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SCOTTISH UNIVERSITIES RESEARCH AND REACTOR CENTRE RADIOCARBON MEASUREMENTS II

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Preparation of samples, operation of counting systems, and calculation of results remain as described previously (Harkness and Wilson, 1973).

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Dates measured for the Institute of Geological Sciences, Exhibition Road, London SW 7, are published by permission of the Director of IGS which should be regarded as "author" in relation to geologic context and interpretation of dates.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

East Mersea series, Essex

Peat from seams at salt marsh edge, East Mersea, Essex, England (51° 47′ N, 0° 60′ E, Natl Grid Ref TM 062141). Coll 1971 by J T Greensmith, Queen Mary Coll, London; subm by Inst Geol Sci, London.

SRR-56. East Mersea, Borehole 1 — **118 ± 48** / **AD 1832**

$\delta^{13}C = -27.5‰$

Peat from seam ca 0.03 to 0.15m thick 0.3m below present marsh surface at 1.8m.

SRR-57. East Mersea, Borehole 2 — **205 ± 56** / **AD 1745**

$\delta^{13}C = -28.7‰$

Fragmented peat occupying channel in clayey-silt 0.3m below present marsh surface at 1.8m.

General Comment (JTG): represents last 2 major phases of peat formation at East Mersea. Seams now being actively eroded and destroyed.

SRR-58. Dengie, Borehole 4 — **4959 ± 65** / **3009 BC**

$\delta^{13}C = -26.4‰$

Peat seam from surface (Dengie No. 4) at −0.9m, Offshore Bank, St Peter's Flat, Essex, England (51° 44′ N, 0° 58′ E, Natl Grid Ref

TM043093). Coll 1971 by J T Greensmith; subm by Inst Geol Sci, London. *Comment* (JTG): probably represents local base of an early phase of Flandrian transgression.

SRR-59. Fugla Ness, Shetland

+2000
40,100
−1600
38,150 BC
$\delta^{13}C = -26.4‰$

Wood from peat bed on coast of Fugla Ness, N Shetland, Scotland (60° 36′ N, 1° 25′ W, Natl Grid Ref HU 311913). Coll 1971 and subm by W Mykura, Inst Geol Sci, Edinburgh. *Comment* (WM): sec described by Chapelhowe (1965) and pollen analysis by Birks and Ransom (1969). Shows general agreement with dates from same deposit (Page, 1972).

SRR-60. Sel Ayre, Shetland

+1950
36,800
−1560
34,850 BC
$\delta^{13}C = -25.7‰$

Peat from eroded cliff face at ca 6.1m below present cliff top, Sel Ayre, W Shetland, Scotland (60° 15′ N, 1° 41′ W, Natl Grid Ref HU 176541). Coll 1971 and subm by W Mykura. *Comment* (WM): sec described in Mykura and Phemister (1973). Pollen content of peat has strong analytic similarities with peat of Fugla Ness (SRR-59). Both assemblages have strong Hoxnian affinities, but as there are no other interglacial deposits within a few hundred miles, correlation is very tentative.

SRR-61. Llandudno

7635 ± 52
5685 BC
$\delta^{13}C = -25.2‰$

Peat from Oval borehole sited near Llandudno RR Sta, Wales (53° 19′ N, 3° 51′ W, Natl Grid Ref SH 7754 8191), at 3.99m. Peat, overlain in turn by estuarine clay, beach deposits, and blown sand, occurs between 8.15 and 9.20m depth. It is underlain by 3.24m of estuarine clay on Irish Sea boulder clay. Coll 1971 and subm by M J C Nutt, Inst Geol Sci, Leeds. *Comment* (MJCN): helps date last major rise in level of Irish Sea.

