

UNIVERSITY OF LUND RADIOCARBON DATES XVI

SÖREN HÅKANSSON

Radiocarbon Dating Laboratory, Department of Quaternary Geology
University of Lund, Sweden

INTRODUCTION

Most of the ^{14}C measurements reported here were made between October 1981 and October 1982. Equipment, measurement, and treatment of samples are as reported previously (R, 1968, v 10, p 36-37; 1976, v 18, p 290; 1980, v 22, p 1045).

Age calculations are based on a contemporary value equal to 95% of the activity of NBS oxalic acid standard (No. 4990A) and on the conventional half-life for ^{14}C of 5568 yr. Results are reported in years before 1950 (years BP). Errors quoted with the dates are based on counting statistics alone and are equivalent to ± 1 standard deviation ($\pm\sigma$).

Corrections for deviations from $\delta^{13}\text{C} = -25.0\text{‰}$ in the PDB scale are applied for almost all samples; also for marine shells. The apparent age for marine material due to the reservoir effect must be subtracted from our dates on such samples.

The remark "undersized; diluted", in *Comments* means the sample did not produce enough CO_2 to fill the counter to normal pressure and "dead" CO_2 from anthracite was introduced to make up the pressure. "% sample" indicates amount of CO_2 derived from the sample present in the diluted counting gas; the rest is "dead" CO_2 . Organic carbon content reported for bone samples is calculated from yield of CO_2 by combustion of gelatine remaining after treatment. Organic carbon lost during treatment is not included in calculated percentage.

The description of each sample is based on information provided by the submitter.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Sweden

Spjälkö series

Sediment from former Littorina bay at Spjälkö, S Blekinge ($56^\circ 10' \text{N}$, $15^\circ 13' \text{E}$). Lu-341 through -349 coll 1969 by R Liljegren; subm by B E Berglund; all other samples coll 1976 and 1981 (Lu-1984) and subm by R Liljegren, Dept Quaternary Geol, Univ Lund. Dating is part of study of biol development and water-level changes in area (Liljegren, 1982). All samples pretreated with HCl; Lu-1984 received additional treatment with NaOH. Elevations above present sea level.

Lu-341. Spjälkö 1	6890 ± 80
Limnic fine detritus gyttja, +3.78 to 3.80m.	$\delta^{13}C = -28.0\text{‰}$
Lu-342. Spjälkö 2	6850 ± 80
Slightly brackish algal gyttja, +3.80 to 3.82m.	$\delta^{13}C = -25.0\text{‰}$
Lu-343. Spjälkö 3	6670 ± 75
Brackish algal gyttja, +3.89 to 3.91m.	$\delta^{13}C = -19.1\text{‰}$
Lu-344. Spjälkö 4	6480 ± 75
Brackish algal gyttja, +3.98 to 4.00m.	$\delta^{13}C = -20.4\text{‰}$
Lu-345. Spjälkö 5	6250 ± 75
Brackish fine detritus gyttja, rich in algae, +4.06 to 4.08m.	$\delta^{13}C = -17.9\text{‰}$
Lu-346. Spjälkö 6	6090 ± 75
Brackish fine detritus gyttja, rich in algae, +4.21 to 4.23m.	$\delta^{13}C = -17.9\text{‰}$
Lu-347. Spjälkö 7	6080 ± 70
Brackish fine detritus gyttja, rich in algae, +4.27 to 4.29m.	$\delta^{13}C = -16.6\text{‰}$
Lu-348. Spjälkö 8	5520 ± 70
Brackish fine detritus gyttja, rich in algae, +4.49 to 4.51m.	$\delta^{13}C = -17.2\text{‰}$
Lu-349. Spjälkö 9	5260 ± 65
Brackish fine detritus gyttja, rich in algae, +4.51 to 4.53m.	$\delta^{13}C = -18.2\text{‰}$
Lu-1899. Spjälkö 10	5820 ± 65
Brackish fine detritus gyttja, rich in algae, +4.43 to 4.45m.	$\delta^{13}C = -16.8\text{‰}$
Lu-1898. Spjälkö 11	5850 ± 65
Clayey fine detritus gyttja, rich in algae, +4.53 to 4.55m.	$\delta^{13}C = -16.9\text{‰}$
Lu-1897. Spjälkö 12	5540 ± 65
Clayey fine detritus gyttja, +4.63 to 4.65m.	$\delta^{13}C = -14.5\text{‰}$
Lu-1984. Spjälkö 13, insoluble	4110 ± 65
Sedge and reed peat from isolation level, +4.75 to 4.76m, insoluble fraction.	$\delta^{13}C = -26.3\text{‰}$

Lu-1984A. Spjälkö 13, soluble **3920 ± 55**
 $\delta^{13}C = -26.1\text{‰}$
Acid-precipitated part of NaOH-soluble fraction, +4.75 to 4.76m.

