- Spherulites: finely crystalline, usually radiating intergrowths of quartz and feldspar indicating devitrification of the glass phase.
- Crystallites (in older literature occasionally termed microlites): very small skeletal or dendritic crystals, often Fe-Mg silicates, in glass; banding in pitchstones is often marked by variation in crystallite density.
- Other alteration products.

Tyrrell (1928) distinguishes between four main types of pitchstone, and they are defined, primarily, by their presence/absence of phenocrysts and spherulites, phenocryst composition, and style of devitrification. The four pitchstone types are: the Coriegills Type (east Arran), the Glenshurig Type (north-east Arran), the Glen Cloy Type (north-east Arran), and the Tormore Type (west Arran). Usually, specialised analysis would be necessary to distinguish between some of these pitchstone forms, but it is relatively easy to visually distinguish between pitchstone of Corriegills Type, which is aphyric, or non-porphyritic (i.e. it has no phenocrysts), and the other three types, which are all porphyritic (i.e. they are characterised by one or the other form of phenocrysts). The Glen Cloy Type is probably not archaeologically relevant, as it is too brittle to be reduced in a controlled manner.

Examination of the assemblage from Barnhouse shows that two pitchstone forms are present. They are characterised by the following attributes:

Type 1 *(Plate 1)*

Almost black with a green hue.

No phenocrysts (aphyric).

Abundant very small, round spherulites.

No crystallites, or a relatively small number of light crystallites, some of which are unsorted and some of which occur as stellate clusters of small needles.

Light-coloured planes of weakness.

Plate 1: Debitage in pitchstone Type 1.

Type 2 *(Plate 2)*

Almost black with a green hue.

A small number of relatively large inclusions (up to 3 mm), which may be phenocrysts or larger spherulites (porphyritic?).

Many elongated, parallel small inclusions, which may be smaller phenocrysts or spherulites.

Numerous light needle-shaped, parallel crystallites, which occasionally give these pieces an almost greyish appearance.

Light-coloured planes of weakness.

Plate 2: Debitage in pitchstone Type 2.

Being aphyric, Type 1 obviously belongs to Tyrrell's Corriegills Type pitchstone, whereas Type 2 may be a deviant form of Corriegills Type or it may belong to one of the other main types. The identification of Type 2 depends on whether its larger inclusions can be defined as either phenocrysts or spherulites (c.f. Ballin and Faithfull 2009). However, there can be little doubt that the two forms of pitchstone derived from two separate outcrops on Arran. Fourteen of the Barnhouse pieces have been defined as belonging to Type 1, and seven as belonging to Type 2.

Two pieces (SF 5653, 6139) have a distinct light-green colour, and the glass matrix is characterised by very fine, almost microscopic crazing (Plate 3). The light-green colour is not characteristic of any naturally occurring Arran pitchstone sources (Ballin and Faithfull 2009), and it is thought that the original colour of the two pieces altered as a result of exposure to fire (Ballin 2009a, 11). The presence/absence of inclusions, as well as the composition of any inclusions present, defines SF 5653 as most likely belonging to Type 1, and SF 6139 to Type 2.

Plate 3: Light-green, probably burnt pitchstone. The piece to the left, bipolar core SF 5653, is in Type 1 pitchstone, and the piece to the right, blade-scraper SF 6139, is in Type 2 pitchstone.

Type 1 pitchstone was found throughout the Barnhouse settlement (Richards 2005, Fig. 3.25), whereas Type 2 pitchstone was only recovered in connection with the middens near the entrance of House 7 (probably so-called 'door dumps'; see Binford 1983, 151).

Assemblage composition

As shown in Table 2, the assemblage includes 17 pieces of debitage, three cores, and three tools.

The *debitage* consists of two chips, 12 flakes, two blades, and one crested flake. The two chips (SF 3573, 6158) are diminutive waste flakes from the reduction process, with a greatest dimension between 6.5 and 7.5 mm. Most of the flakes are proximal, medial or distal fragments, but one piece is intact (SF 6066, 20 x 13 x 3 mm), whereas one (SF 4104) was split through the bulb-of-percussion, due to the application of excessive force (Accident Siret; Inizan et al. 1992, 98). The largest flake fragment (SF 5867) has a greatest dimension of 31 mm. Technologically definable flakes were detached from their parent cores by either hard or medium-hard percussion.