SRR-62. Renfrew By-pass

12,408 ± 85*
10,488 BC
$\delta^{13}C = -1.2‰$

Marine shells (*Arctica islandica*) from silty fine sands temporarily exposed in Renfrew bypass rd sec (55° 51′ N, 4° 24′ W, Natl Grid Ref NS495657), from ca 9.0 to 12.25m (Newlyn) described in Aspen and Jardine (1968). Coll 1967 by W G Jardine, subm by J D Peacock, Inst Geol Sci, Edinburgh. *Comment* (WGJ): agrees with other shell dates from similar deposits in same area (IGS-C14/21: R, 1972, v 14, p 141)

and supports suggestion by Peacock (1971) that Paisley-Renfrew area was occupied by late-Pleistocene sea before Cardross-Greenock area to W.

SRR-63. East Pier, Lochgilphead

12,360 ± 85*
10,410 BC
$\delta^{13}C = -0.8‰$

Shell bed (*Arctica islandica*) at ca 1.6m depth in silt at 0.5m, 40m S of East Pier, Lochgilphead, Argyll, Scotland (56° 2′ N, 5° 26′ W, Natl Grid Ref NR 863875). Coll 1972 and subm by J D Peacock. *Comment* (JDP): agrees with information for interstadial "Clyde Beds" of Paisley area (see SRR-62) and dates ice retreat in this part of Loch Fyne.

SRR-64. Garstang, Lancashire

11,246 ± 78
9296 BC
$\delta^{13}C = -28.2‰$

Peat from loose clay excavated from a temporary trench near Greenhalgh Castle, Garstang, Lancashire, England (53° 54′ N, 2° 46′ W, Natl Grid Ref SD49924502). Trench sec shows peat underlies 1.42m pebbly silty clay. Preliminary palynologic analysis shows a predominance of non-arboreal pollen (62.1%), with *Acer* the major tree type. Coll 1971 and subm by N Aitkenhead, Inst Geol Sci, Leeds.

SRR-65. School site, Omagh

1805 ± 32
AD 145
$\delta^{13}C = -27.3‰$

Peat interbedded in silty sand underlying till at School site, Omagh, Co Tyrone, Ireland (54° 36′ N, 7° 18′ W, Irish Grid Ref H 4582 7335). Coll 1971 and subm by H E Wilson, Inst Geol Sci, Belfast. *Comment* (HEW): sample appeared to be interbedded in glacial deposits when exposed in excavations. But date proves burial late in postglacial time, probably by local mud flow or soil creep.

Powgavie series, Perthshire

Peat from Borehole B at Powgavie Farm, Perthshire, Scotland (56° 25′ N, 3° 9′ W, Natl Grid Ref NO 2912 2532). Coll 1971 and subm by I B Paterson, Inst Geol Sci, Edinburgh.

SRR-66. Powgavie, 6.05m depth

8150 ± 50
6200 BC
$\delta^{13}C = -27.8‰$

SRR-67. Powgavie, 6.15m depth

8320 ± 57
6370 BC
$\delta^{13}C = -29.1‰$

SRR-68. Powgavie, 7.90m depth

8331 ± 74
6381 BC
$\delta^{13}C = -27.9‰$

General Comment (IBP): peat overlain by Flandrian intertidal deposits.

* Although date was not adjusted for isotopic fractionation, $\delta^{13}C$ values are quoted for general information.

Burnside series, Perthshire

Peat from borehole 250m NE of Burnside Farm, Perthshire, Scotland (56° 27′ N, 3° 6′ W, Natl Grid Ref NO 32592861). Coll 1971 and subm by I B Paterson.

SRR-69. Burnside, 7.98m depth — **8170 ± 67** / **6220 BC** / $\delta^{13}C = -26.5‰$

SRR-70. Burnside, 8.59m depth — **8616 ± 52** / **6660 BC** / $\delta^{13}C = -25.8‰$

General Comment (IBP): peat overlain by Flandrian intertidal deposits.

Carey series, Perthshire

Peat from bed below Flandrian "carse clay" exposed on S bank of R Earn 275m NE of Carey Farm, Perthshire, Scotland (56° 20′ N, 3° 20′ W, Natl Grid Ref NO 1747 1703). Coll 1971 and subm by I B Paterson.

