4 Discussion

4.1 Quartz distribution and activities at Scord of Brouster

In this chapter the débitage, core and tool distribution are discussed, as well as the activities suggested by the scattering of artefacts. First, the internal distribution patterns of the three houses is dealt with, followed by the distribution across the three houses. As the principles of recovery and recording of finds differ from house to house, and between layers, the author was incapable of producing standardized distribution maps (point and contour maps) and, in the following discussion, reference will be made to Whittle's general distribution maps (Whittle 1986, 85–90). For a detailed discussion of the three structures see Whittle's monograph on the Scord of Brouster (Whittle 1986).

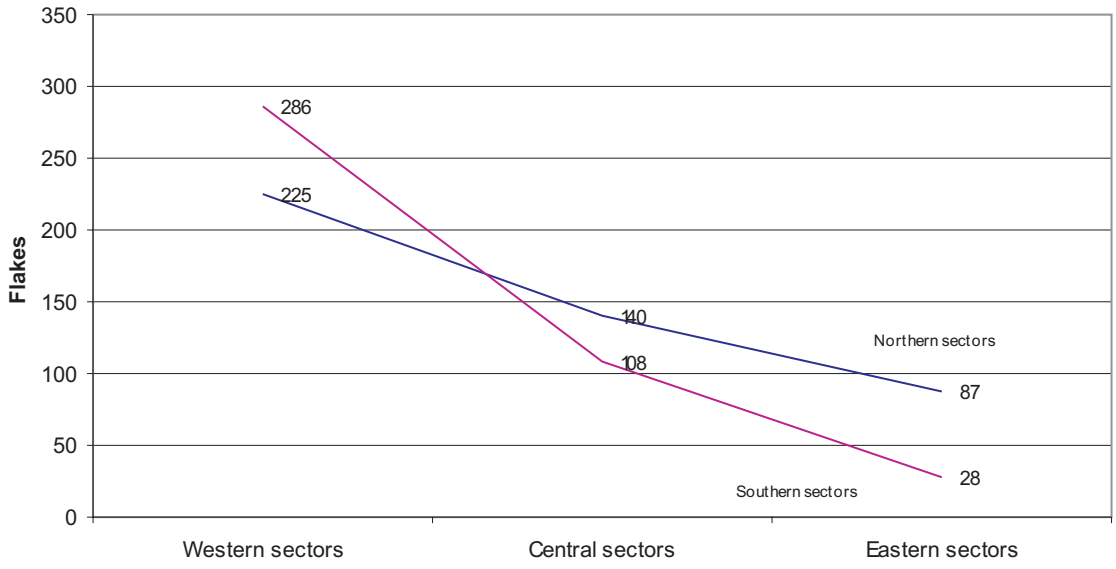
4.1.1 House 2 (Whittle 1986, figs 68–9)

This structure is approximately kidney-shaped, includes two recesses, and has no obvious entrance. The fact that individual finds were recorded in a variety of ways (exact 3D-plotting, per quarter of square metre and per sector) makes it difficult to get a general picture of the distribution of lithic artefacts. However, it is the author's impression that the distribution pattern is more or less the same throughout Phases 1 and 2 (pre-house, construction and use-phases) of House 2.

Generally, most quartz artefacts were found in the western half of the house, with fewer finds in the two central sectors, and even fewer in the two eastern sectors and in the north-east recess (Illus 33). Though the majority of finds from Phases 1 and 2 were recorded per sector, the more precisely recorded and plotted finds suggest that the tools were mostly found in the open area around Hearth F4, a possible central fireplace. The cores were partly recovered from areas characterized by knapping and partly from more peripheral areas. Cores from prehistoric sites are frequently found in the peripheral parts of settlements or houses, as they may have been removed ('tossed') from the central zone of sites as part of preventive maintenance (Binford 1983,189).

The individually plotted quartz objects of Phases 1 and 2 indicate that the northern (F1) and north-eastern (F2/3) recesses were almost, but not entirely, devoid of finds. The larger (F2/3) of the two recesses is approximately 2m long and may have been a sleeping area (cf distribution of lithic finds in the Dalmore house; Ballin, in prep b). The function of the northern recess is less certain. The quartz distribution in Phase 3 (decay) is probably linked to the use of the location after its general abandonment. Lithics were found evenly scattered across the interior of House 2, but also across the wall tumble and outside the house.

The above distribution patterns only yield little and general information on activities involving quartz use. Knapping was mainly carried out in the western half of the structure, with some knapping



Illus 33 House 2. The distribution of quartz flakes from west to east

and tool use taking place around the central hearth. Clearance of rubbish appears to have taken place, but mainly in the form of preventive, not *post hoc*, maintenance, leaving large amounts of lithic waste cluttering the floor space. Two areas, Recesses F1 and F2/3, have been kept relatively free of rubbish, and the size of Recess F2/3 would have allowed use as a sleeping area.

4.1.2 House 1 (Whittle 1986, figs 70–4)

This building is oval, with six recesses, and orientated approximately north-west/south-east; it has an entrance to the south-east. In Phase 1 (pre-house), most of the quartz waste, cores and tools were scattered across the southern half of the building, and a large concentration of quartz artefacts was deposited under the southern wall, outside Trench F10, and a small concentration in Recess 1 to the north-east. The quartz distribution was associated with three hearths: F1 in Recess 4 to the south-west, central hearth F2 and the more complex hearth F4–8 in Recess 1 to the north-east. No areas were specialized, and quartz knapping and tool use seem to have taken place throughout the space occupied by lithic debris.