The two blades are both fragments, and the most intact piece (SF 4645) has dimensions of 31 x 14 x 5 mm, whereas the smaller fragment (SF 5865) has dimensions of 15 x 10 x 2 mm. The former was detached from its parent core by hard percussion. An almost intact blade-scraper (SF 6139, see below) measures 36 x 16 x 4 mm. A large flake (SF 4602) has a relatively expedient dorsal crest running along the distal half of one lateral side. This crest may be a so-called guide ridge, produced as part of the preparation of the original core, or it may (just as likely) be the surviving remains of a former platform-edge. This piece is almost intact (52 x 28 x 12 mm).

None of the three *cores* is a traditional platform-core, although the character of the blanks suggests that some platform-cores must have been present. SF 5670 is a small (30 x 27 x 10 mm) specialised discoidal core, usually referred to as a Levallois-like core (see technology section, below) (Plates 4 and 5). It has been struck at various points of its circumference, and at one end it has a finely faceted platform, from which a broad flake has been detached. SF 4106 is a slightly smaller (21 x 21 x 1 mm) and more irregular discoidal core. This specimen has also been knapped from around its circumference, and an apparent retouch at one end may represent an unsuccessful attempt at producing a finely faceted platform. Due to a number of irregular fractures, the circumference of this core is almost square, rather than oval. SF 5653 is a small (22 x 19 x 10 mm) bipolar core with two perpendicular sets of terminals, or reduction axes (Plate 3). This is a clear indication of the piece having been re-orientated during the knapping process.

Plates 4 and 5: The two opposed faces of Levallois-like core SF 5670 (Type 1 pitchstone).

One of the three *tools* (SF 6139) is a fairly well-executed piece, whereas the other two implements are quite plain. The former is based on a regular blade (36 x 16 x 4 mm) with parallel lateral sides and dorsal arrises, and it has the remains of a convex, steep scraper-edge at the distal end (Plate 3). The central part of the working-edge has broken off, probably during use. The platform remnant has been removed by retouch, and both lateral sides, proximal end, have been blunted. The modification of the proximal end may represent hafting-retouch. The other two tools (SF 5589 A) are fragments of simple flakes with expedient retouch along various parts of the edges. Their greatest dimensions vary between 23 mm and 27 mm.

Technology

Recovered core types and blank attributes suggest that a range of technological approaches were followed, such as:

- traditional platform reduction,
- Levallois-like reduction,
- bipolar reduction.
- Obviously, the small numerical size of the assemblage (23 pieces) limits its statistical value, but a number of blank attributes are diagnostic of specific technological approaches and are therefore highly useful indicators of prehistoric technological choices.

Although no traditional platform cores were found at Barnhouse, the fact that one flake has an abraded platform-edge (SF 3254), and one a trimmed platform-edge (SF 6066), proves that traditional platform techniques were applied, and that platform-edge preparation took place. SF 4602 is a crested flake, but it is highly probable that the crest is an old platform-edge, rather than a guide ridge. This indicates that, most likely, one operational schema included the production of blanks from single-platform cores, which were later re-orientated to become cores with two platforms at an angle.

A number of attributes suggest the application of fairly robust percussion such as some pronounced bulbs-of-percussion, split-bulb fractures (Accident Siret), and collapsed platforms. No discrete platforms ('lipped' platform remnants) were noticed, but many flakes have platform remnants which are neither pronounced nor lipped, i.e. they represent a form of medium-robust approach., The missing platform cores were most likely worked in direct technique, but by the application of hard as well as slightly softer percussors. The platform approach is characterised by the production of broad flakes as well as blades.

