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INSTITUTE OF GEOLOGICAL SCIENCES RADIOCARBON DATES V

E WELIN, L ENGSTRAND, and S VACZY

Radioactive Dating Laboratory, S-10405, Stockholm 50, Sweden*

This date list was compiled by the Institute of Geological Sciences (UK) incorporating data supplied under contract by E Welin, Radioactive Dating Laboratory, Stockholm. Unless otherwise stated, age figures are in ^{14}C years before AD 1950. The half-life of ^{14}C is taken as 5568 years and the error, based on counting statistics of sample, background, and modern, is given as one standard deviation. Correction for $^{13}C/^{12}C$ fractionation has been made.

IGS-C14/88. (St 3853) Isle of Grain, Kent

8250 ± 100
6300 BC
$\delta^{13}C = -31.0‰$

Peat from −26.36m OD in borehole in Medway estuary (51° 26′ N, 0° 43′ E, Grid Ref TQ 8850 7410). Peat 3m thick, overlain by 19m estuarine clays and resting on gravel, in buried channel in London Clay. Coll 1971 and subm by G J Penney, Inst Geol Sci. *Comment* (GJP): date suggests channel was infilled during Holocene rise in sea-level.

IGS-C14/90. (St 3778) Toome, Co Londonderry

4485 ± 100
2535 BC
$\delta^{13}C = -25.3‰$

Wood 0.5m below top of diatomite bed 1m thick forming part of terrace 2m above Lough Neagh (54° 45′ N, 6° 28′ W, Irish Grid Ref H 984 907). Coll 1971 and subm by R A Old, Inst Geol Sci. *Comment* (RAO): determination gives age of Neolithic 'Bann Culture' in diatomite assigned to Zone VIIb by Jessen (1949).

Bingley series

IGS-C14/91. (St 3850) Airedale, Yorkshire

11,135 ± 110
9185 BC
$\delta^{13}C = -31.0‰$

Peat ca 0.15m thick at 2m depth from trial trench near Bingley (53° 51′ N, 1° 51′ W, Grid Ref SE 101 390). Peat lies on laminated clay in hollow at rear of rotational landslip involving till and soliflucted till and is overlain by ca 0.5m laminated clay and a solifluction mantle ca 1.5m thick. Coll 1971 and subm by J N Hutchinson, Imperial College, London. *Comment* (JNH): confirms pollen analysis which suggested Zone II age (J Turner, Univ Durham) and limiting date for landslip.

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IGS-C14/92. (St 3870) Airedale, Yorkshire **<250**
$\delta^{13}C = -28.5‰$

Stems of *Alnus glutinosa*, id by K L Alvin, Imperial College, in growth position from top of peat referred to in IGS-C14/91.

IGS-C14/93. (St 3871) Trafalgar Square, London **>40,000**
$\delta^{13}C = -30.7‰$

Plant stem fragments from peat 150mm thick at 0.6m OD in Flood Plain Terrace deposits, Carlton House Terrace Redevelopment site (51° 30′ N, 0° 8′ W, Grid Ref TQ 2981 8033). Coll 1971 and subm by B C Worssam, Inst Geol Sci. *Comment* (BCW): date accords with Ipswichian age deduced from flora and fauna from previous excavations in vicinity (Franks *et al*, 1958; Franks, 1960).

IGS-C14/94. (St 3846) Stanway By-pass, Essex **28,170 ± 700**
26,220 BC
$\delta^{13}C = -29.2‰$

IGS-C14/95. (St 3864) Stanway By-pass, Essex **+1240 32,500 −1080**
30,550 BC
$\delta^{13}C = -25.5‰$

Peat from cutting (51° 53′ N, 0° 48′ E, Grid Ref TL 9257 2425). Coll 1971 and subm by C R Bristow, Inst Geol Sci. *Comment* (F C Cox): stratigraphic and palynologic evidence favors correlation with the Hoxnian. Samples were not treated with NaOH to dissolve humic matter. The stratigraphically younger specimen (IGS-C14/95) yielded older date; thus, samples must have been contaminated by humic solutions.