SRR-71. Carey, Sample 4 — **7778 ± 55** / **5825 BC** / $\delta^{13}C = -25.4‰$

Top 0.04m of peat.

SRR-72. Carey, Sample 1 — **9524 ± 67** / **7574 BC** / $\delta^{13}C = -26.7‰$

Basal 0.04m of peat.

General Comment (IBP): dates agree closely with those previously reported from this site (NPL-127: R, 1970, v 12, p 185; I-2796: 9640 ± 140 BP, unpub; Sissons and Brooks, 1971). Ages reported above from the Burnside and Powgavie boreholes indicate that the sea fell to its lowest level between 8616 and 8150 BP, prior to Flandrian marine transgression. Thus, early postglacial sea level changes in the Firth of Tay were contemporaneous with those reported by Sissons and Brooks (1971) from the valley of the Firth of Forth.

SRR-74. Cefn-Cynhafal — **4225 ± 55** / **2275 BC** / $\delta^{13}C = -27.3‰$

Wood from peat bog Cefn-Cynhafel 10.5km E of Towyn, Merionethshire, Wales (52° 34′ N, 3° 58′ W, Natl Grid Ref SN 6657 9877). Coll 1971 and subm by R Cave, Inst Geol Sci, London.

Colonsay series, Scotland

Organic detritus extracted from clay of core from sea floor at ca −30m, 4km ENE of Scallosay, Colonsay, Scotland (56° 5′ N, 6° 6′ W). Some 4m of clayey sand overlies 30m of greenish gray to black clay with scattered pebbles and shell fragments resting on boulder clay.

9961 ± 200

SRR-117. Colonsay, 6m depth **8011 BC**

$\delta^{13}C = -6.2‰$

Sample from near top of clay sequence overlying boulder clay.

16,470 ± 300

SRR-118. Colonsay, 30m depth **14,520 BC**

$\delta^{13}C = -23.2‰$

Sample from near base of clay sequence overlying boulder clay.

General Comment (PEB): younger date suggests that cold water fauna from 16 to 26m depth in clay sequence is contemporaneous with Loch Lomond readvance. The deeper sample contained many reworked Mesozoic dinoflagellate cists. The date (SRR-118) is therefore maximum and confirms that sequence was deposited after the last glaciation.

3409 ± 60

SRR-119. Empingham borehole **1459 BC**

$\delta^{13}C = -23.2‰$

Fossil soil at ca 1.88 to 1.95m depth in borehole at Empingham, England (52° 39′ N, 0° 36′ W, Natl Grid Ref SK 9439 0769). Coll 1972 and subm by A Horton, Inst Geol Sci, London. *Comment* (AH): soil horizon lies within deposit of soliflucted material and pre-dates latest period of hill-wash formation.

3066 ± 40

SRR-134. Swainswick Valley **1116 BC**

$\delta^{13}C = -32.3‰$

Woody peat at ca 2.95m depth in superficial head deposit in shallow gulley filling on cambered slope of Swainswick Valley, 1.6km NNE of Bath, England (51° 25′ N, 2° 21′ W, Natl Grid Ref ST 7601 6785). Coll 1972 and subm by R J Wyatt, Inst Geol Sci, London.

New Bradwell series, Buckinghamshire

3813 ± 45

SRR-135. New Bradwell, A **1863 BC**

$\delta^{13}C = -28.0‰$

Wood from base of alluvial gravel beneath alluvial clay at New Bradwell, Milton Keynes, England (52° 4′ N, 0° 47′ W, Natl Grid Ref SP 8288 4092). Coll 1972 and subm by A Horton.

3552 ± 40

SRR-136. New Bradwell, B **1602 BC**

$\delta^{13}C = -28.5‰$

Wood from bed of silty felted peat above alluvial gravel as in SRR-135.