Levallois-like reduction is suggested by the presence of one small typical Levallois-like core (SF 5670), and one flake with a finely faceted platform remnant (SF 5375). Levallois technique is usually associated with the Middle Palaeolithic period, and it is described in Figure 3. This is a highly specialized approach, as part of which a so-

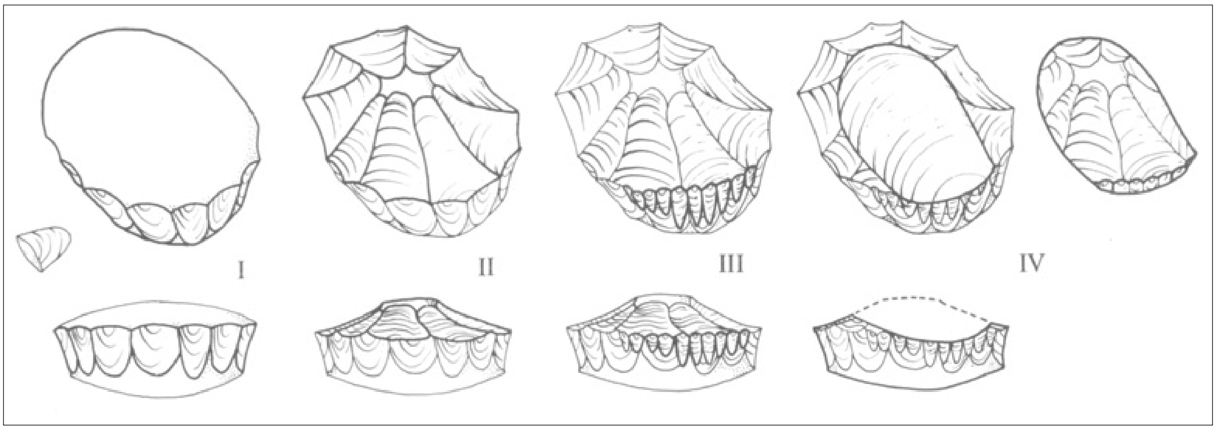

Figure 3: The operational schema of the Late Acheulean / Mousterian Levalloisian (Roe 1981, Figure 3:9). I. Basic shaping of nodule; II preparation of domed dorsal surface; III. preparation of faceted striking platform on core; IV. the flake and the struck core, with their characteristic features. Drawn by the late M.H.R. Cook.

called tortoise-shaped core rough-out is produced (Figure 3, III), from which pre-defined oval or pointed flakes were detached. In Ballin (2011a) the differences between these Palaeolithic cores and the related Late Neolithic Levallois-like cores are discussed, with the main differences being purpose, core preparation, and blank shape.

The purpose of the Levallois-like core is not just to produce broad flakes (as in the case of their Palaeolithic counterparts), but also slender blades from the same cores (for chisel-shaped arrowheads and blade cutting implements) (Suddaby and Ballin 2011). To achieve this, the Late Neolithic cores had to be prepared in a slightly different manner, and the Late Neolithic tortoise-shaped rough-outs therefore have straighter and more regular lateral crests. Both core types (Levallois and Levallois-like cores) are characterised by finely faceted platforms, and consequently blanks, detached from both core types may have finely faceted platform remnants, such as SF 5375. Levallois-like core SF 5670 is a very small specimen, but it is nevertheless, very typical, with its rough tortoise-shape and its finely faceted platform.

Bipolar reduction is indicated by one piece only, the bipolar core SF 5653 (Plate 3). No bipolar flakes were retrieved from the site. Most likely, bipolar reduction was applied at the end of both operational schemas (traditional platform production and Levallois-like production) to exhaust a valuable resource: when platform cores or Levallois-like cores became too small to handle, reduction would continue in the form of bipolar reduction, which is characterised by simply placing a nodule or core remnant on an anvil and hitting it with a hammerstone (also referred to as 'hammer-and-anvil' or 'nut-cracker' technology).

Several factors define this small assemblage as 'only the tip of the iceberg'. Although the presence of 23 pitchstone artefacts at one site is unusual outside southern and central Scotland, many more pieces were probably present at Barnhouse in prehistoric time. Unless all 23 pitchstone objects were imported from Arran to Orkney in their present shapes, some bipolar flakes should have been found, as one bipolar core was recovered. However, all flakes and blades appear to derive from either traditional platform cores or Levallois-like cores. It is also surprising that no pieces conjoin, which again suggests that some pieces are missing from the site (or the excavated parts of the site). These points will be discussed further below.

