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Culduthel

An Iron Age Craftworking Centre in North-East Scotland

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Chapter 2

CHRONOLOGY AND THE RADIOCARBON DATES

Introduction

The phasing of the site is summarised here alongside the approach taken in the radiocarbon dating programme carried out in 2010. The site phasing is heavily reliant on the suite of 34 radiocarbon dates along with some stratigraphic and artefactual evidence, a data set that unfortunately restricts discussions on the evolution and longevity of the site. Due to the number of radiocarbon dates and the strategy for this programme, Bayesian modelling was not deemed suitable as an interpretative tool. Subsequent discussions with Derek Hamilton of SUERC indicate that analysis could have been done to refine the overall start and end dates for the ferrous metalworking activity identified on site and that this work could be undertaken by future researchers (pers. comm. Derek Hamilton).

Artefactual evidence has aided the identification of the earliest prehistoric features on site. A small number of early prehistoric pottery sherds have dated Early and Late Neolithic pits (Period 1). The datable later prehistoric finds such as Roman coins and the decorative metalwork have helped refine elements of the later occupation of the site (Period 3) and support some of the radiocarbon dates gained for this period of activity.

In brief, the early prehistoric evidence indicates that the site at Culduthel was certainly visited in the Neolithic and could, at times, have been intensively settled. The site is next occupied, potentially periodically, in the Early Iron Age, at points between the 8th and 5th centuries BC. After this occupation ceases there is no further evidence of activity on the land until the intense period of craft-focused settlement of large-scale roundhouses and smaller 'workshop' roundhouses. Radiocarbon dates for this phase cover the period from the early 4th century BC to the mid-4th century AD, but evidence suggests that the main phase of craft-working was between the 2nd century BC and the 2nd century AD. The radiocarbon dates indicate no activity on site after *c.*AD 340.

Chronology

This publication uses the following chronological period breakdown:

Neolithic (4100–2450 BC)
Chalcolithic (2450–2150 BC)
Bronze Age (2150–800 BC)
Early Iron Age (800–400 BC)
Middle Iron Age (400 BC–AD 300)
Late Iron Age (AD 300–400)
Early Historic/Early Medieval Period (after AD 400)

Radiocarbon dates

Sample selection, objectives and issues

The radiocarbon dating programme for Culduthel had several key objectives. Firstly, it was designed to gain dates for most of the buildings, furnaces and other significant structures and features, to aid the construction of a chronological framework for the site and its subsequent interpretation. Secondly these dates were intended to clarify whether certain features (e.g. the roundhouses workshops and their internal furnaces) were contemporary activities. Finally, dates were sought for features containing deliberately deposited artefacts, to ascertain their date of deposition and, by extension, an approximate date for the artefact itself.

As most features on site produced charcoal or material suitable for radiocarbon dating, the sample choice appeared, on the surface, to be almost endless. Ideally, all the 34 samples chosen for radiocarbon dating would have come from features that contained carbonised material that was in situ (such as charcoal within the primary fill of a furnace or burnt posts within a post-hole) and from short-lived species or 'freshly' deposited articulated animal bone. These types of material have the highest chance of being primary deposits and could therefore be attributed with some confidence to a structure or feature. In reality the bone preservation across the site was very poor and the primary deposition of material was rare, aside from the final firings within the bases of the furnaces and hearths. Material was selected for dating with the issues outlined above in mind, and samples were taken from basal contexts that, although potentially not primary in nature, were the least likely to have intrusive material unrelated to the original function. Selection also focused on short-lived tree species, cereal grains, hazelnut shell and in one case a charred fruit stone. Where possible the charcoal came from small branch wood in order to refine the date range further. In only a couple of cases there was no option other than dating oak charcoal, never ideal given its long-lived nature and the potential for the 'old wood' effect.