In Phase 2 (main use-phase), there was less quartz and it had a wider distribution. The centre of the building was more or less free of clutter, with most of the lithic finds deriving from either areas along the northern wall, or from a zone just inside the southern orthostats. In the northern half, most of the quartz was found in Recess 6, and small concentrations in Recesses 1 and 2. In the southern half, most of the quartz was recovered from within, or just outside Recess 4, and several pieces from the area surrounding Orthostat 8 (separating Recesses 3 and 4). Again, quartz waste, cores and tools were mixed, with no apparent separation of, for example, knapping floors and areas for tool use. There were a number of hearths (F15 being a central fireplace), or ashy patches, along the central long axis of House 1, the area kept free of lithic waste.

It is possible that some recesses were workspaces, and others sleeping areas, but the quartz concentrations were not dense enough to have prohibited any of the recesses from having been sleeping areas. However, Recess 6 was also associated with a central concentration of coarse stone tools (mainly ard points), suggesting that this particular part of the structure may have been a working area, and the distribution of small scoops and fireplaces in Recesses 1, 5 and 6, makes Recesses 2–4 most probable as 'private quarters' or sleeping areas. In the case of dwellings, traffic in and out of buildings frequently results in a trail of lithic debris in the entrance area, and a solid concentration immediately outside the doorway (cf Dalmore; Ballin, in prep b). An entrance trail and exterior concentration were not identified in connection with House 1, Phase 2.

In Phase 3 (decay), the majority of the worked quartz pieces were found along the walls of the structure, with only a small number of lithic artefacts deriving from the central parts of the building. The discussion of distribution patterns is limited by the retrieval methods, with the findspot of some quartz artefacts being recorded precisely, and some only by house sectors (each *c* 2–3 × 2–3m). The individually plotted artefacts indicate a concentration in one corner of Recess 1, and the sector-recorded finds suggest the presence of one or more concentrations in the eastern quadrant (possibly the Recess 1 concentration identified by the individually plotted pieces), and outside the entrance. The latter imply either the presence of an entrance trail or a so-called 'door-dump' (Binford 1983, 151), where rubbish was deposited in connection with *post hoc* maintenance.

The distribution of quartz does not allow a more detailed analysis of the activities in House 1. Considerably more quartz blanks, cores and tools were produced during Phase 1 than during Phase 2, but as the exact duration of the individual phases is unknown, it is not possible to infer that more quartz implements were produced and used per time unit (for example, per year) in Phase 1. No areas appear to have been used particularly for primary production or tool use, as blanks, cores and tools were generally mixed. The distribution of lithic debris was more widespread in the pre-house phase than in the main occupation phase, with the quartz of Phase 2 respecting and avoiding the central space. Knapping and tool use seem to have taken place mainly in, or just outside, the various recesses (at the Middle Bronze Age site of Bayanne on Shetland no knapping took place inside the dwellings, but only outside the houses or in work-sheds; Ballin, forthcoming c). A low local density of lithic and stone rubbish suggests that one or more of Recesses 2–4 may have been sleeping areas, with the remaining recesses possibly having been used as work-spaces. The finds of the abandonment phase were not numerous enough to allow detailed inference, but the small concentration of quartz in a corner of Recess 1, and another possibly outside the entrance, suggest that even at this stage of disintegration the structural elements of the building were respected in the organization of activities.

4.1.3 House 3 (Whittle 1986, figs 75–6)

The lithic finds of this structure were too few in number to allow definition of internal spatial patterns.

4.1.4 Lithic artefacts and activities

The sub-assemblages from Houses 1 and 2 were substantial, whereas the material from House 3 was numerically limited: 5688 lithics (or 59% of the total

Table 4 Houses 1 and 2: the proportions of the main tool categories

	Numbers		Percentage	
	House 1	House 2	House 1	House 2
Arrowheads	2	0	2	0
Knives (incl truncated piece)	7	7	6	8
Scrapers	91	69	75	77
Piercers	4	2	3	2
Notches and denticulates	2	2	2	2
Pieces with various retouches	12	9	10	10
Fabricators and hammerstones	3	1	2	1
TOTAL	121	90	100	100

collection) were recovered from House 1; 3772 lithics (or 39%) from House 2; and only 227 lithics (or 2% of the total) from House 3. The proportions of the three main categories – débitage, cores and tools – were roughly the same in Houses 1 and 2, with débitage making up approximately 97% of all lithic artefacts, cores *c* 1% and tools *c* 2%. In House 3, débitage constituted 99%, and cores and tools each *c* 0.5% (one single-platform core and one retouched piece).

As shown in Table 4, the tool spectra of Houses 1 and 2 were almost identical. In both sub-assemblages, scrapers make up approximately three-quarters of all tools, with retouched pieces being the second most common tool group (10%). The relatively large number of curved knives makes knives comparatively numerous in both houses (6–8%). All other tool categories represent proportions of between 0% and 2% of the two sub-assemblages.

In terms of function, the arrowheads were produced either for defensive or hunting purposes; the two types of knives may represent different functional categories: the scale-flaked knife and the truncated piece, with their straight edges, would have been suitable for traditional cutting work, for example, butchering, whereas the curved knives may form a separate group of specialized implements the precise function of which is presently unknown. The analysis of scraper-edge angles (above) suggests that the scrapers were manufactured mainly for the processing of harder materials, such as bone, antler and wood. The fact that half of the piercers have almost blunt tips and the other half acutely pointed tips indicate that these may have been used for a variety of tasks – the blunt, more robust pieces may have been involved in the drilling of harder materials, and the more acutely pointed ones may have been used to penetrate softer materials, such as leather and skin. The notched, denticulated and retouched pieces probably represent a number of different functions.