Lu-1954. Ängdala 1981, insoluble **7650 ± 75**
 $\delta^{13}C = -29.2\text{‰}$
Insoluble organic fraction of clay gyttja from sediment layer, ca 15cm thick, overlain by large chalk boulder at Ängdala, Kvarnby, S Scania (55° 36' N, 13° 07' E). Coll 1981 by R Liljegren and M Thelaus; subm by R Liljegren. Pretreated with HCl and NaOH.

Lu-1954A. Ängdala 1981, soluble **7410 ± 70**
 $\delta^{13}C = -27.5\text{‰}$
Acid-precipitated part of NaOH-soluble fraction from Lu-1954.

Lu-2018. Bjäresjö **2610 ± 80**
 $\delta^{13}C = -26.1\text{‰}$
Magnocaricetum or brushwood peat from 5.4 to 5.5m below water surface in reconnaissance core from Lake Bjäresjö, 5km NW of Ystad, S Scania (55° 27.5' N, 13° 45.3' E). Coll 1982 and subm by B E Berglund, Dept Quaternary Geol, Univ Lund. Peat is overlain by ca 3.8m lake sediments. Water depth ca 1.6m at coring point. Dated to obtain approx age of peat surface. No pretreatment. (1-day count.)

Lu-1939. Herrängsviken la, Åsnen **12,320 ± 170**
Clay with some organic matter (<0.3% organic carbon) from Herrängsviken, Lake Åsnen, S Småland (56° 42' N, 14° 38' E). Depth 6.16 to 6.23m below water surface. Coll 1981 and subm by S Björck, Dept Quaternary Geol, Univ Lund. Dated to demonstrate difficulty to obtain reliable dates on bulk sediments with very low organic content (see Björck and Håkansson, 1982). Date is ca 1200 yr older than expected from previous dates for separated coarse detritus from comparable levels at Herrängsviken (R, 1982, v 24, p 198-199). Pretreated with HCl. Sample undersized; diluted; 33% sample. (4 1-day counts.) No ^{13}C measurement. Water depth 1.3m at sampling point.

Lu-1958. Våxtorp **780 ± 45**
 $\delta^{13}C = -24.5\text{‰}$
Charcoal from depression in wind-blasted large boulder uncovered from eolian sand in gravel pit at Våxtorp, Halland (56° 25' N, 13° 07' E). Coll 1981 and subm by H Svensson, Dept Phys Geog, Univ Lund. Site described by Svensson (1981).

Dags Mosse Series I

Peat from S part of Dags Mosse, SW of Lake Tåkern, Östergötland (58° 19.5' N, 14° 42' E). Coll 1980 by H Göransson and M Thelaus; subm by H Göransson, Dept Quaternary Geol, Univ Lund. Results of previous study in area pub by Magnusson (1964). Dating is part of study of human influence on vegetation in S Östergötland (*cf* Göransson, 1977, p 107-127;

1982). Uppermost ca 1m peat removed previously by peat-cutting. Samples are from core taken with Livingstone sampler, 10cm diam. Depths given below refer to present bog surface.

Lu-1964. Dags Mosse 1, coarse, insoluble $\delta^{13}C = -24.6\text{‰}$
5370 $\pm$ 60

Coarse fraction of minerotrophic radicle peat, insoluble part, 283.5 to 286.5cm. Upper part of *Tilia-Quercus-Ulmus* sub-zone (cf Göransson, 1977, p 98). *Comment*: pretreated with HCl and NaOH.

Lu-1964A. Dags Mosse 1, fine and soluble $\delta^{13}C = -25.1\text{‰}$
5320 $\pm$ 60

Fine fraction and acid-precipitated part of NaOH-soluble fraction, 283.5 to 286.5cm.

Lu-1965. Dags Mosse 2, coarse, insoluble $\delta^{13}C = -24.6\text{‰}$
5200 $\pm$ 60

Coarse fraction of minerotrophic radicle peat, insoluble part, 274 to 276cm. Just below initial phase of elm decline. *Comment*: pretreated with HCl and NaOH.

Lu-1965A. Dags Mosse 2, fine and soluble $\delta^{13}C = -25.3\text{‰}$
5250 $\pm$ 60

Fine fraction and acid-precipitated part of NaOH-soluble fraction, 274 to 276cm.