Table 2.1
Radiocarbon dates from Culduthel

Period 2			Period 3			
Lab ID	**Feature**	**Context**	**Material Type**	**Radio-carbon Age (bp)**	**δ13C (0/00)**	**Calibrated date (95% confidence)**
SUERC-30366	House 5	(792) Fill of post-hole [791]	Charred pip *Malus sylvestris* (Crab Apple)	4885 ± 35	-26.4 $^{0}/_{00}$	3760–3630 cal BC
SUERC-30399	House 10/1	(3869) Fill of post-hole [3868]	Charcoal *Corylus avellana* (Hazel)	4220 ± 35	-26.1 $^{0}/_{00}$	2910–2680 cal BC
SUERC-30360	Palisade	(468) Fill of palisade ditch [469]	Charred grain *Hordeum Vulgare* (Hulled Barley)	3895 ± 35	-24.6 $^{0}/_{00}$	2470–2240 cal BC
SUERC-30367	House 3	(1613) Fill of ring-groove [724]	Charcoal *Corylus avellana* (Hazel)	2565 ± 35	-27.8 $^{0}/_{00}$	810–550 cal BC
SUERC-30405	Clearance cairn [4234]	(4234) Fill within cairn	Charcoal *Prunus avium* (Wild Cherry)	2505 ± 40	-26.9 $^{0}/_{00}$	800–490 cal BC
SUERC-30375	House 9	(2108) Post-pipe of post-hole [2106]	Charcoal *Corylus avellana* (Hazel)	2175 ± 35	-25.5 $^{0}/_{00}$	360–120 cal BC
SUERC-30369	House 7	(1936) Post-pipe of post-hole [1830]	Charcoal *Quercus sp.* (Oak)	2140 ± 35	-26.9 $^{0}/_{00}$	360–50 cal BC
SUERC-30376	Hearth [2166]	[2166] Fill of Glass/Copper Alloy Furnace	Charcoal *Alnus glutinosa* (Alder)	2125 ± 35	-27.5 $^{0}/_{00}$	350–50 cal BC
SUERC-30370	Workshop 8	(1992) Fill of post-hole [1991]	Charcoal *Corylus avellana* (Hazel)	2120 ± 35	-24.8 $^{0}/_{00}$	350–50 cal BC
SUERC-30379	House 17	(2347) Fill of eroded hollow [2403]	Charcoal *Corylus avellana* (Hazel)	2115 ± 35	-25.5 $^{0}/_{00}$	350–50 cal BC
SUERC-30407	Hearth [4273]	(4279) Fill of black-smithing hearth	Charcoal *Corylus avellana* (Hazel)	2110 ± 35	-25.2 $^{0}/_{00}$	350–40 cal BC
SUERC-30377	Furnace [2246] Workshop 16	(2288) Fill of iron-smelting furnace within Workshop 16 (PRIMARY)	Charcoal *Corylus avellana* (Hazel)	2080 ± 35	-25.6 $^{0}/_{00}$	200 cal BC–cal AD 1
SUERC-30388	Pit [2777]	(2778) Fill of Pit	Charcoal *Salix sp.* (Willow)	2080 ± 35	-25.6 $^{0}/_{00}$	200 cal BC–cal AD 1
SUERC-30368	Workshop 6	(1619) Fill of post-hole [1618]	Charcoal *Pomoideae sp.* (Apple/Pear/ Hawthorn)	2080 ± 35	-25.7 $^{0}/_{00}$	200 cal BC–cal AD 1
SUERC-30400	Furnace [4147] Workshop 15	(4141) Fill of iron-smelting furnace in Workshop 15 (PRIMARY)	Charcoal *Quercus sp.* (Oak)	2060 ± 35	-25.8 $^{0}/_{00}$	170 cal BC–cal AD 20
SUERC-30378	Workshop 16	(2304) Post-pipe of post-hole [2303]	Charred grain *Hordeum Vulgare* (Hulled Barley)	2055 ± 35	-25.1 $^{0}/_{00}$	170 cal BC–cal AD 20
SUERC-30386	Hearth [2434]	(2677) Fill of Glass/Copper Alloy Furnace (PRIMARY)	Charcoal *Alnus glutinosa* (Alder)	2055 ± 35	-27.3 $^{0}/_{00}$	170 cal BC–cal AD 20
SUERC-30390	Furnace [3050] Workshop 13	(3204) Fill of iron-smelting furnace [3050] within Workshop 13 (PRIMARY)	Charcoal *Prunus avium* (Wild Cherry)	2035 ± 35	-26.2 $^{0}/_{00}$	160 cal BC–cal AD 50