The leaf-shaped arrowhead CAT 2297 from House 1 is a rough-out and proves that arrowheads were produced on site. CAT 2080 (House 2) is most probably a pre-form of a large leaf-shaped arrowhead broken during production, and CAT 2050, 2092 and 2124 (Houses 1 and 2) are probably base-fragments of leaf-shaped arrowheads. They may have broken during use (hunting?) in the field, and the arrows, with the bases of the points still attached to the arrowshaft, were brought back to the settlement for retooling (Keeley 1982).

The number of functions covered by the lithic tools from Houses 1 and 2, and the similarities between the two sub-assemblages, support the notion of the structures as being permanent, or semi-permanent (seasonal), dwellings (cf Whittle 1986, 137). It is a well-known fact that in prehistoric times many, or most, tools were made in perishable materials, and a large number of the lithic tools may have been used for the manufacture of tools and other products in organic raw materials (wooden bowls and spoons, bone piercers and points, clothing and adornments, fish-traps, nets, bows and arrows, shafts and handles and so on). No such objects were recovered at Scord of Brouster, but the excavation of prehistoric settlements from submerged or wetland sites (for example, Oakbank Crannog, Loch Tay, Perthshire; Dixon & Cavers 2001, 78–9) demonstrates that implements in organic materials usually made up a large proportion of the tools employed by prehistoric man.

The lithic assemblage from House 3 (practically all from the main Structure 3a) defines this unit as functionally different. As demonstrated previously (Fischer *et al* 1979, 12), lithic reduction produces much debris in a short span of time. In one experiment at the Lejre Archaeological Research Centre, Denmark, almost 20,000 flakes were manufactured in 2 hours and 40 minutes, and the 170 flakes and indeterminate pieces from House 3 may represent a single brief knapping event. The small amount of lithic rubbish probably represents one of three scenarios: either House 3 was in use for a very short period, it was thoroughly cleared out, or the structure may have had a specialized function (or a combination of the three). The composition of the débitage category supports the latter option.

The sub-assemblage from House 3 includes the same proportion of flakes as Houses 1 and 2 (on average 77% of the débitage), but fewer chips (3.5% against *c* 16–20%) and many more natural pieces of quartz (*c* 20% against *c* 3–6%). As suggested above, the flakes of House 3 may derive from a single knapping event, and the large amount of natural quartz is probably a byproduct of the decortication of relatively large numbers of raw quartz blocks. Most of the natural quartz has sandstone adhering to it, and this material had to be removed before the collected quartz was suitable for schematic knapping. The decortication of raw quartz blocks would not produce many chips; they would largely be produced as part of the primary and secondary production sequences. The decorticated core rough-outs were most probably removed from the building for further reduction elsewhere.

This suggests that House 3 may have had a workshop-like function, though the internal structure of the building, with a central hearth and five recesses or cells, corresponds to the structure of other contemporary Shetland dwellings (for example, Calder 1956). As the radiocarbon dates indicate a possible chronological overlap of the use-phases of Houses 1 and 2, but none between House 3 and the other buildings, it is uncertain to which settlement the House 3 workshop was linked.

4.2 Dating

The assemblage appears homogeneous, typologically as well as technologically. It includes few strictly diagnostic elements, but two leaf-shaped arrowheads suggest an early Neolithic date. (Some analysts sub-divide the Neolithic period into two phases: the early and late Neolithic – defined, respectively, by leaf-shaped points/blade technology and chisel-shaped or oblique points/flake technology; others sub-divide the period into three phases: early, middle and late Neolithic – mainly pottery-based. In the present paper the former distinction will be made.) One point is a small teardrop-shaped piece which cannot be dated more precisely than to the period in general, whereas the other piece (CAT 2296) is somewhat angular and belongs to the group of 'kite-shaped' arrowheads. These points are usually associated with the later part of the early Neolithic (in northern England, the Towthorpe Burial Tradition, Green 1980, 85; or Early Individual Burials, Clarke *et al* 1985, 63–7), and with artefacts, such as Seamer/Duggleby axes and polished flint knives. The Scord of Brouster assemblage also includes a number of fragments of leaf-shaped points or rough-outs for such points.

The curved knives may be dated by their invasive retouch to the Neolithic/Early Bronze Age period *sensu largo*, and the fact that some of these pieces were recovered from the same contexts as the leaf-shaped points (pre-wall contexts in House 1) suggests an early Neolithic date. The curved flint knife from Camster Long (Davidson & Henshall 1991, 101, fig 21; Wickham-Jones 1997, 162, fig 22) forms part of a larger lithic assemblage, including Mesolithic as well as early Neolithic elements. Though it is not possible to determine which of the Camster Long artefacts are contemporary, it is encouraging that this assemblage combines curved knives and kite-shaped arrowheads, like the Scord of Brouster assemblage (for discussion of the radiocarbon dates from Camster Long, see below).

Knives with cutting-edges formed by invasive retouch (CAT 2243) are defined by their invasive retouch as either Neolithic or Early Bronze Age implements, and denticulated pieces (CAT 2090, 2258) have been associated with later prehistoric environments (for example, Saville 1981; Herne 1991). The use of felsite in the production of polished Shetland knives or polished stone axeheads has traditionally been dated to the late Neolithic or the Early Bronze Age (Fojut 1986, 17–18; Saville 1994, 60–1), but during an inspection in 2004 of felsite artefacts in the collections of the Shetland Museum, the author noticed several small kite-shaped arrowheads in this material (for example, ARC 662 and ARC 666, labelled 'Lerwick' and 'Semblester, Sandsting', respectively), suggesting a slightly earlier date for the commencement of Shetland felsite quarrying and use.