IGS-C14/96. (St 3903) Brantingham, Yorkshire **21,835 ± 1660**
19,885 BC
$\delta^{13}C = -32.8‰$

Bone fragment from temporary excavation in sand and gravel SW of Brantingham (53° 45′ N, 0° 35′ W, Grid Ref SE 9385 2918). Depth 3.05m below surface. Coll 1970 and subm by G D Gaunt, Inst Geol Sci. *Comment*: bone occurred within or at base of littoral sediments attributed to maximum elevation phase of 'Lake Humber'. Date indicates an upper Devensian age for this phase and supports stratigrahic evidence that it was approx contemporaneous with the maximum Devensian ice advance into the Vale of York.

Stoneferry series, Yorkshire

Peat and shells from excavation at Stoneferry, Hull (53° 46′ N, 0° 20′ W, Grid Ref TA 1036 3214). Coll 1971 and subm by G D Gaunt, Inst Geol Sci.

IGS-C14/97. (St 3812) **5240 ± 100**
3290 BC
$\delta^{13}C = -28.6‰$

Peat from 5.7m below surface.

IGS-C14/98 I. (St 3803) **3775 ± 100**
1825 BC
$\delta^{13}C = -4.3‰$

Shells (*Cerastoderma edule*) from base of estuarine sediments in same excavation as /97 at 5.5m below surface.

IGS-C14/98 II. (St 3804) **3435 ± 200**
1485 BC
$\delta^{13}C = -5.8‰$

Shells (*Macoma balthica*) from base of estuarine sediments in same excavation as /97 and at same depth as /98 I.

Hull series, Yorkshire

Peat from borehole at Market Place, Hull (53° 44′ N, 0° 20′ W, Grid Ref TA 1003 2851). Coll 1971 by J Bartlett, Hull Mus, and subm by G D Gaunt, Inst Geol Sci.

IGS-C14/99. (St 3845) **6970 ± 100**
5020 BC
$\delta^{13}C = -29.5‰$

Sample from base of peat bed, 16.15m below surface, in borehole.

IGS-C14/100. (St 3825) **6890 ± 100**
4940 BC
$\delta^{13}C = -28.8‰$

Sample from upper part of peat bed in same borehole as /99.

General Comment on IGS-C14/97-100 (GDG): dates help determine relative rise of Flandrian sea level in Humber region. Dates for /98I and 98II show extent of variation between two species of shells from same horizon; date from *M balthica*, the thinner-shelled species is younger and has a wider margin of uncertainty.

IGS-C14/101. (St 3805, outer fraction) **+910**
28,720
−820
Ballykelly, Co Londonderry **26,770 BC**
$\delta^{13}C = +5.5‰$

(St 3806, inner fraction) **>40,000**
Ballykelly, Co Londonderry
$\delta^{13}C = +0.3‰$

Shells from deeply cut Londonderry Lower Till exposed in stream sec at Thorny Hill, Northern Ireland (55° 02′ N, 7° 02′ W, Irish Grid Ref C 627 210). Coll 1971 and subm by R A B Bazley, Inst Geol Sci. *Comment*: shells derived from marine sediments of Lough Foyle or North Channel. Age >40,000 BP does not confirm theory that widespread lower shelly till of area belongs to an early stage of main Midlandian (Weichsel) glaciation. Present popular theory that this till is Munsterian (Saale) age remains likely.

Uwchygarreg series, Montgomeryshire

Samples from lower 1.22m of hill-top peat, Ochr Lygnant, Uwchygarreg, Machynlleth (52° 31′ N, 3° 46′ W, Grid Ref SN 8001 9163). Total thickness of peat 2.44m weathered into vertical face and resting on weathered surface of mudstones.

IGS-C14/103. (St 3834) **5570 ± 100**
3620 BC
$\delta^{13}C = -28.9‰$

From basal 0.08m of sediment.

IGS-C14/104. (St 3827) **4065 ± 100**
2115 BC
$\delta^{13}C = -27.3‰$

0.84m above base.