Lu-2015. Dags Mosse 15 $\delta^{13}C = -23.8\text{‰}$
5180 $\pm$ 60

Minerotrophic peat, 268 to 271cm. Very beginning of elm decline. *Comment*: pretreated with HCl.

Lu-1966. Dags Mosse 3 $(\delta^{13}C = -25.7\text{‰})^*$
5020 $\pm$ 70

Minerotrophic radicle peat, 258.5 to 261.5cm. Continuing elm decline. *Comment*: pretreated with HCl and NaOH; charred in nitrogen atmosphere before burning. Sample undersized; diluted; 83% sample.

Lu-1967. Dags Mosse 4, coarse, insoluble $\delta^{13}C = -26.1\text{‰}$
4860 $\pm$ 60

Coarse fraction of minerotrophic radicle peat, insoluble part, 248.5 to 251.5cm. *Ulmus* only 1%. *Comment*: pretreated with HCl and NaOH; charred in nitrogen atmosphere before burning.

Lu-1967A. Dags Mosse 4, fine and soluble $\delta^{13}C = -25.4\text{‰}$
4760 $\pm$ 60

Fine fraction and acid-precipitated part of NaOH-soluble fraction, 248.5 to 251.5cm.

Lu-1968. Dags Mosse 5, insoluble $\delta^{13}C = -25.9\text{‰}$
4550 $\pm$ 60

Peat from transition minero/ombrotrophic peat, 238.5 to 241.5cm, insoluble part. Absolute *Ulmus* min (0.7%) after decline. First finds of

* No ^{13}C measurement. $\delta^{13}C$ used is mean value for Lu-1964 to -1973.

Plantago lanceolata. *Comment*: pretreated with HCl and NaOH; charred in nitrogen atmosphere before burning.

4480 ± 60

Lu-1968A. Dags Mosse 5, soluble

$\delta^{13}C = -25.4\text{‰}$

Acid-precipitated part of NaOH-soluble fraction, 238.5 to 241.5cm.

4690 ± 60

Lu-1969. Dags Mosse 6

$\delta^{13}C = -25.7\text{‰}$

Ombrotrophic peat, 233.5 to 236.5cm. *Ulmus* rising to 1.3‰. *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4590 ± 60

Lu-1970. Dags Mosse 7

$\delta^{13}C = -26.5\text{‰}$

Ombrotrophic *Eriophorum vaginatum* peat, 228.5 to 231.5cm. Start of regeneration phase (1.5% *Ulmus*, 4.9% *Tilia*, *Corylus* increasing from 16 to 30%). *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4450 ± 60

Lu-1971. Dags Mosse 8

$\delta^{13}C = -25.6\text{‰}$

Ombrotrophic *Eriophorum vaginatum* peat, 218.8 to 221.2cm. Continuing regeneration phase (4.7% *Ulmus*). *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4350 ± 60

Lu-1972. Dags Mosse 9

$\delta^{13}C = -26.1\text{‰}$

Dark, highly humified *Sphagnum* peat, 213.5 to 216.5cm. *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4310 ± 60

Lu-1973. Dags Mosse 10

$\delta^{13}C = -25.6\text{‰}$

Dark, highly humified *Sphagnum* peat, 208.5 to 211.5cm. *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4060 ± 55

Lu-1974. Dags Mosse 11

$\delta^{13}C = -26.4\text{‰}$

Dark, highly humified *Sphagnum* peat, 198.5 to 201.5cm. *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

4070 ± 55

Lu-1975. Dags Mosse 12

$\delta^{13}C = -25.9\text{‰}$

Chocolate-colored, highly humified *Sphagnum* peat, 195 to 198cm. *Comment*: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

3980 ± 55

Lu-1976. Dags Mosse 13

$\delta^{13}C = -25.5\text{‰}$

Chocolate-colored, highly humified *Sphagnum* peat, 188.5 to 191.5cm.

Comment: only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

Lu-1977. Dags Mosse 14 **3650 ± 55**
 $\delta^{13}C = -26.2\%$

Chocolate-colored, highly humified *Sphagnum* peat, 178.5 to 181.5cm. *Comment:* only mild pretreatment with HCl and NaOH; charred in nitrogen atmosphere before burning.

St Rögöl series

Fine detritus gyttja from Lake St Rögöl, NE Småland (57° 32' N, 16° 33' E). Alt 20m; area 6.7ha. Coll 1981 and subm by T Persson, Dept Quaternary Geol, Univ Lund. Dated as part of study of human influence on vegetational development in area. Samples pretreated with HCl. Water depth at sampling point, 2m.