General Comment (AH): older date (A) marks onset of alluvial deposition in tributary of R Ouse at site near main channel. Deposition of the main alluvial clay began later (B).

Pantybedw series

Wood and peat samples from freshly cut drainage ditch at Pantybedw, Wales (52° 34′ N, 3° 47′ W, Natl Grid Ref SN 7925 9752). Coll 1972 by D Davies and R Cave, Inst Geol Sci, London; subm by R Cave.

SRR-137. Pantybedw, No. 1 — **3609 ± 40** / **1659 BC** / $\delta^{13}C = -26.0‰$

Silty peat at depth 1.28 to 1.38m below surface, from base of layer ca 0.46m thick overlying clay and below ca 0.92m surface peat.

SRR-138. Pantybedw, No. 2 — **3345 ± 40** / **1395 BC** / $\delta^{13}C = -31.4‰$

Wood fragment from base of surface peat layer at 0.92m below surface.

SRR-139. Pantybedw, No. 3 — **1835 ± 40** / **AD 115** / $\delta^{13}C = -27.7‰$

Wood (*Quercus*) embedded in upper level of surface peat layer, depth 0 to 0.61m below surface. Sample dated represented ca initial 40 yr of tree growth.

SRR-140. Melin-dulas — **3330 ± 45** / **1380 BC** / $\delta^{13}C = -29.2‰$

Wood (*Quercus*) from peat accumulated on surface of soliflucted boulder clay at Melin-dulas, Wales (52° 34′ N, 3° 47′ W, Natl Grid Ref SN 7976 9715). Coll 1972 by E Williams, subm by R Cave.

Garthgwinion series

Silty peat and wood fragments from sides of ditch at Garthgwinion, Wales (52° 34′ N, 3° 52′ W). Coll 1972 and subm by R Cave.

SRR-147. Garthgwinion 1 — **2937 ± 55** / **987 BC** / $\delta^{13}C = -28.9‰$

Sample from ca 0.9m depth in stoneless clay/silt containing lenses of plant debris. (Natl Grid Ref SN 7351 9804).

SRR-148. Garthgwinion 2 — **3270 ± 45** / **1320 BC** / $\delta^{13}C = -27.1‰$

Sample from ca 0.9m depth in 1.06 to 1.22m thick band of silty peat. (Natl Grid Ref SN 7351 9804).

SRR-149. Garthgwinion 3a — **4159 ± 55**, **2209 BC**, $\delta^{13}C = -29.6‰$

Sample from base of ca 0.6m thick layer of silty peat overlying ca 0.6m solifluction gravel (Natl Grid Ref SN 7353 9803). Material dated contained many fine rootlets, perhaps non-contemporaneous.

SRR-150. Garthgwinion 3b — **4104 ± 55**, **2154 BC**, $\delta^{13}C = -30.0‰$

Same as SRR-149. All visible roots were removed prior to ^{14}C assay.

SRR-152. Garthgwinion 4a — **5473 ± 40**, **3523 BC**, $\delta^{13}C = -28.8‰$

Sample from base of 0.44m thick seam overlying ca 0.7m silty solifluction gravel. (Natl Grid Ref SN 7354 9802). Material contained many fine rootlets that were removed prior to dating.

SRR-153. Garthgwinion 4b — **5395 ± 40**, **3445 BC**, $\delta^{13}C = -27.8‰$

Same as SRR-152. Visible rootlets were not removed prior to dating.

SRR-151. Garthgwinion 5 — **6894 ± 60**, **4944 BC**, $\delta^{13}C = -29.3‰$

Peat from base of ca 0.9m thick layer overlying ca 0.15m seam of soliflucted gravel (Natl Grid Ref SN 7359 9803).

SRR-141. Roe Valley borehole — **7602 ± 55**, **5652 BC**, $\delta^{13}C = -27.8‰$

Peat from base of estuarine clay at ca 9.75m depth in borehole (No. 7 12/195) at 7.0m in Roe Valley, Limavady, Co Londonderry, N Ireland (55° 4′ N, 6° 57′ W, Irish Grid Ref C 672 245). Coll 1972 and subm by R A Bazley, Inst Geol Sci, Belfast.