The blanks, cores and tools from Scord of Brouster were generally relatively small, with sizes corresponding to those of artefacts from Mesolithic quartz assemblages, and differing from sizes of artefacts from later prehistoric quartz assemblages (Table 5). This fact supports the suggested Neolithic date of the Scord of Brouster material, although it must be borne in mind that the chosen assemblages represent different geological regions (Shetland, western mainland Scotland and the Western Isles), and the size of the available raw material may be partly responsible for the observed size differences.

A series of radiocarbon dates (14) was obtained from the site (Whittle 1986, table 1), forming a sequence from House 2 (early), through House 1 to House 3 (late) (Illus 34; for a discussion of the stratigraphy and phasing of the three houses, see Whittle 1986, 12–38). All the following dates were calibrated by the author using the program OxCal v3.8 (95.4% probability). The earliest date from House 2 is from its late Phase 2 (CAR-253: 3990–3650 cal BC) and should probably be disregarded; the remaining dates (CAR-249: 3370–2920 cal BC; CAR-250: 3350–2920 cal BC; CAR 251: 3500–3439 and 3380–3020 cal BC; CAR-252: 3340–2880 cal BC), mainly from Phase 1, form a dense cluster in the period 3500–2900 cal BC. In House 1, two Phase 1 dates (CAR-244: 3350–2920 cal BC; CAR-245: 3350–2700 cal BC) overlap with, and form a continuation of, the latest dates from House 2, with four of the remaining five dates clustering around 2900–2500 cal BC (CAR-243: 2880–2470 cal BC; CAR-246: 2890–2490 cal BC; CAR-247: 2890–2490 cal BC; HAR-2413: 2920–2490 cal BC); the last date from House 1 is a late 'outsider' (CAR-248: 2300–

Table 5 Comparison between the average dimensions of the most common quartz types from Mesolithic, Neolithic, Early Bronze Age and Later Bronze Age assemblages

	Mesolithic (Lussa River) (mm)	Neolithic (Scord of Brouster) (mm)	Early Bronze Age (Rosinish) (mm)	Later Bronze Age (Bayanne) (mm)
Single-platform cores	38 × 33 × 26	27 × 29 × 34	44 × 40 × 34	40 × 44 × 37
Bipolar cores	27 × 19 × 11	27 × 20 × 12	36 × 27 × 18	44 × 34 × 23
Short end-scrapers	30 × 24 × 12	30 × 22 × 12	45 × 36 × 20	37 × 31 × 19

1750 cal BC) from Phase 2b. Both dates from House 3 are from its Phase 1, suggesting a date for this structure of *c* 1500–1900 cal BC (CAR–477: 1740–1440 cal BC; CAR-479: 1890–1520 cal BC). If these dates represent the main occupation of the houses, this defines the Houses 1, 2 and 3, as mainly late Neolithic, early Neolithic and Early Bronze Age, respectively.

Four radiocarbon dates (Davidson & Henshall 1991, 102) have been obtained from Camster Long, namely one from activities in front of the platform in the south forecourt (4000–3050 cal BC), and three from buried soil under the southern part of the cairn (GU-1707: 3960–3630 cal BC; GU-1708: 3940–3870, 3810–3630 and 3560–3530 cal BC; GU-1709: 4000–3350 cal BC). Due to the find circumstances, it is not possible to relate any of these radiocarbon dates securely with any parts of the lithic assemblage, but the date from activities in the south forecourt (4000–3050 cal BC) represents a *terminus ante quem* for the curved knife and the kite-shaped points found in the pre-cairn soil (Davidson & Henshall 1991, 101–2). The remaining three radiocarbon dates may date these implements. If this is accepted, the dates from Camster Long and Scord of Brouster suggest a northern British, or Scottish, horizon including kite-shaped points and curved knives encompassing the period *c* 4000–3000 cal BC. The tradition of Early Individual Burials, referred to above, has been dated (in calendar years) to the end of the fourth millennium BC (Clarke *et al* 1985, 14, 63–7, 246–51).

With most (*c* 90%) of the House 2 sub-assemblage deriving from later phases (Phase 2 construction, Phase 2 and Phase 3), and most (*c* 68%) of the House 1 sub-assemblage being from the early Phase 1, it is possible that the major part of the quartz assemblage forms a chronological whole, dating to the very end of the early Neolithic period (associated with, *inter alia*, kite-shaped points and curved knives). This is supported by the fact that the bifacial curved points, presently unique to the assemblages from Scord of Brouster, Camster Long and Druim Arstail, were recovered from early and late House 2 contexts (seven pieces), but only early House 1 contexts (five pieces). The sub-assemblage from House 3 is small (227 pieces or *c* 2% of the entire assemblage) and uncharacteristic; it only includes one tool and one core, both undiagnostic, and most of the material is undatable outer vein rubbish from the decortication of quarried quartz plates and nodules.