Lu-1987. St Rögöl, Sample 15 **1400 ± 50**
 $\delta^{13}C = -29.4\%$

Gyttja from 35 to 37.5cm below sediment surface. Rising frequency of cereal pollen.

Lu-1988. St Rögöl, Sample 19 **1740 ± 50**
 $\delta^{13}C = -30.1\%$

Gyttja from 45 to 47.5cm below sediment surface. *Picea* pollen percentages increasing.

Baldringe series

Peat from Coring Site III in Baldringe area, ca 4km N of Sövestad, S Scania (55° 32.2' N, 13° 48.3' E). Coll 1981 by L-O Jönsson and B Liedberg-Jönsson; subm by M Hjelmroos-Ericsson, Dept Quaternary Geol, Univ Lund. No pretreatment.

Lu-1997. Baldringe III:1 **1090 ± 45**
 $\delta^{13}C = -27.4\%$

Dark gray peat with radicles and wood remains, 48 to 50cm below peat surface.

Lu-1998. Baldringe III:2 **3680 ± 55**
 $\delta^{13}C = -22.8\%$

Magnocaricetum peat with wood remains, 177.5 to 182.5cm below peat surface.

B. Iceland

Lu-1996. Flateyjdalur **8740 ± 95**
 $\delta^{13}C = -18.8\%$

Gyttja from lake at Flateyjdalur, N Iceland (66° 05' 55" N, 17° 54' 20" W). Sample from 522.5 to 527.5cm below sediment surface in 560cm long profile. Alt of lake ca 25m. Coll 1977 by H Norddahl and G Hjaltason; subm by H Norddahl, Dept Quaternary Geol, Univ Lund. *Comment:* pretreated with HCl. Sample undersized; diluted; 53% sample. (3 1-day counts.) Sample from lowest 5cm of same profile dated at 9650 ± 120 BP (Lu-1433: R, 1979, v 21, p 395).

Icelandic recent marine shell series

Bivalve shells from various parts of coast of Iceland, selected from mollusk colln of Zool Mus, Copenhagen, by L. A. Simonarson, Sci Inst, Univ Iceland, Reykjavik. Coll between 1898 and 1939; subm by O Ingolfsson, Dept Quaternary Geol, Univ Lund. Dated to gain information about reservoir effects in coastal waters of Iceland.

Lu-2006. Reykjavik 1900 **505 ± 35**
 $\delta^{13}\text{C} = +1.0\text{‰}$

Shells (*Mytilus edulis*) coll alive in 1900 by A C Johansen at 3m depth outside Reykjavik, SW Iceland (65° 10' N, 22° 00' W). *Comment:* expected ^{14}C age of mollusks living in 1900 is 110 ± 20 BP, corrected for reservoir effect (see Olsson, 1980, p 670). Thus, reservoir age is 395 ± 40 yr.

Lu-2007. Djúpivogur 1898 **480 ± 41**
 $\delta^{13}\text{C} = +0.1\text{‰}$

Shells (*Mytilus edulis*) coll alive in 1898 by H Jónsson at ca 6m depth outside Djúpivogur, E Iceland (64° 40' N, 14° 15' W). *Comment:* expected reservoir-corrected ^{14}C age: 110 ± 20 BP. Reservoir age: 370 ± 46 yr.

Lu-2008. Seydisfjörður 1926 **480 ± 41**
 $\delta^{13}\text{C} = -0.3\text{‰}$

Shells (*Macoma calcarea*) coll alive in 1926 by Tåning at 40m depth in Seydisfjörður, E Iceland (65° 17' N, 14° 00' W). *Comment:* expected reservoir-corrected ^{14}C age: 110 ± 20 BP. Reservoir age: 370 ± 46 yr.

Lu-2009. Faxaflói 1926 **470 ± 35**
 $\delta^{13}\text{C} = +0.1\text{‰}$

Shells (*Macoma calcarea*) coll alive in 1926 by Tåning at 33m depth in Faxaflói, SW Iceland (64° 20' N, 22° 30' W). *Comment:* expected reservoir-corrected ^{14}C age: 110 ± 20 BP. Reservoir age: 360 ± 40 yr.

Lu-2010. Faxaflói 1939 **500 ± 42**
 $\delta^{13}\text{C} = +1.7\text{‰}$

Shells (*Arctica islandica*) coll alive in 1939 by Einarsson at 48m depth in Faxaflói, SW Iceland (64° 07' N, 22° 12' W). *Comment:* expected reservoir-corrected ^{14}C age: 130 ± 20 BP. Reservoir age: 370 ± 47 yr.