SRR-142. Burton Row borehole — **3985 ± 55**, **2035 BC**, $\delta^{13}C = -27.8‰$

Peat from alluvial sequence at ca 5.15m depth in Burton Row borehole, Brent Knoll, Somerset, England (51° 16′ N, 2° 57′ W, Natl Grid Ref ST 3356 5208). Coll 1971 and subm by A Whittaker, Inst Geol Sci, London. *Comment* (AW): one of the higher peats of the Somerset Levels alluvial sequence. Date agrees with others from this general area and stratigraphic level (Hawkins, 1971).

SRR-143. River Nene **3870 ± 55**
1920 BC
$\delta^{13}C = -28.5‰$

Wood fragment from alluvium of tributary of R Nene, Northampton, England (52° 15′ N, 0° 49′ W, Natl Grid Ref SP 8068 6214). Coll 1972 and subm by A Horton. *Comment* (AH): sample from bed of felted plant material near base of alluvium. Overlying calcareous tufa particles were probably formed after the wood.

SRR-144. Barnsdale **11,819 ± 85**
9869 BC
$\delta^{13}C = -25.4‰$

Alkali insoluble organic detritus separated from clay at ca 2.5m depth near bottom of extensively landslipped slope, Barnsdale, Rutland, England (52° 40′ N, 0° 40′ W, Natl Grid Ref SK 8985 0920). Coll 1972 and subm by R J Chandler, Imperial College, London. *Comment* (RJC): sample underlies shear surface at base of solifluction layer; date suggests Zone III for solifluction.

SRR-145. Kildale Hall borehole **16,713 ± 340**
14,763 BC
$\delta^{13}C = -27.5‰$

Organic detritus extracted from calcareous mud at ca 4.9m depth in borehole at 168m, Kildale Village, Yorkshire, England (54° 28′ N, 1° 4′ W, Natl Grid Ref NZ609097). Coll 1970 and subm by R L Jones, Univ Sheffield. *Comment* (RLJ): sample from base of ca 3m thick organic deposit; stratigraphic relationships and pollen content suggest a late Devensian interstadial age. Older date obtained is probably due to calcareous nature of deposit.

SRR-146. Seamer Carr borehole **13,042 ± 140**
11,092 BC
$\delta^{13}C = -26.7‰$

Organic detritus extracted from calcareous mud at ca 7.0m depth in borehole at 70m, 2km NW of Stokesley, Yorkshire, England (54° 29′ N, 1° 15′ W, Natl Grid Ref NZ 486 097). Coll 1969 and subm by R L Jones. *Comment* (RLJ): sample from middle of ca 0.5m thick organic deposit; stratigraphic relationships and pollen content suggest a late Devensian interstadial age. Date is too old for conventional Allerød interpretation, perhaps due to calcareous nature of deposit or possibility of earlier interstadial conditions in this region.

Farm Wood Quarry, Chelford

Wood (*Pinus sylvestris*) from fresh quarry exposure at ca 10m below ground surface in Chelford sands at Farm Wood Quarry, Chelford, Cheshire, England (53° 15′ N, 2° 33′ W, Natl Grid Ref SJ 810 732). Coll by P Worsley and subm by N R Page, Hendon College Technol, London. *Comment* (DDH): samples previously dated by several labs, *viz*, 1) >52,000 (GrN-1292) and 60,800 ± 1500 after isotopic enrichment

(GrN-1475), R, 1967, v 9, p 80; 2) whole wood 32,850 ± 400 (HU-1978, unpub) and humate extract 26,200 ± 390 (HU-1979B, unpub); 3) whole wood after extensive NaOH pretreatment >47,000 (BIRM-157), R, 1970, v 12, p 385.

Various fractions of sample were analyzed to study effect of possible contamination on previous age determinations.