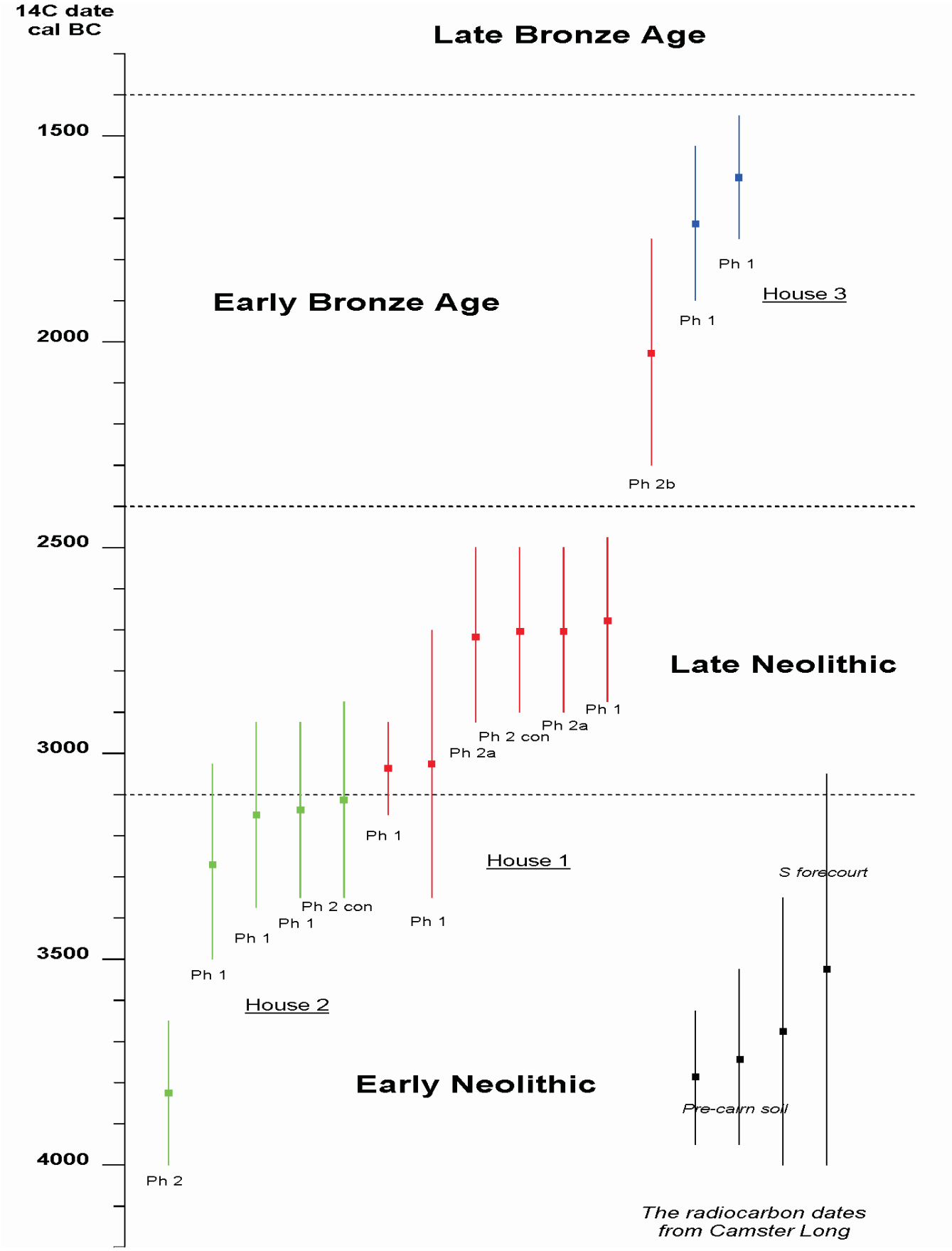
4.3 The quartz assemblage from Scord of Brouster compared with other Neolithic assemblages from Scotland – the regional context

In the present chapter the assemblage from Scord of Brouster is compared with other Neolithic quartz and non-quartz assemblages from Scotland, but only finds from settlements are included in the comparison. Due to an uneven distribution of Neolithic sites across the country, a region-by-region comparison is not feasible and, instead, the author has chosen to focus on the most important elements of variation: assemblage size, raw materials, artefact size, typology and technology (see Table 6 for an overview). The analysis is influenced by the fact that many Neolithic assemblages from Scotland remain unpublished.

4.3.1 Assemblage size

Most chronologically 'clean' lithic assemblages from Scottish Neolithic sites are small, usually numbering from a handful of pieces (for example, Dunloskin, Argyll, Rennie 1977, 6; Wardend of Durris, Russel-White 1995) to a few hundred pieces (for example, Beckton Farm, Dumfries and Galloway, Pollard 1997; Auchategan, Argyll, Marshall 1978). Larger assemblages do, however, exist and, in terms of size, the Scord of Brouster assemblage is not unique. Substantial collections are known from several Orcadian sites, with the assemblage from Tofts Ness (Dockrill 1987) being the largest (7280 pieces), but sizeable collections have also been recovered from sites in the Western Isles (Eilean Dhomnuil – 'hundreds of pieces'; Finlayson, forthcoming; A Saville pers comm), and sites in the Highland (Lairg – *c* 10,000 pieces; Finlayson 1996) and in Argyll (Carding Mill Bay – 990 pieces; Connock *et al* 1992). A number of large mixed assemblages from the Scottish west coast and the Southern Hebrides contain Neolithic elements (for example, Shieldaig; Ballin *et al*, forthcoming; Lussa River, Ballin 2002; Ellary Boulder Cave, Tolan-Smith 2001), but in none of these cases is it possible to assess the precise proportion of the Neolithic component.