Table 2.1
(continued)

Period 3						
Lab ID	**Feature**	**Context**	**Material Type**	**Radio-carbon Age (bp)**	**δ13C (0/00)**	**Calibrated date (95% confidence)**
SUERC-30398	Pit [3811]	(3812) Fill of metalworking waste pit [3811]	Charcoal ***Corylus avellana*** (Hazel)	2030 ± 35	-24.8 $^{0}/_{00}$	160 cal BC–cal AD 60
SUERC-30381	Posthole [2416]	(2419) Fill of post-hole [2416] containing iron dagger blade (SF 479)	Charred grain ***Hordeum Vulgare*** (Hulled Barley)	2025 ± 35	-24.6 $^{0}/_{00}$	160 cal BC–cal AD 60
SUERC-30387	House 10/2	(2738) Fill of post-hole [2670]	Charcoal ***Pomoideae sp.*** (Apple/Pear/ Hawthrorn)	2025 ± 35	-25.0 $^{0}/_{00}$	160 cal BC–cal AD 60
SUERC-30385	Workshop 12	(2461) post-pipe in post-hole [2459]	Charcoal ***Alnus glutinosa*** (Alder)	2015 ± 35	-27.6 $^{0}/_{00}$	110 cal BC–cal AD 70
SUERC-30401	Furnace [4355] Workshop 15	(4148) Fill of iron-smelting Furnace [4355] within Workshop 15 (PRIMARY)	Charcoal ***Alnus glutinosa*** (Alder)	2010 ± 35	-25.0 $^{0}/_{00}$	110 cal BC–cal AD 70
SUERC-30391	Furnace [3790] Workshop 13	(3467) Ash fill of iron-smelting furnace [3790] within Workshop 13 (PRIMARY)	Charred fruit stone ***Prunus avium*** (Wild Cherry)	2000 ± 35	-25.7 $^{0}/_{00}$	90 cal BC–cal AD 80
SUERC-30371	Workshop 11	(2100) Abandonment phase of Workshop 11	Charcoal ***Prunus spinosa*** (Blackthorn)	1985 ± 35	-25.7 $^{0}/_{00}$	90 cal BC–cal AD 90
SUERC-30361	Workshop 2	(595) Fill of post-hole [597]	Charred grain ***Hordeum Vulgare*** (Hulled Barley)	1975 ± 35	-23.2 $^{0}/_{00}$	50 cal BC–cal AD 120
SUERC-30406	Furnace [4262] Workshop 15	(4257) Fill of iron-smelting furnace [4262] within Workshop 15 (PRIMARY)	Charcoal ***Corylus avellana*** (Hazel)	1975 ± 35	-25.4 $^{0}/_{00}$	50 cal BC–cal AD 120
SUERC-30395	Workshop 15	(3495) Fill of post-hole [3494]	Charred grain ***Hordeum Vulgare*** (Hulled Barley)	1965 ± 35	-23.1 $^{0}/_{00}$	40 cal BC–cal AD 120
SUERC-30365	Furnace [681] Workshop 2	(676) Fill of iron-smelting furnace [681] in Workshop 2 (PRIMARY)	Charcoal ***Quercus sp.*** (Oak)	1960 ± 35	-25.7 $^{0}/_{00}$	40 cal BC–cal AD 120
SUERC-30389	Workshop 13	(2920) Fill of post-hole [2919]	Charred grain ***Hordeum Vulgare*** (Hulled Barley)	1935 ± 35	-23.1 $^{0}/_{00}$	40 cal BC–cal AD 130
SUERC-30397	House 10/3	(3799) Fill of post-hole [3746]	Charcoal ***Alnus glutinosa*** (Alder)	1890 ± 35	-27.3 $^{0}/_{00}$	cal AD 30–230
SUERC-30396	Workshop 18	(3600) Fill of pit [3599]	Charcoal ***Corylus avellana*** (Hazel)	1870 ± 35	-26.3 $^{0}/_{00}$	cal AD 70–230
SUERC-30380	House 4	(2351) Fill of post-hole [2352]	Charred grain ***Hordeum Vulgare*** (Hulled Barley)	1860 ± 35	-23.7 $^{0}/_{00}$	cal AD 80–240
SUERC-30359	Cobbled surface [227]	(225) Dark deposit overlying cobbles	Charcoal ***Alnus glutinosa*** (Alder)	1785 ± 35	-27.9 $^{0}/_{00}$	cal AD 130–340