SRR-154. Farm Wood Quarry (untreated wood) >47,300

SRR-155. Farm Wood Quarry (humic free wood) >48,700

100g original sample boiled in 6 successive 1.0L aliquots of 0.5m KOH. Residue acidified and washed to neutral with distilled water.

SRR-156. Farm Wood Quarry (humate extract) 41,290 +980 −880

Humics recovered by acidification (H_2SO_4) of alkali supernatant from SRR-155. Yield = 28.9% w/w of original sample.

SRR-157. Farm Wood Quarry (cellulose) >48,700

Humic free wood digested in $NaClO_2$/HCl, cellulose recovered by filtration. Yield = 43.0% w/w of humic free wood.

SRR-158. East Mersea No. 3 173 ± 60 Modern

$\delta^{13}C = -28.5‰$

Basal peat overlying Neolithic/Bronze age silts exposed on upper beach at ca 1.5m, East Mersea Essex, England (51° 47′ N, 0° 60′ E, Natl Grid Ref TM 058 139). Coll 1972 and subm by J T Greensmith. *Comment* (JTG): peat at base of plastic intertidal clayey silts overlies an oxidized firm surface, probably Mersea equivalent of "Lyonesse surface" of the Clacton-on-Sea dist, where very similar plastic sediments resting on "Lyonesse surface" were suggested as post-1500 BC and pre-Roman (Hazzledine-Warren, 1918-19; 1932).

Ennerdale Water series, England

Postglacial detritus lake mud from Ennerdale Water, Cumberland, England (54° 31′ N, 3° 22′ W, Natl Grid Ref NY 105150). Core No. 71/1 taken near deepest part of lake. Depth intervals quoted relate to present mud surface. Coll 1971 and subm by W Tutin and the late F J H Mackereth, Freshwater Biol Assoc, Ambleside, Westmorland.

SRR-178. Ennerdale Water, 44 to 54cm 1282 ± 55 AD 668

$\delta^{13}C = -26.8‰$

SRR-179. Ennerdale Water, 114 to 124cm 1485 ± 60 AD 465

$\delta^{13}C = -27.2‰$

SRR-180.	**Ennerdale Water, 194 to 204cm**	**2440 ± 60** **490 BC** $\delta^{13}C = -27.0‰$
SRR-181.	**Ennerdale Water, 252 to 262cm**	**2996 ± 55** **1046 BC** $\delta^{13}C = -27.1‰$
SRR-182.	**Ennerdale Water, 308 to 318cm**	**3800 ± 60** **1850 BC** $\delta^{13}C = -27.1‰$
SRR-183.	**Ennerdale Water, 358 to 368cm**	**4554 ± 60** **2604 BC** $\delta^{13}C = -27.3‰$
SRR-184.	**Ennerdale Water, 414 to 424cm**	**6006 ± 75** **4056 BC** $\delta^{13}C = -27.2‰$

General Comment (WT): dates measure annual rate of sedimentation in this lake, used in preparing a pollen diagram based on annual deposition rates of each pollen type. The object is to estimate what numerical changes in recruitment of tree pollen to the sediments of a large lake accompanied prehistoric and late Romano-British forest clearance. Any changes in sediment composition will be followed by parallel chemical analysis.

The dates agree well with those for other sites in the W Lake District (Pennington, 1970). The Elm Decline in this profile falls at 395cm, just before 5000 BP on the time-scale provided. A well-defined clearance episode falls just before the date 2996 ± 55 (SRR-181), which agrees well with 3040 ± 140 (NPL-124: R, 1969, v 11, p 130) for a similar episode at Seathwaite Tarn. The 2 uppermost dates, which indicate a major increase in sediment accumulation rate, correspond closely with dates for a period of extensive deforestation and upland farming at nearby sites, Devoke Water and Burnmoor Tarn (NPL-116 to 120; R, 1969, v 11, p 130).