The distribution of large and small Neolithic assemblages across Scotland is not unequivocal, partly because of the uneven distribution of



Illus 34 Radiocarbon dates; the dates were calibrated by the author using OxCal v3.8 (95.4% probability). For comparison, the dates from Camster Long have been inserted in the lower right corner

Table 6 The general characteristics of Neolithic assemblages from the two main raw material provinces of Scotland. The province of the west coast of the Scottish mainland/Southern Hebrides constitutes a hybrid form of these two

	The quartz province of northern and western Scotland	The flint (and similar raw materials) province of eastern, central and southern Scotland
Assemblage size	Several very large assemblages: Scord of Brouster 9687, Lairg c 10,000	Mostly smaller assemblages, from a handful of pieces to a few hundred pieces
Artefact size	The general artefact size is comparable to that of the Mesolithic period (relatively small)	Varying artefact sizes: some assemblages consist of mainly larger pieces (Lunanhead), some of mainly smaller pieces (Auchategan)
Technology	Flake production, either by the application of hard percussion or bipolar technique	Blade (EN) or flake (LN) production, the former mainly by the application of soft percussion, the latter by hard percussion and/or bipolar technique
Typology	Limited tool selection: dominance of scrapers, no or few arrowheads, some retouched pieces and individual specimens of other tool types – no serrated pieces	More varied tool selection: less marked dominance of scrapers, more arrowheads, serrated pieces, truncated pieces, plano-convex knives and other tool types

Neolithic finds in general, but large assemblages do appear to be concentrated mainly in the western and northern parts of the country, with assemblages from eastern, central and southern Scotland generally being smaller. It is quite possible that this situation is, in part, artificial and reflects the fact that the eastern, central and southern parts of Scotland have been more densely populated throughout prehistory and history, and that agricultural and industrial activities have, to some degree, destroyed many prehistoric settlements and monuments (see, for example, the distribution of chambered tombs in central Scotland; Henshall 1972). However, the sizeable Neolithic component in some surface collections (for example, Robert Fortune's collection from Airhouse, Berwickshire; Callander 1928) suggests that larger Neolithic settlement assemblages may yet be uncovered, if not in the heavily built-up Central Belt then possibly in eastern and southern Scotland.

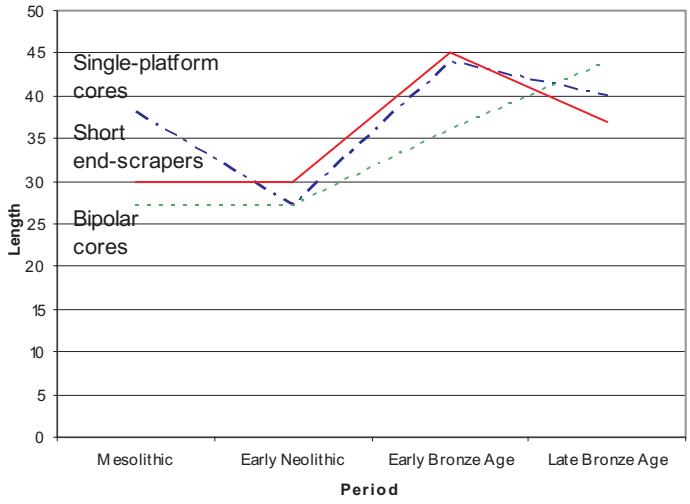
However, Warren's analysis of the early Neolithic industries of eastern Scotland shows that the assemblages from this region generally have smaller proportions of débitage and higher tool ratios (Warren, forthcoming). It is possible that the small assemblage sizes of the Scottish east and south reflect, at least partly, differences in the spatial organization of lithic knapping (separation of knapping floors and living spaces?), differences in site maintenance (more vigorous clearing of settlement surfaces in eastern/southern Scotland?), or the site types excavated in eastern and southern Scotland differ from site types excavated elsewhere (as an example, Warren emphasizes the presence of large middens on Orcadian sites). The different flaking properties of quartz and other lithic raw materials definitely played a role in the regional variation of assemblage sizes, as the tendency of many quartz varieties to disintegrate uncontrolledly generally creates more débitage per finished tool.

4.3.2 Raw materials

Throughout prehistory, Scotland appears to be divided into a number of raw material zones. Many of these are small, like the Arran pitchstone zone, the Rùm bloodstone zone and the Orcadian/Caithness flint zone (the latter sandwiched between quartz-using areas), but on a more general level Scotland may be divided into only three main raw material provinces: the quartz-dominated north and west of the country; eastern, central and southern Scotland, where flint and similar lithic raw materials (chert, chalcedony, pitchstone, and so on) were exploited; and west-coast mainland Scotland/the Southern Hebrides, constituting a hybrid form based on the use of quartz and relatively large supplements of flint and raw materials with similar flaking properties (Rùm bloodstone, Staffin baked mudstone and so on) or, in some cases, the exclusive use of flint (for example, Newton, Islay; Clarke 1989).

Scord of Brouster is characterized by an almost total dominance of quartz, with flint only constituting *c* 1/1000, whereas the assemblage from Sumburgh on the southern tip of Shetland (Finlayson 2000) includes 1% flint. The late Neolithic/Bronze Age assemblage from Lairg, Sutherland (Finlayson 1996), has a similar raw material composition with *c* 99% quartz and *c* 1% flint. Neolithic and Bronze Age collections from the Western Isles generally have a high quartz ratio, with flint and mylonite forming significant sub-assemblages; the raw material composition of the late Neolithic/Early Bronze Age assemblage from Calanais (Ballin, in prep a) is quartz 74%, flint 14% and mylonite 12%.

As many assemblages from the Scottish west coast and the Southern Hebrides are chronologically mixed, it is difficult to calculate reliable raw material ratios for the Neolithic of this region; some are heavily dominated by quartz (Carding Mill Bay; Connock *et al* 1992), whereas others are heavily



Illus 35 The lengths of single-platform cores, short end-scrapers and bipolar cores from representative Mesolithic, Neolithic and Bronze Age assemblages (see Table 5)

dominated by flint (Newton, Area 1 Upper Terrace, Islay; Clarke 1989) and some flint- or quartz-dominated assemblages are supplemented by noticeable proportions of locally available raw materials, such as bloodstone or baked mudstone, or imported exotica like pitchstone (for example, Ellary Boulder Cave, Argyll – 75 pieces of pitchstone; Tolan-Smith 2001).