IGS-C14/105. (St 3818) **3640 ± 100**
1690 BC
$\delta^{13}C = -26.2‰$

1.22m above base.
Coll 1971 and subm by R Cave, Inst Geol Sci.

IGS-C14/107. (St 3815) Swanscombe, Kent **>40,000**
$\delta^{13}C = -11.1‰$

Shells from a life assemblage of *Potomida littoralis* Cuvier from sand lens in Lower Loam 0.10m above junction with Lower Gravel, NW face of Trench B33 (51° 26′ N, 0° 18′ E, Grid Ref TQ 5986 7428), 1971 excavations at Barnfield Pit (Conway, 1972). Coll 1971 and subm by B W Conway, Inst Geol Sci. *Comment* (BWC): Lower Loam widely accepted as Hoxnian (Ovey, 1964) and specifically correlated with early temperate sub-stage of Hoxnian interglacial (Kerney, 1971) occurring within insolation half-cycle 6W to which an age of 200,000 to 220,000 yr BP has been assigned (Evans, 1971). As expected, the infinite date is consistent with this.

IGS-C14/108. (St 3830) Hoxne Brick Pit, Suffolk **26,930 ± 975**
24,980 BC
$\delta^{13}C = -26.4‰$

Peat from Main Cutting, Layer 2, archaeologic excavation (52° 21′ N, 1° 12′ E, Grid Ref TM 175 767). Coll 1971 and subm. by C R Bristow. *Comment* (F C Cox): radiometric age much younger than expected. Stratigraphy and other ^{14}C dates (Bristow and Cox, 1973) suggest sample should be >40,000 yr and thus must have been contaminated by humic solutions. Sample was not treated with NaOH.

Woodhall Spa series, Lincolnshire

IGS-C14/109. (St 3831) **3945 ± 100**
1995 BC
$\delta^{13}C = -27.6‰$

Upper layer of peat overlain by blue gray clay and overlying coarse sand containing Humic Gley soil, 2.60 to 2.64m below surface at Kirk-

stead Bridge (53° 08′ N, 0° 15′ W, Grid Ref TF 172 619). Coll 1971 and subm by K W G Valentine, Reading Univ.

IGS-C14/110. (St 3823) **4155 ± 100**
2205 BC
$\delta^{13}C = -27.9‰$

Basal layer of peat in IGS C14/109, immediately overlying the Humic Gley soil in coarse sand, 2.80 to 2.84m below surface. Coll 1971 and subm by K W G Valentine.

IGS-C14/111. (St 3819) **3980 ± 100**
2030 BC
$\delta^{13}C = -25.5‰$

Basal layer of peat overlain by blue gray clay and immediately overlying Humic Gley soil in coarse sand and clay, 2.31 to 2.36m below surface at Timberland Dales (53° 08′ N, 0° 14′ W, Grid Ref TF 179 602). Coll 1971 and subm by K W G Valentine.

IGS-C14/112. (St 3838) **4130 ± 100**
2180 BC
$\delta^{13}C = -26.7‰$

Basal layer of peat overlain by blue gray clay and immediately overlying Humic Podzol soil in coarse sand and gravel, 2.48 to 2.52m below surface at Tattershall Bridge (53° 05′ N, 0° 13′ W, Grid Ref TF 186 557). Coll 1971 and subm by K W G Valentine.

General Comment (KWGV): date is latest for development of a Podzol to Gley sequence of paleosols in coarse sands and clay exposed for ca 10 km along a gas pipeline trench. IGS-C14/109 and 110 show peat developed quickly over paleosols. All dates are corroborated by pollen analyses, made by B Seddon and S Page, Reading Univ, that gave a consistent spectrum from Zone VII b. Stratigraphically, peat is tentatively correlated with Lower Fen Peat of S fens, but dates are a little later.