Lu-2011. Skjálfandi 1926 **440 ± 34**
 $\delta^{13}\text{C} = +2.1\text{‰}$

Shells (*Arctica islandica*) coll alive in 1926 by Tåning at 22m depth at Skjálfandi, N Iceland (66° 00' N, 17° 30' W). *Comment:* expected reservoir-corrected ^{14}C age: 110 ± 20 BP. Reservoir age: 330 ± 40 yr.

General Comment: weighed mean value of reservoir age for coastal waters of Iceland is 365 ± 20 yr, based on this series. Results will be treated in more detail elsewhere (Håkansson, ms in preparation). Corrections for deviations from $\delta^{13}\text{C} = -25\text{‰}$ PDB are applied also for these samples.

Icelandic Subfossil Marine Shell Series I

Marine shells from SW Iceland, coll 1980 and 1981 and subm by O Ingolfsson. Dated as part of study of Late Weichselian ice recession in area.

12,470 ± 110
 $\delta^{13}C = +0.3\text{‰}$

Lu-2055. Laxá

Shells (*Hiatella arctica*) from marine silt, alt 25m, at Laxá, N of Akranes, SW Iceland (64° 24' N, 21° 50' W). There are indications that site was overridden by latest ice advance in area. *Comment*: outer 25‰ of shells removed by acid leaching. Sample undersized; diluted; 80‰ sample. (3 1-day counts.)

11,330 ± 80
 $\delta^{13}C = +0.5\text{‰}$

Lu-2056. Súlvá

Shells (*Mya truncata*) found *in situ* with *Portlandia arctica* (not dated) in marine silt; ca +2m at Súlvá, N of Akranes (64° 24' N, 21° 57' W). Silt probably deposited in distal position in front of latest ice margin in area. *Comment*: outer 27‰ removed by acid leaching. (3 1-day counts.) *General Comment*: corrections for deviations from $\delta^{13}C = -25\text{‰}$ PDB are applied. No corrections are made for reservoir age of living marine mollusks.

*C. Spitsbergen***Kapp Linné series**

Whale bone from fossil beach ridge at Kapp Linné, Isfjord, West Spitsbergen (78° 04' N, 13° 38' E). Coll 1979 and subm by J Åkerman, Dept Phys Geog, Univ Lund. Dated as part of study of elevated shorelines in area (*cf* Åkerman, 1980). Collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. Only dense bone material used for dating.

9680 ± 90
 $\delta^{13}C = -14.9\text{‰}$

Lu-2019. Kapp Linné, Flya

Collagen from well-preserved jaw bone of unid. whale. *Comment*: organic carbon content: 5.5‰.

9790 ± 90
 $\delta^{13}C = -15.9\text{‰}$

Lu-2020. Kapp Linné, RK179

Collagen from well-preserved skull? bone fragment of unid. whale. *Comment*: organic carbon content: 6.0‰.

D. Switzerland

11,560 ± 280

Lu-2002. Petit-Saconnex

Wood fragments and conifer needles from top of deposit overlain by basal till at Petit-Saconnex, Budé, SE Switzerland (46° 13' 50" N, 6° 08' 30" E). Coll 1964; subm by C Reynaud, Dept Geol, Univ Geneva. *Comment*: very small sample; diluted; 23‰ sample. (3 1-day counts.) No ^{13}C measurement.

Lu-2053. Grotte du Poteux **3870 ± 60**
 $\delta^{13}C = -19.9\text{‰}$

Collagen from bones of Horseshoe Bat (*Rhinolophus euryale*, id by V Aellen, Mus Nat Hist, Geneva) from Grotte du Poteux at Saillon, Valais, S Switzerland (46° 10' N, 7° 11' E). Coll 1981 by Arlettaz and Praz; subm by V Aellen. *Comment*: collagen extracted as described previously (R, 1976, v 18, p 290) with NaOH treatment. Organic carbon content: 0.8%. Sample undersized; diluted; 61% sample. (3 1-day counts.)

E. Bulgaria

Tschokljovo Marsh Series I

Peat from Tschokljovo marsh, W Bulgaria (42° 22' N, 22° 50' E). Alt 870m. Coll 1980 by S Tonkov; subm by E Bozilova, Biol Fac, Univ Sofia. Dating is part of palaeoecol study belonging to IGCP Sub-proj 158B (Berglund, 1979). Peat classified by submitter as *Phragmites*-type peat for all samples. Lowermost sample is from core (Lu-1989); all other samples are from wall of dug trench. All samples pretreated with HCl. Lu-1990, -1991, and -1994 received additional treatment with NaOH, and soluble fractions were precipitated with HCl and dated separately. Depths refer to surface of upper peat layer.