Neolithic sites from eastern and central Scotland (as well as the Orcadian and Caithness 'enclaves') are usually heavily dominated by flint, or their assemblages are exclusively in flint (for example, Aberdeen City, Ballin, forthcoming a; Lunanhead, Angus, Wickham-Jones & MacKenzie 1996; Balbridie, Kincardineshire, Sabine & Warren 2002). In Orkney there is some use of local chert, for example, at Skara Brae (Childe 1931, 113), and throughout eastern Scotland flint was supplemented by some quartz or agate (for example, at Hawkhill, Angus – Warren no date – if a cache of unworked agate pebbles is disregarded, the ratios of this assemblage are flint 45%, agate 34% and quartz 21%). Neolithic collections from southern Scotland generally include large proportions of flint and Southern Uplands chert, with some assemblages being dominated by the former (Beckton Farm, Dumfries and Galloway; Pollard 1997) and some by the latter (Tinto Sand and Gravel Pit, South Lanarkshire; Ballin 2003).

Outside Arran (Williams Thorpe & Thorpe 1984), identified as the likely source of most, if not all, archaeological pitchstone, pitchstone forms part of an impressively large number of Neolithic collections, from the Scottish Borders to Orkney (Ness & Ward 2001), but so far no pitchstone has been recovered from any Shetland sites. Large assemblages of pitchstone artefacts have almost exclusively been recovered from southern Scotland and from the southern part of Argyll.

The use of specific raw materials in lithic production generally reflects either function (availability) or style (' . . . formal variation in material culture that transmits information about personal and social identity'; Wiessner 1983, 256; for a general discussion of the concept of style, see Ballin, forthcoming d). Raw material preference as an expression of function usually results in a gradually declining fall-off curve (Renfrew 1977, 73) with growing distance to the outcrop, whereas raw material preference as an expression of style is characterized by a marked drop in frequency at the borders of the social territory in question (Hodder 1979, 447). Stylistic use of a raw material is demonstrated by the almost exclusive use of rhyolite in early Neolithic south-west Norway, with the raw material deriving from one central locality (the Bømlo Quarry; Alsaker 1987), and with a marked drop in the rhyolite frequency at the borders of that territory (Ballin, forthcoming d). A similarly exclusive distribution pattern has not been demonstrated in connection with the raw materials recovered from Scottish Neolithic sites, with most assemblages displaying a combination of raw materials generally reflecting local availability.

How pitchstone was used on Arran, and perceived as an either utilitarian or non-utilitarian resource, is still uncertain, as very little lithic material has been published from the island (in 1999, a number of Mesolithic and Neolithic sites were excavated on Arran in connection with the construction of a pipeline; Donnelly 1999), but the distribution of pitchstone across Scotland suggests that some non-utilitarian value was attached to this raw material. Pitchstone knapping debris has been recovered from sites in southern Scotland and southern Argyll (Ness & Ward 2001; Tolan-Smith 2001), but on most sites outside this region pitchstone appears as individual, or at most a handful, of pieces. Warren points out that these specimens are usually high quality pieces of unmodified débitage (Warren, forthcoming), and they were probably not intended for practical use; a small pitchstone nodule from the site of Achnahaird Sands, Highland (Ballin, forthcoming b), does not fit this picture.

4.3.3 *General artefact size*

As demonstrated by Table 5 and Illus 35, the general artefact size varies between assemblages within the Scottish quartz province, with artefacts from Neolithic Scord of Brouster being of roughly the same small proportions as artefacts from Mesolithic assemblages, but somewhat smaller than artefacts from Early and Late Bronze Age assemblages. However, as the following comparison demonstrates, general dimensions also differ between contemporary Neolithic settlement collections.

The somewhat unusual group of mainly blanks from Lunanhead, Angus, is assumed on technological grounds to be early Neolithic (Wickham-Jones & MacKenzie 1996, 13). The pieces, many of which were fragmented, had an average length of *c* 45mm, with several blades being almost 70mm long. Almost as large blades were found in connection with the excavation of Trench H at the Carmelite Friary in Aberdeen (Ballin, forthcoming a). Outside eastern Scotland, lithic artefacts are usually a fraction smaller, with chert (for example, Tinto Sand and Gravel Pit, South Lanarkshire; Ballin 2003) and pitchstone (for example, Auchategan; Marshall 1978) blanks having dimensions comparable to those of the quartz artefacts from Scord of Brouster.

As mentioned above, there is no logical explanation to the generally small size of the Scord of Brouster quartz artefacts, but the size of the artefacts from various non-quartz assemblages in eastern, central and southern Scotland appears mainly to be linked to local raw material availability, the size of local pebbles and nodules and the flaking properties of these materials. Eastern Scotland is comparatively rich in flint which can be found in beach deposits or inland gravel deposits, and these nodules are frequently fairly large – though too a large extent of fairly poor quality (Saville 1994; Saville 1995; A Saville, pers comm). Chert, chalcedony and agate do occasionally appear as large nodules, but in most cases these raw materials are found in the form of relatively small pebbles. Though pitchstone does form substantial dykes and sills (Williams Thorpe & Thorpe 1984, 2), no quarry sites have been found, examined and published (though a knapping floor was detected near the Brodick Schoolhouse outcrop; Mann 1918, 144), and it is not known to which extent the collection of pitchstone beach pebbles or erratics played a role.