St. Ouen's Bay series, Jersey

IGS-C14/113. (St 3911) **3890 ± 100**
1940 BC
$\delta^{13}C = -27.6‰$

Peat from 6.1 to 6.6m below surface in a borehole (49° 14′ N, 2° 14′ W, Grid Ref 3 SW 1742 0388) at Les Laveurs. Coll 1971 and subm by R G Thurrell, Inst Geol Sci. *Comment* (RGT): 0.5m peat with sand, interbedded in beach sand sediments of coastal plain, is based at +2m OD.

IGS-C14/114. (St 3837) **1925 ± 240**
AD 25
$\delta^{13}C = -27.6‰$

Peat from 5.9 to 6.1m below surface in a borehole (49° 14′ N, 2° 14′ W, Grid Ref 3 SW 2103 0172) 400m SE of IGS-C14/113. Coll 1971 and subm by R G Thurrell. *Comment* (RGT): 0.2m peat with sand based at +5.6m OD is overlain by sandy beach deposits of St Ouen's coastal plain

and underlain by predominantly clayey silts and gravelly sands, apparently derived from hinterland.

IGS-C14/115. (St 3833) Sandwich, Kent **5315 ± 100 3365 BC**

$\delta^{13}C = -27.9‰$

Peat from site investigation borehole for Sandwich By-pass (51° 17′ N, 1° 20′ E, Grid Ref TR 3229 5915) in reclaimed estuarine marshland. Coll 1971 by Kent County Council Highways Department and subm by E R Shephard-Thorn, Inst Geol Sci. *Comment* (ERS-T): borehole commenced at +3.5m OD and proved 3.8m fill, overlying 5m estuarine silts on solid Thanet Beds; peat occurs as thin bed within silts between −4.0 and −4.3m OD. Date closely compares with those from submerged forest of Pett Level, Sussex (Welin *et al,* 1972, p 332-333).

IGS-C14/116. (St 3835) Tilling Green, Rye, Sussex **9565 ± 120 7615 BC**

$\delta^{13}C = -29.4‰$

Peat from site investigation borehole (50° 57′ N, 0° 44′ E, Grid Ref TQ 9145 2060) in estuarine alluvium of flood plain of R Tillingham. Coll 1971 by A G Weeks and subm by E R Shephard-Thorn. *Comment* (ERS-T): borehole, surface ca +3.5m OD, proved 28.80m sequence of alluvial silts, sands and clays with organic horizons, overlying Wealden strata. Sample from bed of laminated silty peat between 25.5 and 26.5m below surface, just above base of channel. Date compares closely with that from a similar sediment in Cuckmere Valley at Arlington (Welin *et al,* 1971, p 28) and probably represents same pause early in Flandrian transgression.

Spalding series, Lincolnshire

Plant fragments and peat from borehole Spalding 1, (52° 45′ N, 0° 10′ W, Grid Ref TF 2368 1923). Coll 1971 and subm by A Horton, Inst Geol Sci.

IGS-C14/117. (St 3851) **3570 ± 100 1620 BC**

$\delta^{13}C = -27.6‰$

Reed rootlets *in situ* in Fen Clay at depth 3.96 to 4.11m.

IGS-C14/118. (St 3817) **4445 ± 100 2495 BC**

$\delta^{13}C = -27.7‰$

Top of peat seam within Fen Clay at depth 4.54 to 4.57m.

IGS-C14/119. (St 3849) **4890 ± 100 2940 BC**

$\delta^{13}C = -28.5‰$

Top of lower peat seam within Fen Clay at depth 7.11 to 7.16m.

IGS-C14/120. (St 3848) **5665 ± 100**
3715 BC
$\delta^{13}C = -28.5‰$

Base of lower peat seam within Fen Clay at depth 7.62 to 7.67m.

Peat from borehole Spalding 2, (52° 45′ N, 0° 9′ W, Grid Ref TF 2427 1919). Coll 1971 and subm by A Horton.

IGS-C14/121. (St 3844) **5175 ± 100**
3225 BC
$\delta^{13}C = -27.1‰$

Top of upper leaf of lower peat within Fen Clay at depth 8.08 to 8.13m.

IGS-C14/122. (St 3841) **5600 ± 100**
3650 BC
$\delta^{13}C = -27.9‰$

Base of upper leaf of lower peat within Fen Clay at depth 8.48 to 8.51m.