Lu-1989. Tschokljovo, Sample 6 **6300 ± 65**
 $\delta^{13}C = -26.5\text{‰}$
Sample from separate peat layer, 400 to 405cm, underlain and overlain by clay.

Lu-1990. Tschokljovo, Sample 5 **3010 ± 55**
 $\delta^{13}C = -25.9\text{‰}$
Depth 274 to 279cm. Insoluble fraction.

Lu-1990A. Tschokljovo, Sample 5, soluble **3130 ± 55**
 $\delta^{13}C = -25.4\text{‰}$
Acid-precipitated part of NaOH-soluble fraction from Sample 5.

Lu-1991. Tschokljovo, Sample 4 **2470 ± 50**
 $\delta^{13}C = -25.5\text{‰}$
Depth 230 to 240cm. Insoluble fraction.

Lu-1991A. Tschokljovo, Sample 4, soluble **2380 ± 50**
 $\delta^{13}C = -26.5\text{‰}$
Acid-precipitated part of NaOH-soluble fraction from Sample 4.

Lu-1992. Tschokljovo, Sample 3 **2430 ± 50**
 $\delta^{13}C = -25.4\text{‰}$
Depth 149 to 152cm.

Lu-1993. Tschokljovo, Sample 2 **2380 ± 50**
 $\delta^{13}C = -25.2\text{‰}$
Depth 140 to 144cm.

Lu-1994. Tschokljovo, Sample 1	1710 ± 50
Depth 72 to 80cm. Insoluble fraction.	$\delta^{13}C = -24.1\text{‰}$
Lu-1994A. Tschokljovo, Sample 1, soluble	1860 ± 50
Acid-precipitated part of NaOH-soluble fraction from Sample 1.	$\delta^{13}C = -26.0\text{‰}$

F. Jamaica

Negril Morass Series II

Peat from coastal wetland at Negril, W Jamaica (18° 20' N, 78° 20' W). Coll 1982 and subm by G Digerfeldt, Dept Quaternary Geol, Univ Lund. Dating is part of study of development of coastal wetland and eustatic sea-level changes in area. For other dates from Negril Morass, see R, 1982, v 24, p 203-204. Depths given are below surface. Peat classification is preliminary (based on field observations). All samples pretreated with HCl.

Negril Morass 1

Lu-2022. Negril Morass 1, 140 to 150cm	2340 ± 50
Sedge peat, highly humified. <i>Comment:</i> low $\delta^{13}C$ value checked by second ^{13}C measurement.	$\delta^{13}C = -38.1\text{‰}$
Lu-2023. Negril Morass 1, 340 to 350cm	3560 ± 60
Mangrove peat, slightly humified.	$\delta^{13}C = -24.7\text{‰}$
Lu-2024. Negril Morass 1, 540 to 550cm	4560 ± 60
Mangrove peat, slightly humified.	$\delta^{13}C = -25.8\text{‰}$
Lu-2025. Negril Morass 1, 740 to 750cm	5930 ± 70
Mangrove peat, highly humified.	$\delta^{13}C = -28.8\text{‰}$
Lu-2026. Negril Morass 1, 935 to 945cm	6960 ± 70
Mangrove peat, highly humified.	$\delta^{13}C = -28.3\text{‰}$

Negril Morass 2

Lu-2027. Negril Morass 2, 240 to 250cm	3630 ± 60
Mangrove peat, moderately humified.	$\delta^{13}C = -26.0\text{‰}$
Lu-2028. Negril Morass 2, 437 to 447cm	5680 ± 60
Mangrove peat, highly humified.	$\delta^{13}C = -27.6\text{‰}$

Negril Morass 3

Lu-2029. Negril Morass 3, 140 to 150cm	2260 ± 50
Mangrove peat, slightly humified.	$\delta^{13}C = -25.5\text{‰}$

Lu-2030. Negril Morass 3, 340 to 350cm **4270 ± 60**
 $\delta^{13}C = -25.6\text{‰}$
 Mangrove peat, slightly humified.

Lu-2031. Negril Morass 3, 570 to 580cm **5970 ± 70**
 $\delta^{13}C = -27.3\text{‰}$
 Mangrove peat, highly humified.

Negril Morass 4

Lu-2032. Negril Morass 4, 240 to 250cm **3810 ± 60**
 $\delta^{13}C = -25.9\text{‰}$
 Mangrove peat, moderately humified.