Dating

The pitchstone assemblage is dated by a number of factors, such as the generally accepted chronological framework of pitchstone use, typology, technological attributes, and the association with the Barnhouse village.

The dating of pitchstone in general

From examination of all pitchstone artefacts from the main Scottish museums, it is clear that, beyond Arran, this material was not used in the Mesolithic, as the finds include no artefacts diagnostic of this period (e.g. microliths *sensu stricto*, microburins, *meches de foret*, burins). Basically, two different patterns emerged in connection with the discussion (above) of the chronological evidence: in most of northern

Britain, pitchstone use and exchange may have been a largely early Neolithic phenomenon, whereas immediately north of Arran, in Argyll & Bute and in southern parts of the Inner Hebrides, pitchstone probably continued in use until the end of the early Bronze Age period, as was the case on Arran itself (Ballin 2009a, 38).

Analysis of the Scottish museum collections showed that – on and off the Isle of Arran – there is a tendency for pitchstone artefacts to be entirely aphyric in the earlier part of the Neolithic period, whereas assemblages from the later Neolithic period tend to include slightly higher numbers of porphyritic material. The more varied raw material composition of the Barnhouse collection suggests a later Neolithic date for the finds.

Typo-technological attributes

Only one of the 23 pitchstone artefacts from Barnhouse, the Levallois-like core (SF 5670, Plates 4 and 5) is diagnostic *sensu stricto*. As described above, the Levallois-like approach is characteristic of the British late Neolithic period, where in flint assemblages it is frequently associated with types such as chisel-shaped and oblique arrowheads as well as specialised blade-based cutting implements (scale-flaked, serrated and polished-edge knives; Manby 1974, 86-90; Ballin 2011b).

The fact that the industry responsible for the assemblage is a broad blade industry, with some additional production of flakes, suggests a date either in the early Mesolithic, or in the later part of the early Neolithic / the late Neolithic period (Ballin 2011b). As at present no Mesolithic worked pitchstone is known outside Arran (see above), this indicates a date for the Barnhouse pitchstones of the later early Neolithic or late Neolithic periods. The presence of one flake with a finely faceted platform remnant (SF 5375), narrows down the likely date to the late Neolithic period.

As mentioned above, most pitchstone finds recovered from contexts outside Arran are thought to date to the early Neolithic period, and these assemblages are generally characterised by the presence of microblades or narrow broad blades (c.f. the radiocarbon-dated pieces from pits at, *inter alia*, Carzield in Dumfriesshire and Fordhouse Barrow in Fife; Ballin 2009a, 31). The collection from Machrie Moor on Arran's west-coast (Haggarty 1991) represents a typical late Neolithic broad blade assemblage (Ballin 2009a; 2011b), predominantly in pitchstone, and to a large extent produced by the application of Levallois-like technique.

The village

The distribution of the pitchstone finds clearly link these to the Barnhouse village and its houses. One group of artefacts was found around the large hearth of Structure 8, one outside House 7, with the remainder having been retrieved from within or immediately outside houses 10 and 12 (Richards 2005, Figure 3.25). This indicates contemporaneity between the assemblage and the structures of the village, and the dating elements of the village become relevant to the dating of the assemblage. The most important dating elements of Barnhouse are the houses themselves (houses of 'Skara Brae Type'; c.f. Clarke and Maguire 1989), and the associated Grooved Ware pottery (c.f. Cleal and MacSween 1999). Based on his analysis of the site's radiocarbon dates, Ashmore (2005, 388) suggests that the village may have been constructed around 3100 cal BC, or possibly slightly before, and abandoned about 2900 cal BC, but no later than 2750 cal BC. These dates define Barnhouse as a later late Neolithic (or Grooved Ware) settlement[1].