IGS-C14/123. (St 3824) **5905 ± 100**
3955 BC
$\delta^{13}C = -24.3‰$

Sample from lower leaf of lower peat within Fen Clay at depth 8.74 to 8.76m.

IGS-C14/124. (St 3847) **1875 ± 100**
AD 75
$\delta^{13}C = -28.6‰$

Phragmites roots at depth 2.1m in borehole Spalding 4, (52° 45′ N, 0° 10′ W, Grid Ref TF 2417 1914). Coll 1971 and subm. by A Horton. *General Comment* (AH): samples provide data on development and relative rates of deposition of Fen Clay sequence of the Fens. Dates indicate that peat growth may not have begun nor ended isochronously throughout area.

IGS-C14/125. (St 3872) Woodston, Peterborough **>40,000**
$\delta^{13}C = -24.9‰$

Wood from gravel bed near base of Woodston series at depth 2.4m in drainage trench at Woodston, Peterborough, (52° 33′ N, 0° 16′ W, Grid Ref TL 1799 9608). Coll 1971 and subm by A Horton. *Comment* (AH): date accords with interglacial age deduced from flora.

Setch series, Norfolk

Peats from Nar Valley 1 Borehole (52° 42′ N, 0° 25′ E, Grid Ref TF 6295 1327). Coll 1971 and subm by R W Gallois, Inst Geol Sci.

IGS-C14/126. (St 3843) **1875 ± 100**
AD 75
$\delta^{13}C = -26.7‰$

Peat from upper part of 1.1m bed, 3.7m below surface.

IGS-C14/127. (St 3868) **3215 ± 100**
1265 BC
$\delta^{13}C = -26.1‰$

Peat from lower part of same bed as /126, 4.7m below surface.

IGS-C14/128. (St 3865) **5440 ± 100**
3490 BC
$\delta^{13}C = -27.6‰$

Peat from near base of 0.69m bed, 7.3m below surface.

General Comment (RWG): /126 and /127 are the upper peats of the Fenland Holocene sequence, and /128 is the lower peat. The difference in date between /126 and /127 appears anomalous for such a thin bed of peat.

IGS-C14/129. (St 3874) Setch, Norfolk **>40,000**
$\delta^{13}C = -31.0‰$

Peat from bed 0.69m thick at 12.8m below surface in Nar Valley 4 Borehole (52° 42′ N, 0° 26′ E, Grid Ref TF 6502 1419). Coll 1971 and subm by R W Gallois. *Comment* (RWG): part of Nar Valley Freshwater Beds; infinite date does not conflict with presumed Hoxnian age of these deposits (Stevens, 1958).

Glaspwll series, Machynlleth, Montgomeryshire

IGS-C14/131. (St 3873) **5345 ± 100**
3395 BC
$\delta^{13}C = -25.8‰$

Ditch, Garthgwinion (52° 34′ N, 3° 52′ W, Grid Ref SN 7359 9803). Sample of wood from bottom of ditch, 0.91m below top of peat. Coll 1971 and subm by R Cave, Inst Geol Sci.

IGS-C14/132. (St 3867) **11,430 ± 160**
9480 BC
$\delta^{13}C = -28.9‰$

Ditch, Garthgwinion (52° 34′ N, 3° 52′ W, Grid Ref SN 7367 9791). Sample of plant remains in diatomaceous silt beneath 1.22m to 1.52m dark peat, the latter probably continuous with 0.91m peat of IGS-131. Coll 1971 and subm by R Cave.

IGS-C14/133. (St 3820) **7515 ± 100**
5565 BC
$\delta^{13}C = -28.2‰$

Ditch, Garthgwinion (52° 34′ N, 3° 52′ W, Grid Ref SN 7355 9803). Sample from 0.08m layer of peat, underlying 0.30m to 0.60m fawn, silty gravel (Head or ditch diggings) and overlying 0.60m fine, solifluction gravel (Head). Coll 1971 and subm by R Cave.