Llangorse Lake series, Wales

Dark brown lacustrine gyttja from cores in bed of Llangorse Lake, Breconshire, Wales (51° 54′ N, 3° 15′ W), along N to S axis of a trough where water depth is greater than elsewhere in the lake. Core LG 10 coll in 7.6m water ca 200m off-shore and ca 900m N of major stream entering lake from S (Natl Grid Ref SO 139 265). Core LG9 from 6m water ca 200m off-shore and ca 500m N of stream entry (Natl Grid Ref SO 139 261). Depths are measured from top of retrieved cores excluding fluid muck at mud/water interface. Coll 1971 and 1972 and subm by B Seddon, Univ Reading.

General Comment (BS): 2 stratigraphic members are distinguished in both cores by change in lithology and color: an upper red-brown (2.5YR

3/4) to dark reddish brown (5YR 3/3) silty clay overlies very dark brown (10YR 2/2) organic mud. Samples were from both cores in the more organic part of the short (10cm) transition between the 2 sediments and also from the lower termination of both cores.

SRR-129. Llangorse core LG10, 240 to 244cm **1790 ± 60** **AD 160** $\delta^{13}C = -29.0‰$

From transition zone immediately below the red-brown silty clay. Pollen analysis show presence of *Fagus, Fraxinus, Tilia, Ulmus, Quercus,* and other trees, and 30% non-arboreal pollen including cereal grains and agricultural weeds. *Comment* (BS): dates beginning of accelerated soil erosion in the catchment.

SRR-130. Llangorse core LG10, 310 to 314cm **2410 ± 60** **460 BC** $\delta^{13}C = -29.4‰$

From base of sediment core in organic lake mud. Pollen analysis as for SRR-129 with 29% to 33% non-arboreal pollen including a few cereal grains.

SRR-131. Llangorse core LG9, 255 to 259cm **1681 ± 60** **AD 269** $\delta^{13}C = -28.7‰$

From transition zone immediately below the red-brown silty clay. Pollen analysis not yet completed. *Comment* (BS): dates beginning of accelerated soil erosion in the catchment.

SRR-132. Llangorse core LG9, 302 to 306cm **2508 ± 70** **558 BC** $\delta^{13}C = -29.3‰$

From base of sediment core in organic lake mud. Pollen analysis as for SRR-129 with 23.5% to 36.5% non-arboreal pollen including a few cereal grains. *Comment* (BS): with SRR-130, dates a stable period in land use of the catchment where agricultural practices did not markedly erode soil.

SRR-87. Tolsta Head **27,333 ± 240** **25,373 BC** $\delta^{13}C = -26.8‰$

Laminated peat detritus and silt from upper 15cm of layer ca 0.4m thick (probably a lake deposit) exposed in eroded sea cliff at Tolsta Head, N Lewis, Outer Hebrides, Scotland (58° 20′ N, 6° 10′ W, Natl Grid Ref NB 557 468). Organic deposit rests on Lewisian gneiss and is overlain by ca 3.5m glacial till. Coll 1973 and subm by J Von Weymarn, Univ Aberdeen. *Comment* (JVW): overlying glacial till contains particles of Torridonian sandstone, an erratic alien to the lithologic assemblages of the Outer Hebrides. These foreign erratics in glacial deposits of N Lewis, *ie,* on the Eye Peninsula, at Tolsta Head, and in the Ness dist, indicate a mass of ice from across the Minch younger than the

above date. The fossil peat was probably formed under warmer climatic conditions of an interstadial during later stages of the Weichselian glaciation.

SRR-163. East Golds Quarry **3332 ± 70** **1382 BC** $\delta^{13}C = -26.8‰$

Wood (*Quercus*) from log (ca 8.1m x 0.4m diam) at 4.0m depth in fluviatile gravels of R Teign at East Golds Quarry, Newton Abbot, England (50° 30′ N, 3° 40′ W, Natl Grid Ref SX 8589 7308). Coll 1972 and subm by T M Gouldstone, Watts Blake Bearne & Co Ltd, Newton Abbot. *Comment* (TMG): wood at ca −1.0m and ca 2km from present salt marshes of Teign estuary. Peat underlying estuarine clays at Teignmouth at −23.8m depth dated 8580 ± 830 (NPL-86: R, 1966, v 8, p 341); with above date suggests that Flandrian transgression was complete by at least 3300 BP in this part of country.