Lu-2033. Negril Morass 4, 440 to 450cm **4740 ± 60**
 $\delta^{13}C = -26.4\text{‰}$
 Mangrove peat, highly humified.

Lu-2034. Negril Morass 4, 670 to 680cm **6220 ± 70**
 $\delta^{13}C = -25.3\text{‰}$
 Mangrove peat, highly humified.

Negril Morass 5

Lu-2035. Negril Morass 5, 140 to 150cm **2110 ± 50**
 $\delta^{13}C = -27.0\text{‰}$
 Mangrove peat, highly humified.

Lu-2036. Negril Morass 5, 340 to 350cm **3650 ± 60**
 $\delta^{13}C = -26.2\text{‰}$
 Mangrove peat, moderately humified.

Lu-2037. Negril Morass 5, 540 to 550cm **5310 ± 60**
 $\delta^{13}C = -24.2\text{‰}$
 Mangrove peat, moderately humified.

Lu-2038. Negril Morass 5, 762 to 772cm **6610 ± 70**
 $\delta^{13}C = -29.0\text{‰}$
 Mangrove peat, moderately humified.

Negril Morass 6

Lu-2039. Negril Morass 6, 80 to 90cm **1370 ± 45**
 $\delta^{13}C = -26.7\text{‰}$
 Mangrove peat, moderately humified.

Lu-2040. Negril Morass 6, 240 to 250cm **3730 ± 60**
 $\delta^{13}C = -26.5\text{‰}$
 Mangrove peat, highly humified.

Lu-2041. Negril Morass 6, 390 to 400cm **5100 ± 60**
 $\delta^{13}C = -26.4\text{‰}$
 Mangrove peat, highly humified.

Negril Morass 7

Lu-2042. Negril Morass 7, 140 to 150cm **1760 ± 50**
 $\delta^{13}C = -26.1\text{‰}$
 Sedge peat, highly humified.

Lu-2043. Negril Morass 7, 340 to 350cm	3190 ± 50
Mangrove peat, slightly humified.	$\delta^{13}C = -26.4\text{‰}$
Lu-2044. Negril Morass 7, 540 to 550cm	4480 ± 60
Mangrove peat, slightly humified.	$\delta^{13}C = -26.0\text{‰}$
Lu-2045. Negril Morass 7, 740 to 750cm	5240 ± 60
Mangrove peat, slightly humified.	$\delta^{13}C = -25.9\text{‰}$
Lu-2046. Negril Morass 7, 940 to 950cm	5910 ± 70
Mangrove peat, slightly humified.	$\delta^{13}C = -26.3\text{‰}$
Lu-2047. Negril Morass 7, 1140 to 1150cm	6670 ± 70
Mangrove peat, slightly humified.	$\delta^{13}C = -27.3\text{‰}$
Lu-2048. Negril Morass 7, 1295 to 1305cm	8070 ± 80
Mangrove peat, highly humified.	$\delta^{13}C = -23.1\text{‰}$
Lu-2049. Negril Morass, at E canal	4370 ± 60
Depth 230 to 240cm. Mangrove peat, highly humified.	$\delta^{13}C = -27.6\text{‰}$
Lu-2050. Negril Morass, 200m W of E canal	4450 ± 60
Depth 305 to 315cm. Mangrove peat, highly humified.	$\delta^{13}C = -27.3\text{‰}$
Lu-2051. Negril Morass, 600m E of Crystal Water	8080 ± 80
Depth 1195 to 1205cm. Mangrove peat, highly humified.	$\delta^{13}C = -26.1\text{‰}$
Lu-2068. Negril Morass, 220 to 230cm	6220 ± 70
Peat. Coll 1981 by M Hendry.	$\delta^{13}C = -27.8\text{‰}$

G. Bahamas

Lu-2100. Bimini, Sample 17	1950 ± 50
Single shell (<i>Strombus</i> sp) from poorly-cemented grainstone forming beach cliff, 2m high, 200m S of "Paradise point," Bimini, NW Bahamas (25° 46' N, 79° 19' W). Coll 1982 by A Strasser and E Davaud; subm by A Strasser, Geol Inst, ETH Zürich, Switzerland. <i>Comment:</i> outer 54% removed by acid leaching. Correction for deviation from $\delta^{13}C = -25\text{‰}$ PDB is applied also for shell samples. No correction is made for apparent age of living marine mollusks caused by reservoir effect.	$\delta^{13}C = +1.6\text{‰}$

II. ARCHAEOLOGIC SAMPLES

A. Sweden

Skateholm Series II

Charcoal from settlement area (Early Ertebølle culture) at Skateholm, Tullstorp parish, S Scania (55° 23' 10" N, 13° 29' E). Coll 1980 and 1981 by L Larsson and B Troy; subm by L Larsson, Inst Archaeol, Univ Lund. Preliminary excavation repts pub by Larsson (1980; 1981). Skateholm II denotes separate settlement discovered in 1981 close to Skateholm (I). For other dates from area, see R, 1982, v 24, p 205-206. All samples pretreated with HCl and NaOH.