Discussion

As stated in the introduction, the main aim of this paper is to place the unusual Barnhouse pitchstone assemblage in its Scottish Neolithic context by drawing on the latest information gained via the SAPP and other research into the period. The most important attribute in this respect is numerical size, where Barnhouse shares similarities with locations like the Biggar area, South Lanarkshire (Ballin and Ward 2008), the Luce Bay area of Dumfries and Galloway (Williams Thorpe and Thorpe 1984), Bute/southern Argyll (Ballin et al. 2008), and Ballygalley, Co. Antrim, Northern Ireland (Simpson and Meighan 1999). These areas are all characterised by hosting one or more individual sites from which more than 100 pitchstone artefacts have been retrieved.

Admittedly, the Barnhouse assemblage is considerably smaller than this in absolute numbers (23 pieces), but like the above locations

Barnhouse stands out as a very special place. The point in this respect is *numerical assemblage size in relation to zone characteristics*, where Biggar, Luce Bay, Bute/southern Argyll, and Ballygalley are located within Zone II where the average number of pitchstone artefacts per pitchstone-bearing assemblage is14-33 pieces, whereas Barnhouse is situated at the northern periphery of Zone IV where the average number of pitchstone artefacts per pitchstone-bearing assemblage is 2 pieces) (Table 1; Figure 4).

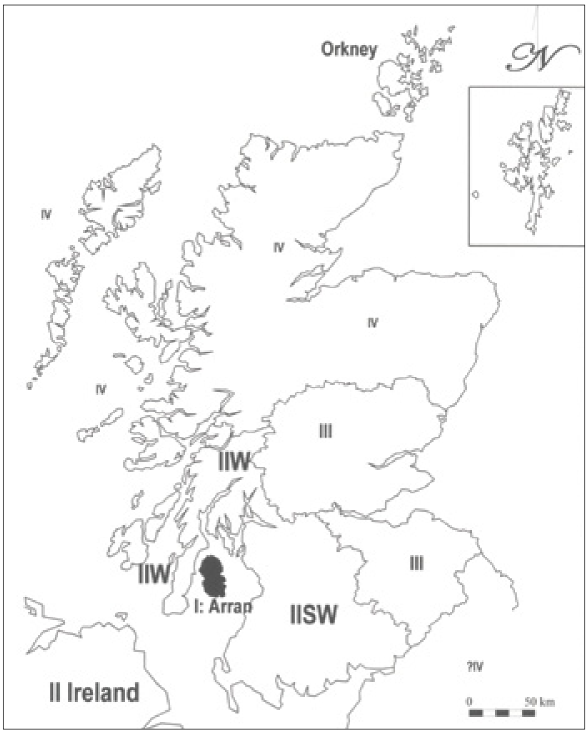

Figure 4: Pitchstone distribution zones based on Table 1 and Figure 2.

The most important aim of the SAPP was to shed light on territoriality and exchange patterns in the Scottish Neolithic, with scrutiny of the fall-off curve (Renfrew 1977) of the exchanged Arran pitchstone objects being one of the main tools. A direct relationship between quantity and distance to source (the larger the distance, the smaller the quantity) would imply that Scottish pitchstone was perceived entirely in functional terms by prehistoric people, and the study of pitchstone distribution would reveal little of relevance to the understanding of the territorial structure of Neolithic Scotland. The examination of the project's data shows that this fall-off curve is clearly not gently sloping. The general distributional trends are summarised in Table 3.

Within each zone, there is generally a reasonably even distribution of pitchstone, although the pitchstone fall-off-curve displays a number of peaks in Zones II and III. In Ballin (2009a, 64), it was suggested that this distribution indicated a number of social territories, where each peak defined the location of a territorial centre (the residence of a local chieftan). This was further tested on the basis of data from the Central Belt and southern Scotland, where Thiessen polygons defined a number of fairly even-sized territories (ibid.).