As there is high potential for cross-contamination on a site rich in charcoal and industrial debris, the radiocarbon dates presented here are more likely to have come from material influenced by redeposition than, say, a comparable group of samples retrieved from purely domestic Iron Age settlements. It is also clear that, even with the careful selection outlined above, the majority of the radiocarbon dates obtained are derived from material retrieved from secondary or tertiary contexts. These two issues are further compounded by the single-date strategy employed during the selection process (see Results section below). As only one date was obtained from each building or feature there are no supporting radiocarbon dates available to corroborate any of the 34 dates obtained.

Where the radiocarbon dates are considered to be 'secure' (i.e. retrieved from primary deposits) they have been used to assist in the development of the chronological framework. The most obviously secure dates were from deposits assumed to be primary: the fuel of the final firing of a smelting furnace or hearth. These are eight of the 34 radiocarbon dates, seven from the iron-smelting furnaces and one from a glass/copper alloy working hearth. These dates are noted as 'primary' on the radiocarbon date table (Table 2.1).

The dates made for the final firing of three of the furnaces do appear to corroborate those obtained for the roundhouse 'workshops' that housed them. As the origins of the charred material used to make the radiocarbon dates for the buildings is unknown (for each date the sampled material was obtained from backfill of the buildings' post-holes), it can only be postulated that the workshops and furnace were contemporaneously constructed.

Results

A total of 34 samples from 34 separate deposits were sent for radiocarbon dating to the Scottish Universities Environmental Research Centre (SUERC). Each AMS radiocarbon age measurement was made on a single entity. Samples were taken from:

- Each roundhouse
- The palisade
- A clearance cairn
- All excavated iron smelting furnaces
- Hearths associated with copper alloy/glassworking
- A layer overlying Workshop 11, a building associated with copper/glassworking
- A layer overlying cobbled yard (227), associated with ironworking
- A post-hole [2416] containing a deliberately deposited iron dagger
- Pits with ferrous, non-ferrous or glassworking waste.

The results of the radiocarbon dates are presented in chronological order in Table 2.1 and as a multiple curve illustration (multi-plot) (Illus. 2.1). Calibrated date ranges were calculated using the calibration curve of Reimer et al (2013) and OxCal v 4.2 (Bronk Ramsey 2009). They are presented as 95% probability ranges throughout the text, unless otherwise noted.

The sequence of radiocarbon dates runs from *ca.* 3760 BC to AD 340. This is not a continuous sequence of dates, with three clear periods of activity (Period 1, 2 and 3) and two hiatuses

