Society of Antiquaries of Scotland

Rhum

Mesolithic and Later Sites at Kinloch, Excavations 1984–86

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ISBN: 978-0-903903-07-3 (paperback) • 978-1-908332-29-5 (PDF)

Wickham-Jones, C R 1990 *Rhum: Mesolithic and Later Sites at Kinloch, Excavations 1984–86*. Edinburgh: Society of Antiquaries of Scotland. https://doi.org/10.9750/9781908332295

10 THE RADIOCARBON DETERMINATIONS

G COOK & E SCOTT

INTRODUCTION

Radiocarbon dating was carried out at the Glasgow University Radiocarbon Dating Laboratory (now based at the Scottish Universities Research and Reactor Centre), during the period 1984–87. One date, relating to the Kinloch Glen pollen core (Chapter 11) was obtained from the Harwell laboratory (HAR–6608). A procedural resumé is included in the microfiche (Cook & Scott mf, 3:G11–G14).

RESULTS

THE FIRST COUNT

Table 22 presents all of the samples dated for Kinloch. All dates are quoted in conventional years BP (before 1950 AD) and are uncalibrated with respect to dendrochronological age. The errors are expressed at the ± one sigma level of confidence.

THE RECOUNT

One dilemma which faces those involved with radiocarbon dating is the relative reliability of any large series of dates, as dating may be carried out over several years and within more than one laboratory. In this study it was decided to recount the samples of mesolithic origin as a single batch, so that the long term reproduceability of the counting process could be determined. In this respect the use of glass sealable ampoules has a significant advantage in that the samples can be stored virtually indefinitely, without any loss through evaporation. Ideally, it would be preferable to re-synthesise the sample benzene from replicate sample material, but in the absence of this option the best alternative was employed. Results from the recent intercalibration study, which is in part organised by this laboratory, have shown that the major contributory factor to interlaboratory variation probably derives from the counting process (Scott *et al* in press).

Table 23 presents the results obtained from the recount of the Rhum dates. These indicate that there are no significant differences at the 2 δ level between the ages calculated from 1984 to 1987 and the ages dated as a single batch in 1988. Furthermore, there is no trend to suggest a shift to either older or younger ages within the 2 δ error band. In approximately 50% of the results the central ages from the 1988 calculation are older than those of the first count, and the other 50% are younger, thus inferring that there is no bias in the results from the first count. Because of the lack of both significant difference and bias between the two counts, the original radiocarbon dates are used throughout the text and for calibration.

CALIBRATION

Table 24 presents the calibration of the radiocarbon ages using the 20 year atmospheric record from the University of Washington, Quaternary Isotope Laboratory radiocarbon calibration programme. The earliest dates are beyond the present calibration limits. For this reason dates are presented uncalibrated within the text.

DISCUSSION WITH E SCOTT G COOK & K HIRONS

Four of the radiocarbon determinations (GU–1873, GU–2040, GU–1874, and GU–2150) all date features that provide the earliest excavated evidence, so far, for the human settlement of Scotland. A further five dates (GU–2146, GU–2039, GU–2147, GU–2145, and GU–2149) come from similar features and suggest mesolithic occupation over a period of time. The first three dates are the earliest; they come from Trenches AD and AJ, and they are relatively close in age, with a mean