The evidence suggests that pitchstone was used differently in the different zones:

- Zone I (Arran) is characterised by *local* procurement[2]; general use of pitchstone throughout the Mesolithic, Neolithic and early Bronze Age periods; all types are present. Zone IIW (Argyll and Bute) may have been closely associated with Zone I throughout prehistory.
- Zone II-III (the mainland east of Arran) is characterised by *regional* procurement; pitchstone occasionally forms substantial proportions of assemblages; almost exclusively an early Neolithic resource; most types are present but with a lower implement ratio than in Zone I.
- Zone IV (outside and north of Zone II) is characterised by *exotic* procurement and a marked drop in the frequency of pitchstone; mostly individual pieces of pitchstone; almost exclusively an early Neolithic resource; mostly flakes and blades, with cores being rare, and with a fairly high tool ratio.

The regional differences in pitchstone use are likely to represent different perceptions of the raw material as mainly functional (Zone I) and mainly symbolic (Zone IV), with Zones II-III possibly forming a hybrid of these two options. However, although pitchstone use appears to have been perceived in a largely functional light on Arran, it should be borne in mind that in Stone Age societies most raw materials were associated with some non-functional (frequently totemic) values (see examples in Topping 2005, Appendix 1), and that possibly no raw materials were perceived as entirely functional in prehistoric times. Basically, it is a question of more or less functional/symbolic – not either/or.

<table>
<tr><th>Zones</th><th>Average. No's</th><th>Largest no. per 10 x 10 km</th><th>Porphyry ratio</th><th>Microblade ratio</th><th>Levall. technique</th><th>Inclusion in EBA burials</th><th>Tool ratio</th></tr>
<tr><td>I</td><td>>200</td><td>9363</td><td rowspan="2">c. 45-50%</td><td rowspan="2"><15%</td><td>X</td><td>X</td><td>13%</td></tr>
<tr><td>IIW</td><td rowspan="2">c. 15-30</td><td rowspan="2">1627</td><td>(X)</td><td>X</td><td rowspan="2">c. 5-7%</td></tr>
<tr><td>IISW</td><td rowspan="3">c. 0-3%</td><td rowspan="3">c. 20-30%</td><td rowspan="3">Absent</td><td rowspan="4">Absent</td></tr>
<tr><td>III</td><td rowspan="2">c. 2-4</td><td>34</td><td rowspan="3">c. 20-30%</td></tr>
<tr><td>IV</td><td>7</td></tr>
<tr><td>Orkney</td><td>14</td><td>23</td><td>31%</td><td>0%</td><td>X</td></tr>
</table>

Table 3: Summary characteristics of the various pitchstone zones.

If it is accepted that Barnhouse had a central (redistributional?) function in relation to the Orcadian Neolithic society, and that the other four 'mega-sites' in southern Scotland were central settlements in their territories, one might ask what qualities of pitchstone these places share. Places like Barnhouse (23 pieces), Blackpark Plantation East in Bute (c. 400 pieces), Glen Luce Sands (c. 1,500-2,000 pieces), and Ballygalley (c. 600 pieces) are all coastal, situated at the innermost part of an inlet. From these locations they would have had easy access to marine trade routes. Biggar is an inland location, but rich finds of not only pitchstone (c. 600 pieces of pitchstone) but also Cumbrian tuff and Yorkshire flint suggests that this area may have represented a crossroads of trade routes from the south-west, the west, and south-east, possibly drawing on local rivers such as the Clyde, the Tweed, and the various rivers connecting the area to the Solway Firth.

It is tempting to associate these central locations, or 'ports of trade', with other central – for example religious – functions. This link, however, is yet to be substantiated, for example by comparison between the spatial patterns of pitchstone and that of religious centres (e.g. chambered tombs and stone circles). In Orkney, excavations in recent years (e.g. Ness of Brodgar; Card 2013) have focused on the so-called 'Heart of Neolithic Orkney' (with its high-status villages, chambered tombs, and stone circles), possibly partly explaining why pitchstone has not been found in connection with 'ordinary' Neolithic Orcadian settlements[3]. And how many stone circles are there, for example in eastern Scotland, where no pitchstone has been recovered from adjacent settlements?