4.3.4 *Technology*

The radiocarbon determinations from Scord of Brouster date this assemblage (Houses 1 and 2) to the transition between the early and late Neolithic periods. In general, the British early Neolithic is defined by the presence of leaf-shaped arrowheads and regular, parallel-sided macroblades (Edmonds 1995), whereas the British late Neolithic is characterized by the presence of chisel-shaped or oblique arrowheads and elongated flake blanks (Manby 1974). In typo-technological terms, the Scord of Brouster assemblage is a hybrid form defined by leaf-shaped points and the production of elongated flakes, and regular macroblades were not manufactured at this location.

Technologically, the Neolithic assemblages of Scotland can be subdivided into three groups in the same way as they were sorted in connection with the analysis of raw material use in the Scottish Neolithic (above): the Scottish quartz province is characterized by the production of elongated flakes through the early and late Neolithic periods (for example, Scord of Brouster, Shetland, this paper; and Lairg, Sutherland, Finlayson 1996); in the eastern, central and southern parts of Scotland flint, chert or similar raw materials were in use, and the industries are characterized by the manufacture of regular broad blades in the early Neolithic (for example, the Carmelite Friary, Aberdeen; Ballin, forthcoming a) and a flake technology in the late Neolithic (for example, Beckton Farm, Dumfries and Galloway; Pollard 1997); and the zone of the Southern Hebrides/western mainland Scotland is defined by opportunistic raw material use and an equally opportunistic choice of technological approach. Early Neolithic assemblages dominated by quartz represent flake industries (for example, Carding Mill Bay, Argyll; Connock *et al* 1992) and contemporary flint-dominated assemblages represent blade industries (for example, Newton, Islay; Clarke 1989), with the situation being less clear in the late Neolithic period due to fewer finds. Some assemblages, like Auchategan, Argyll (Marshall 1978), display more than one technological approach, with the pitchstone artefacts representing a blade technology and the quartz artefacts a flake technology.

The choice of percussion technique varies between soft percussion, hard percussion and bipolar technique. Bipolar technique is either the main approach to detaching blanks or it may be the final stage of a complex operational schema, primarily employed to completely exhaust abandoned platform cores. In Neolithic Scotland, quartz blanks may be detached in various ways, with the assemblage from Scord of Brouster representing a hard-hammer approach (supported by bipolar technique), and the lithic finds from Carding Mill Bay (Connock *et al* 1992) representing an entirely bipolar approach. Collections of artefacts in flint and related materials were mostly produced by the application of platform techniques, with the early Neolithic assemblages mainly representing soft-hammer percussion on single-platform cores (for example, the pitchstone sub-assemblage from Auchategan; Marshall 1978), whereas late Neolithic assemblages represent more robust techniques on simpler, usually irregular, core forms (for example, Beckton Farm, Dumfries and Galloway; Pollard 1997). Flint and similar collections in most cases include some bipolar cores as well.

The technological choices of the Scottish Neolithic

appear to be basically opportunistic, reflecting mainly raw material availability and the flaking properties of the available lithic materials. The choice, for example, of whether to apply hard percussion or bipolar technique in the reduction of quartz may mainly be a matter of size – the larger, quarried nodules at Scord of Brouster allowed hard percussion to be used, whereas the smaller beach pebbles at Carding Mill Bay made bipolar reduction more appropriate (cf Ballin 1999a).

4.3.5 Typology

The typological composition of the Neolithic assemblages of Scotland shows the same dichotomy as described in connection with the discussion of the technology of these industries: the quartz assemblages generally display a limited selection of morphological types, whereas the assemblages in flint and flint-like materials frequently display the full range of tool types, with a general assemblage composition similar to that of Neolithic assemblages of southern Britain (Edmonds 1995).

The quartz assemblages are usually characterized by a marked dominance of scrapers (in the case of Scord of Brouster, 75% of the tools), supplemented by a small number of arrowheads (if any), some retouched pieces and individual specimens of other tool types. Uniquely, the assemblage from Scord of Brouster also includes 12 curved knives – a type only known from two other Scottish sites (Camster Long, Caithness, Wickham-Jones 1997; and Druim Arstail, Oronsay, Wickham-Jones *et al* 1982). Presently, this tool type seems to be limited to the later part of the early Neolithic period of north-west Scotland, and they were made in flint as well as in quartz. Assemblages in flint and flint-like raw materials in most cases include a slightly smaller proportion of scrapers, though scrapers usually dominate the tools, supplemented by arrowheads, serrated pieces, truncated pieces, and – occasionally – plano-convex knives (cf table in Warren, forthcoming). At present, it would be statistically unsound to put forward exact proportions of the various tool types, as the majority of the known Neolithic assemblages from eastern, central and southern Scotland are fairly small (see above).

The different typological compositions of Neolithic assemblages from eastern/central/southern Scotland and northern/western Scotland may be due to a number of factors, but most likely differences in raw material availability and subsistence economy are the more important ones. Flint and quartz, for example, have different flaking properties – a fact probably best demonstrated by the geologically mixed assemblages from western Scotland: if flint and quartz were being exploited simultaneously on a site, artefact types requiring neat pressure flaking or invasive retouch are mostly in flint (for example, the various chronologically mixed Jura sites; Mercer 1968; Mercer 1971; Mercer 1972).

As little, or no, organic material has been preserved from most Neolithic sites of Scotland it is difficult to positively demonstrate differences between the economies of the various sites, but with most locations from the north and west being situated either on islands or directly on the west mainland coast, and many locations from the south and east being inland sites, it is obvious that economic differences must have existed between these two groups of sites. It is logical to associate a 'semi-diagnostic' type such as the serrated piece with inland sites, as detailed use-wear analysis has demonstrated that this type may mainly have been used for the processing of plant material (Juel Jensen 1988; Juel Jensen 1994).