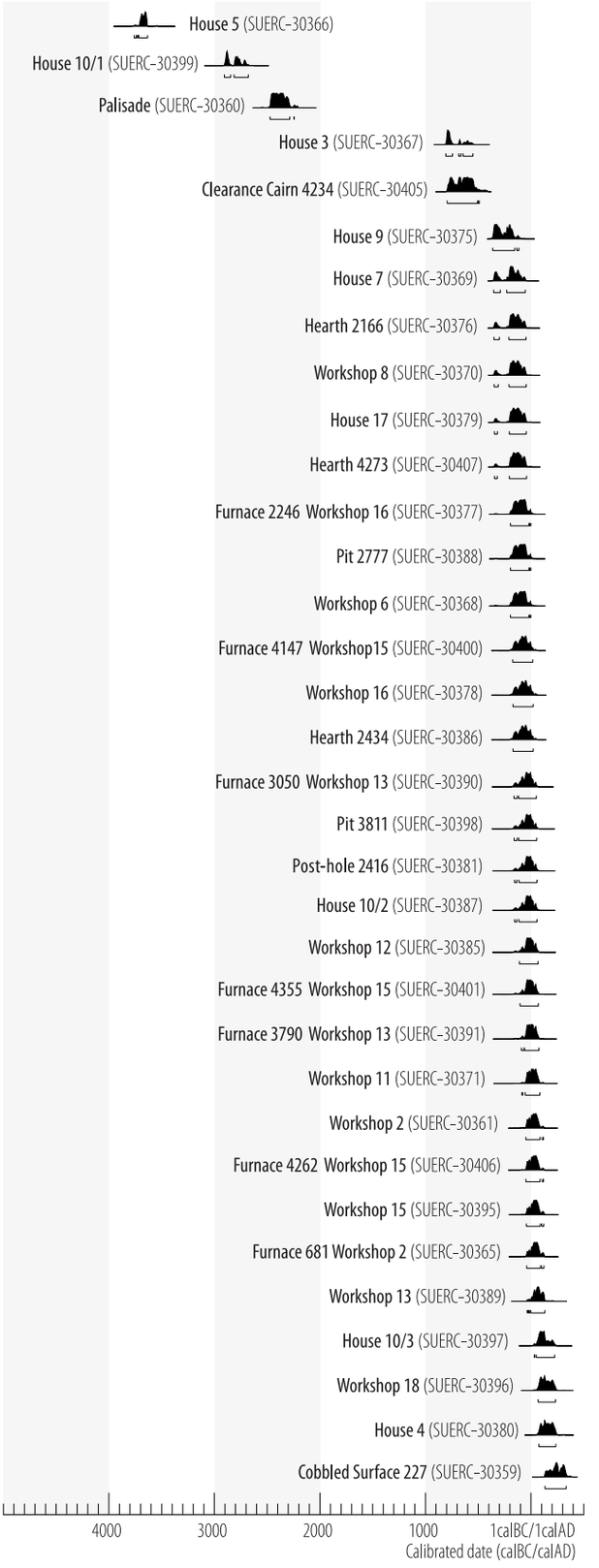

Illustration 2.1
Calibrated radiocarbon dates for Culduthel

recognised (Table 2.1). Period 1 falls into the Neolithic/Chalcolithic (between 3760 and 2240 BC) and is followed by the longest gap in the sequence, potentially lasting up to 1470 years, between 2240 BC and 810 BC. Period 2 spans the Early Iron Age between 810 and 490 BC and is followed by another break between 490 BC and 360 BC. The remaining Iron Age sequence (Period 3) is seemingly unbroken single continuous distribution which spans a potential 700-year period from 360 BC to AD 340, with 29 of the 34 dates falling within this sequence.

Period 1 – Earlier prehistoric activity

The pre-Iron Age activity at Culduthel was represented by a small number of pits scattered across the excavation area, which contained sherds of Early/Middle Neolithic carinated bowls, Beaker pottery of the Late Neolithic/Early Bronze Age and lithics. Numerous undated pits scattered across the site may also have related to this early prehistoric activity.

Three AMS dates, all from charred material, also came back with Neolithic or Chalcolithic dates. In each case they seem to represent residual material within later, Iron Age, features, which suggests that earlier prehistoric features were disturbed by the Iron Age occupations. A single AMS date from the Early Neolithic (3760–3630 cal BC, SUERC-30366) was retrieved from a crab apple pip within a post-hole of the post-ring of House 5. The design of the roundhouse, and its relationship to other features on site, suggests that it was Early Iron Age in date, and it has been placed within Period 2.

A second Early Neolithic date was obtained from the fill of a post-hole of the primary phase of House 10 (2910–2680 cal BC, SUERC-30399). This building is clearly Iron Age in date as it is succeeded on the same footprint by two houses (House 10/2 and 10/3) that are dated to Middle Iron Age (Period 3) by material culture. House 10/1 has been placed within Period 3.