Pengelley (1883) described archaeologic finds, ascribed to early Bronze age, at Zitherixon Quarry, on left bank of R Teign. Although exact depth of artifacts in the gravel is not recorded, date agrees well with archaeologic age.

Benacre Beach series

Phragmites peat exposed on seaward side of Benacre Beach, Suffolk, England (52° 25′ N, 1° 45′ E, Natl Grid Ref TM 532829). Deposit formerly accumulated on bottom of adjacent Benacre Broad, now much reduced by erosion. Coll 1973 and subm by P B Nicholson, Nature Conservancy, Oakham.

SRR-167. Benacre Beach A **351 ± 55** **AD 1599** $\delta^{13}C = -26.1‰$

Superficial peat layer.

SRR-168. Benacre Beach B **2951 ± 50** **1001 BC** $\delta^{13}C = -25.5‰$

Peat from ca 0.9m depth in deposit.

II. ARCHAEOLOGIC SAMPLES

Lussa Wood 1 series, Jura

Charcoal (wood and *Corylus* shell) from base of 3 stone circles overlain by ca 0.6m fine marine gravel and ca 0.3m peaty humus, Lussa Wood, N Jura, Argyll, Scotland (56° 1′ N, 5° 47′ W, Natl Grid Ref NR 645874). Sample level assoc with scraps of bone, marine shell, red ocher, and microliths of Phase IB in proposed industrial sequence (Mercer, 1970). Top layer of overlying gravel contained Neolithic artifacts. Coll 1970-72 and subm by J Mercer.

SRR-159. Lussa Wood I — **7963 ± 200**, **6013 BC**, $\delta^{13}C = -30.5‰$

SRR-160. Lussa Wood I — **8194 ± 350**, **6244 BC**, $\delta^{13}C = -28.2‰$

General Comment (JM): as expected (Mercer, 1970) this is the earliest dated Scottish site and industry.

North Carn series, Jura

Wood charcoal from N Carn, Jura, Argyll, Scotland (56° 5′ N, 5° 43′ W, Natl Grid Ref NR 685 939). Coll 1968 and subm by J Mercer.

SRR-161. N Carn — **7414 ± 80**, **5464 BC**, $\delta^{13}C = -29.6‰$

Wood charcoal within stone setting (probably a hearth) sunk in old land surface and overlain by marine pebbles and ca 0.3m Sub-Boreal peat, assoc with tools of Phase I or early Phase II of N Jura microlithic occupation sequence (Mercer, 1970). *Comment* (JM): date acceptable for beginning of occupation.

SRR-162. N Carn — **3584 ± 65**, **1634 BC**, $\delta^{13}C = -30.8‰$

Charcoal scattered in top of marine gravel and thought to relate to assoc uppermost microlithic occupation. *Comment* (JM): date is far too late for above context but may correspond to chip from scale-flaked Neolithic or Bronze age tool also found at this level.

Raigmore, Inverness series

Carbonized wood assoc with potsherds and fragments of cremated bone from pits outside kerb of Clava cairn, Raigmore, Inverness, Scotland (57° 30′ N, 4° 15′ W). Coll 1972 and subm by R A Simpson, Univ Leicester.

SRR-187. Raigmore, Pit 11 — **4732 ± 90**, **2782 BC**, $\delta^{13}C = -28.4‰$

SRR-188. Raigmore, Pit 14 — **4983 ± 130**, **3033 BC**, $\delta^{13}C = -22.5‰$

General Comment (RAS): dates are earlier than expected on purely topologic grounds but no other precise dates are available for Clava cairns.

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