Lab. No.	Date	C13	Material	Site Ref.	Feature	Comment
HAR-6608	8770 ± 90		Peat	KR84 K		Kinloch Glen Core base
GU-1873	8590 ± 95	-24.9	Carbonised hazel-nut shell	KR84AD0028	AD 5	Pit fill
GU-2040	8560 ± 75	-25.1	Carbonised hazel-nut shell	KR85AJ0175	AJ 2	Lower fill of a truncated pit
GU-1874	8515 ± 190	-23.8	Carbonised hazel-nut shell	KR84AD0028	AD 5	as GU-1873
GU-2150	8310 ± 150	-25.7	Carbonised hazel-nut shell	KR86BA0100	BA S2	Only date associated with a structural feature
GU-2146	8080 ± 50	-25.0	Carbonised hazel-nut shell	KR86BA0023	BA 1	Pit fill
GU-2039	7925 ± 65	-25.3	Carbonised hazel-nut shell	KR85AG0121		Part of pit complex further investigated in trench BA, see also GU-2149
GU-2147	7880 ± 70	-25.1	Carbonised hazel-nut shell	KR86BA0052	BA 10	Hollow sealed by dumps on edge of burn, TPQ for the dumps.
GU-2145	7850 ± 50	-25.0	Carbonised hazel-nut shell	KRB6BA0021	BA 3	Pit fill
GU-2062	7800 ± 75	-28.5	Peat	KRB5 RH 1 base		Base of organic deposit in transitional sandy peat, TAQ for local marine transgression, post-dates start of Corylus-type pollen rise and relates to establishment of open scrub. See also GU-2107, GU-2108, GU-2109, GU-2110.
GU-2149	7570 ± 50	-25.3	Charcoal	KR86BA0090	BA 4/5	Fill of pit complex, see also GU-2039
GU-2211	7140 ± 130	-25.8	Charcoal & hazel-nut shell	KR86BA0085		Buried soil at edge of burn, TPQ for peat in burn

Table 22: The radiocarbon determinations: Kinloch. Rhum series in chronological order.
These dates are quoted in conventional years BP (before 1950 AD) and they are uncalibrated with respect to dendrochronological age. The errors are expressed at the ± one sigma level of confidence.

Lab. No.	Date	C_{13}	Material	Site Ref.	Feature	Comment
GU-2108	6430 ± 90	-28.0	Brown woody peat	KR85 RH 1 1.39-1.41 m		Start of initial rise in Alnus pollen. See also GU-2062, GU-2107, GU-2109, GU-2110.
GU-2107	5300 ± 60	-26.8	Brown woody peat	KR85 RH 1 1.19-1.21 m		Major Alnus maximum prior to phase of reduced tree pollen. See also GU-2062, GU-2108, GU-2109, GU-2110.
GU-2043	4725 ± 140	-27.3	Charcoal	KR85AD0153	AD 7	Fill of hollow. See also GU-2106, GU-2042, GU-2148.
GU-2110	4660 ± 70	-29.2	Brown woody peat	KR85 RH 1 0.89-0.91 m		Transition from fen-wood peat to monocot peat. Initial pollen evidence for major local impact of man. See also GU-2062, GU-2107, GU-2108, GU-2109.
GU-2106	4260 ± 70	-25.9	Humified amorphous peat with charcoal	KR85AM 0.50-0.58 m		Peaty material below slopewash, TPQ for onset of slopewash See also GU-2042.
GU-2148	4080 ± 60	-26.5	Charcoal	KR86BA0077	BA D1	'Midden'-type dump in peat of burn. TAQ for peat and for gravel dumps on edge of burn. See also GU-2042, GU-2106.
GU-2041	3945 ± 50	-28.5	Wood	KR85AG0245		Base of slopewash to N. of burn. Matches interpolated date for start of major Alnus pollen decline in monolith. See also GU-2106.
GU-2042	3890 ± 65	-28.5	Wood	KR85AG0128		Deposit of rock and debris within peat of burn. See also GU-2106, GU-2148.
GU-2109	3340 ± 80	-29.2	Dark brown-black humified peat	KR85 RH 1 0.59-0.62 m		Start of major rise in *Potentilla* pollen and end of decline in arboreal pollen. See also GU-2107, GU-2108, GU-2110.

Table 22: continued

Laboratory Number	1984-87 Ages	1988 Ages
GU-1873	8590 ± 95	8360 ± 70
GU-2040	8560 ± 75	8490 ± 50
GU-1874	8515 ± 190	8060 ± 150
GU-2146	8080 ± 50	8180 ± 50
GU-2039	7925 ± 65	7860 ± 50
GU-2147	7880 ± 70	7950 ± 50
GU-2145	7850 ± 50	7900 ± 50
GU-2062	7800 ± 75	7800 ± 50
GU-2149	7570 ± 50	7600 ± 50
GU-2211	7140 ± 130	7220 ± 100

Table 23: The radiocarbon determinations: samples of mesolithic origin with ages as calculated from several batches during the period 1984–7 and re-counted as a single batch in 1988.