Poulton-le-Fylde series, Lancashire

Coarse detrital mud (53° 50′ N, 3° 1′ W, Grid Ref SD 3312 3867) with skeleton of male elk (*Alces alces,* L.) bearing lesions from two attacks by hunters ca 2-3 weeks apart; two uniserial barbed bone points of Meso-

lithic type were assoc. Level assigned to the Allerød period (Zone II) (Barnes *et al,* 1971; Hallam *et al,* in press). Coll 1970 by B Barnes, subm by B J N Edwards.

IGS-C14/134. (St 3836) **11,665 ± 140**
9715 BC
$\delta^{13}C = -23.7‰$

Sample from +11.97 to +11.95m OD.

IGS-C14/135. (St 3832) **12,200 ± 160**
10,250 BC
$\delta^{13}C = -18.6‰$

Sample from +11.90 to +11.87m OD.

General Comment (BJNE): determinations support Allerød dating and that for a Zone II level at Skitham, Out Rawcliffe (11,170 ± 260 BP GaK-2820).

IGS-C14/136. (St 3801, outer fraction) **4265 ± 100**
Foulness Island, Essex **2315 BC**

(St 3802, inner fraction) **4350 ± 210**
Foulness Island, Essex **2400 BC**
$\delta^{13}C = -1.5‰$

Mixed shells from 7.92m in borehole (51° 36′ N, 0° 55′ E, Grid Ref TM 029 940). Coll 1969 and subm by J T Greensmith, Queen Mary College. *Comment* (JTG): dates initiation of phase of shell accumulation in vicinity of proto-Crouch and proto-Roach river mouths, reaching climax in formation of shell banks and cheniers at 4000 to 3500 BP (Birm-243) (Greensmith and Tucker, 1971).

IGS-C14/137. (St 3799, outer fraction) **800 ± 100**
Dengie Peninsula, Essex **AD 1150**
$\delta^{13}C = -7.9‰$

(St 3800, inner fraction) **645 ± 100**
Dengie Peninsula, Essex **AD 1305**
$\delta^{13}C = -7.6‰$

Shells (*Cardium*) from 1.3m in Dengie No 2 Borehole (51° 39′ N, 0° 54′ E, Grid Ref TM 012 995). Coll 1967 and subm by J T Greensmith. *Comment* (JTG): date indicates that area on W side of Dengie inland chenier zone was open to marine influence long after period when chenier formation ceased.

IGS-C14/138. (St 3807, outer fraction) **1410 ± 100**
Dengie Peninsula, Essex **AD 540**
$\delta^{13}C = -0.6‰$

(St 3808, inner fraction) **1340 ± 100**
Dengie Peninsula, Essex **AD 610**
$\delta^{13}C = -0.6‰$

Shells (*Cardium*) from 0.9m in Dengie No 3 Borehole (51° 41′ N, 0° 56′ E, Grid Ref TM 021 028). Coll 1966 and subm by J T Greensmith.

Comment (JTG): date confirms that Dengie inland chenier zone is post-Roman and, together with Birm-244, suggests a 200-yr phase of chenier formation, probably in conjunction with salt marsh erosion (Greensmith and Tucker, 1969).

IGS-C14/139. (St 3798) Foulness Island, Essex **6620 ± 100**
4670 BC
$\delta^{13}C = +1.5‰$

Shells (*Ostrea*) from 13.72 to 15.24m in Borehole R/11/1 (51° 36′ N, 0° 54′ E, Grid Ref TM 018 943). Coll 1969 and subm by J T Greensmith.

IGS-C14/140. (St 3797) Foulness Sands, Essex **5650 ± 240**
3700 BC
$\delta^{13}C = -3.4‰$

Shells (*Ostrea*) from 12.19 to 13.72m in Borehole R/7/1 (51° 36′ N, 0° 57′ E, Grid Ref TM 050 940). Coll 1969 and subm by J T Greensmith.

General Comment (JTG): both dates represent marked phases of *Ostrea* colonization at mouths of proto-Crouch and proto-Roach rivers.

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