The Chalcolithic AMS date (2470–2240 cal BC, SUERC-30360) is more problematic as it is the only radiocarbon date obtained from the palisade enclosure. As this AMS date was from a charred hulled barley grain present in the main fill of the ditch, it is impossible to ascertain whether the charred grain is a reliable indicator of the date of the enclosure or residual material from the early prehistoric activity in the immediate vicinity.

Similar palisade enclosures have been identified at Dryburn Bridge and Broxmouth hillfort in East Lothian; the construction of both heralded the start of the occupation of these sites in the Early Iron Age (*c.*800–400 BC) (Dunwell 2007; Armit and McKenzie 2013). While the construction of these palisades appears to signal the establishment of new settlements in this period in East Lothian and across to south-east Scotland (Armit and McKenzie 2013, 40), evidence for this tradition taking place in the north-east in the Early Iron Age is currently scant.

Closer to Culduthel, the palisade identified in Headland Phases 7 and 8 to the north of the site also returned a Neolithic date of 3340–3010 cal BC (SUERC-20230). The excavator was keen to emphasise, however, that this backfill was redeposited as it also contained plastic and modern glass (Murray 2008). To the north-east of the site the palisade at Balloan Park remains undated but is likely to relate to the Early and Middle Iron Age settlement clustered around its perimeter (Wordsworth 1999). The date of the Culduthel palisade remains unclear but as it contained no material relating to the industry seen in the Middle Iron Age (Period 3) it appears unrelated to this phase of occupation. As a stand-alone fenced enclosure set apart from any other occupation of the land it may have been a stock enclosure for the Early Iron Age farming activity identified on the site (Period 2). It has been placed within this period of activity.

Period 2 – Early Iron Age occupation

Two AMS dates came back with Early Iron Age dates, one from a ring-groove roundhouse (House 3 – 810–550 cal BC, SUERC-30367) and one from a clearance cairn (Cairn 4234 – 800–490 cal BC, SUERC-30405).

As House 3 overlies another roundhouse (House 5) and was cut by an iron smelting workshop from Period 3 (Workshop 2), both houses have been interpreted as Early Iron Age in date. The clearance cairn, alongside another similar cairn and a cobbled surface, was located beneath a thick layer of hillwash that predated the Middle Iron Age settlement (Period 3). Another similar cairn to the east and the palisade enclosure may also be part of this activity.

Period 3 – The Middle Iron Age craftworking centre

Radiocarbon dates indicate that the most intense period of occupation at Culduthel occurred between the 2nd century BC and the 2nd century AD. The majority of the structural remains, the artefact assemblage and the wealth of evidence for the on-site production of iron, glass and copper can be placed in this period. Ten remarkably similar workshop roundhouses were constructed in this period, nine of which contained iron smelting furnaces or evidence of activities associated with ironworking within their interiors. Several of these workshops contained multiple furnaces with each additional furnace built to replace derelict structures, evidence that suggests iron production was at times intense and may have been ongoing for a considerable period.

Glass and copper alloy items were manufactured on site within a group of hearths located beside a U-shaped turf-walled workshop. Items produced include opaque red glass for metalwork inlay, glass beads and a copper alloy harness strap mount. A radiocarbon date from the basal fill of one of the hearths indicates that this hearth was fired at some point between the 2nd century BC and the early 1st century AD.

Domestic evidence in this period is limited but four post-ring roundhouses, located to the north-west side of the site, could have been for housing. In the final phase of occupation (defined as Period 3b) two large ring-groove houses were constructed, one overlying an existing roundhouse. A wealth of artefacts was recovered from the backfilling of these large houses, including leather-, bronze- and woodworking tools, a chariot linchpin, Roman coins and decorated copper alloy items and sheetwork.

The abandonment of the settlement is recognised in the archaeological record as thick layers of waste debris that covered structures and cobbled surfaces over a large area in the north-west of the site.