Laboratory Number	1984-87 Ages	* Calibrated Ages (cal. BC)
GU-1873	8590 ± 95	B.C.L.
GU-2040	8560 ± 75	B.C.L.
GU-1874	8515 ± 190	B.C.L.
GU-2150	8310 ± 150	B.C.L.
GU-2146	8080 ± 50	B.C.L.
GU-2039	7925 ± 65	6569-7060
GU-2147	7880 ± 70	6493-7050
GU-2145	7850 ± 50	6495-7026
GU-2062	7800 ± 75	6450-7022
GU-2149	7570 ± 50	6230-6554
GU-2211	7140 ± 130	5730-6222
GU-2108	6430 ± 90	5230-5540
GU-2107	5300 ± 60	3990-4330
GU-2043	4725 ± 140	3046-3790
GU-2110	4660 ± 70	3140-3632
GU-2106	4260 ± 70	2625-3040
GU-2148	4080 ± 60	2470-2881
GU-2041	3945 ± 50	2320-2580
GU-2042	3890 ± 65	2146-2573
GU-2109	3340 ± 80	1440-1878

Table 24: The radiocarbon determinations: calibration of ages using the 20 year atmospheric record from the University of Washington, Quaternary Isotope Laboratory Radiocarbon Calibration Program, 1987.
B. C. L. = Beyond Calibration Limits.
* Calibrated age ranges are ± 2.

determination of 8555 years BP. The six later dates come from Trench BA (with the exception of one from Trench AG), and although they appear to follow a time trend in themselves, they are all more recent than those from Trenches AD/AJ. They have a mean age of 7936 years BP, but the standard error is large. Bearing in mind this difference in the mean age of the samples from the two areas, it was thought possible that the different parts of the site might have been in use at different times. In order to test this possibility, a two sample t-test was carried out to examine the hypothesis that: 'the mean age of the AD/AJ samples equalled the mean age of the BA samples'. The results of this test were highly significant and indicated that the hypothesis could be rejected. It is therefore possible that the features of Trenches AD and AJ represent a slightly earlier occupation than those of Trench BA, but the apparent time trend in the BA determinations does cast some doubt on this interpretation.

Four dates (GU–2043; GU–2106; GU–2148; GU–2042), relate to neolithic activity on site. Of these GU–2043 appears to be earlier than the others, but it has a large standard error and does lie within the mean age of the other three dates (calculated at 95% confidence interval), so that none of the determinations can be separated. It should be stressed that interpretation of the neolithic activity has been difficult. No traces of occupation structures were uncovered, but it is likely that dwelling structures were not far away (Chapters 3 and 14).

Between the mesolithic and neolithic activity the site was apparently abandoned, but the environmental record does show signs of human influence, suggesting the presence of people within the area (Chapter 11). At some point gravel was scraped up and spread as a low bank along

the S edge of the watercourse. There are no dates directly associated with this activity, but the gravel seals mesolithic material (GU–2211), and stratigraphically it underlies the midden-like dumps within the peat (GU–2148). It is likely, therefore, that people did frequent the area of Kinloch, if only intermittently, during the time when the site itself was abandoned.

The remaining dates relate to the environmental history of the area (Chapter 11). The date suggested for the initial rise in alder (*Alnus*) pollen (GU–2108), does accord well with other radiocarbon datings of this pollen stratigraphic marker from west Inverness, south Skye, Wester Ross and Sutherland (Birks 1977). The dates are later than those from further south, and possibly much later than the actual arrival of alder (Rymer 1974). GU–2110 provides a date for the earliest major local human influence marked by a reduction in tree and hazel (*Coryloid*) pollen, and an increase in grass pollen, together with that of open habitat taxa. The interpolated date for the start of a major alder pollen decline (GU–2041) coincides with the first evidence of cereal-type pollen and the start of major local clearances, which are indicated by declining tree pollen and increased frequencies of grasses and weedy pollen taxa. At the end of the arboreal pollen decline (GU–2109), the data suggest the replacement of hazel (*Corylus*) on the drier slopes above the site by heath, and a decline in local alder fen woodland with a rise of acid grassland.