The visual distinctiveness of pitchstone, combined with its hierarchical distribution pattern, have led many analysts to speculate about the specific functions of pitchstone implements, including suggestions such as the 'embodiment of otherness' (Edmonds 1995; Thomas 1996, 166-71; Richards 2005, 45); colour symbolism (Jones 1997); and tools for ritual scarification/ tattooing (Preston et al. 2002, 234). Although these proposals may in fact form individual parts of a more complex explanatory model, they are all insufficient in themselves and characterised by the fact that, until recently, only a very small and biased sample of archaeological pitchstone had been put forward in the archaeological literature (e.g. Ritchie 1968; Williams Thorpe and Thorpe 1984).

The suggested 'embodiment of otherness', for example, disregards the fact that, exchange networks in tribal societies are based on kinship (Ballin 2009a, 49), and that people in Zones I and II may have been closely related/inter-married. Most likely, people in Zone II did not associate pitchstone with 'otherness', whereas people in Zone IV (c. 400 km from Arran) generally may have. The proposed 'embodiment of otherness' is therefore at best a too general explanation, with its validity being limited to the most peripheral parts of the exchange network.

In his analysis of the different symbolic meanings attached to Arran's red flint artefacts and black pitchstone artefacts, Jones (1997) suggests that the red flint was used for the manufacture of specific large-sized tools, whereas the black pitchstone was used for the production of other, smaller-sized tool forms[4]. However, he does not take into account the effects of different nodule sizes and flaking properties on tool production (c.f. Ballin forthcoming).

And the suggested application of pitchstone in ritual scarification leaves out the fact that other tool forms than knives are known in pitchstone, on as well as beyond Arran (arrowheads, piercers, scrapers, etc.) (Ballin 2009a, 25).

As indicated above, the distribution of archaeological pitchstone throughout Scotland leaves little doubt that pitchstone was perceived as a very 'special' raw material by prehistoric people, and that the exchange of pitchstone was organised or even strictly controlled. However, a fuller understanding of how pitchstone was perceived in Scottish Neolithic society requires more detailed scrutiny of pitchstone artefacts in relation to their sources and find locations, and more research into this topic is clearly needed. At present, the evidence, as presented by the SAPP (Ballin 2009a), points towards a model in which prehistoric people perceived pitchstone in a functional as well as symbolic light.

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Notes

1 In British archaeological literature, the late Neolithic period may be defined in a number of different ways, mainly determined by whether the analyst is a pottery specialist or a lithics specialist (explained in Ballin 2011, 2). In the present paper, the 'lithic perspective' is followed, and the late Neolithic is defined as the combined Impressed Ware/Grooved Ware period, that is, a period defined by the massive importation of Yorkshire flint from north-east England; the introduction and application of the Levallois-like technique; theproduction of hard-percussion blades (where broad blades from the early Mesolithic and early Neolithic periods were produced by soft percussion); and by a number of highly diagnostic implement forms, first and foremost chisel-shaped and oblique arrowheads.

2 In the present paper, Fisher and Eriksen's (2002, 31, 68) distinction between local, regional, and exotic raw materials is followed. Local raw materials were procured from sources less than 10 km from the site; regional raw materials from sources at distances between 10 and 50 km from the site; and exotic raw materials from sources more than 50 km from the site.

3 When the author examined the assemblage from Pool on Sanday, Orkney, he found neither pitchstone nor Yorkshire flint; in contrast, contemporary Barnhouse yielded 23 pieces of Arran pitchstone, and neighbouring Ness of Brodgar nine pieces (Nick Card pers. comm.), and half of the flints from Barnhouse represents importation from north-east England.

4 The suggested symbolic value associated with the dark colour of pitchstone may find some support in the raw material composition of the contemporary Skara Brae lithic assemblage. At Skara Brae, on Orkney's west-coast, no pitchstone was found, but instead a substantial assemblage of black Orcadian chert was recovered (Alan Saville pers. comm.). Usually, black chert forms very small sub-assemblages of Orcadian collections, and it may be that, at Skara Brae, local black chert was used as a substitute for the rarer, exotic pitchstone? However, the fact that Orcadian chert is predominantly found along the Stromness-Warbeth shore, and immediately south and east of the Skara Brae prehistoric village (Mykura 1974, 74 and Fig. 16; N.H. Trewin pers. comm.), probably also affected the procurement choices of the Skara Brae settlers.

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