Lu-1955. Skateholm (I), Structure 11 **2530 ± 50**
 $\delta^{13}C = -25.0\%$

Charcoal (mainly Pomoideae and *Crataegus* or *Sorbus* sp) id by T Bartholin, from Structure 11 (hearth).

Lu-1985. Skateholm, Structure 19 **2520 ± 55**
 $\delta^{13}C = -23.9\%$

Charcoal (*Fraxinus*) id by T Bartholin, from Structure 19 (hearth).

Lu-1995. Skateholm (I), x=80, y=126 **7000 ± 70**
 $\delta^{13}C = -23.9\%$

Charcoal (*Quercus*, *Corylus avellana*, *Ulmus*, and Pomoideae) id by T Bartholin, from cultural layer; x=80, y=126.

Lu-1956. Skateholm II, x=100, y=100 **5470 ± 105**
 $\delta^{13}C = -25.0\%$

Charcoal from cultural layer; x=100, y=100; depth 50 to 60cm. *Comment*: sample undersized; diluted; 35% sample. (3 1-day counts.)

Lu-1957. Skateholm II, x=100, y=101 **6050 ± 100**
 $\delta^{13}C = -24.5\%$

Charcoal (*Quercus*, *Ulmus*, and *Corylus avellana*) id by T Bartholin, from cultural layer; x=100, y=101; depth 50 to 60cm. *Comment*: sample undersized; diluted; 41% sample. (3 1-day counts.)

Lu-1983. Kams, Gotland **8050 ± 75**
 $\delta^{13}C = -18.0\%$

Collagen from human tibia from destroyed grave at Kams, Lummelunda parish, Gotland (ca 57° 45.7' N, 18° 26' E). Date of colln and name of collector unknown; subm by L Larsson. Expected age: Late Mesolithic (ca 6000 BP). *Comment*: organic carbon content: 5.4%. Collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment.

Lu-1982. Löddesborg 1981 **2730 ± 50**
 $\delta^{13}C = -24.5\%$

Charcoal (*Fraxinus* and *Corylus avellana*) id by T Bartholin, from hearth-pit in settlement area at Löddesborg, W Scania (55° 43' N, 12° 59' E). Coll 1981 and subm by K Jennbert-Spång, Inst Archaeol, Univ Lund. Assoc with transverse arrowhead and flint waste indicating Ertebølle cul-

ture. Dated as complement to Löddesborg series (R, 1982, v 24, p 207). Pretreated with HCl and NaOH.

6280 ± 80

$\delta^{13}C = -23.7\text{‰}$

Lu-1945. Havtäppan

Charcoal from partly wave-washed settlement layer overlain by sand at Havtäppan, Risanäs, S Blekinge (56° 11' N, 15° 16' E). Alt 7.5m. Coll 1972 by T Persson and K-A Björkqvist; subm by R Liljegren, Dept Quaternary Geol, Univ Lund. Artifact assemblage indicates Ertebølle culture (Liljegren, 1982, p 61-62).

Fotevik Series I

Wood from preliminary marine-archaeol study of area with Late Viking-age stone blocking in bay Fotevik, SW Scania (55° 28' N, 12° 56' E). Coll Aug 1981 by O Crumlin-Pedersen; subm by E Cinthio, Inst Archaeol, Univ Lund. Rept of study pub by collector (Crumlin-Pedersen, 1981). Two flint tools were found near blocking indicating human activity in area during Stone age. Samples pretreated with HCl and NaOH.

7380 ± 70

Lu-1999. Fotevik 1a/1981

$\delta^{13}C = -25.2\text{‰}$

Wood from part of oak trunk (No. D1872) with ca 60 annual rings preserved.

7070 ± 70

Lu-2000. Fotevik 3/1981

$\delta^{13}C = -25.2\text{‰}$

Wood from part of oak branch from surface of clay bottom below stones of blocking (Crumlin-Pedersen, 1981, p 27-28).

880 ± 45

Lu-2001. Fotevik 5/1981

$\delta^{13}C = -25.4\text{‰}$

Wood from pole of beech (diam 7 to 9cm) directly below planks of wrecked boat (Crumlin-Pedersen, 1981, p 14, 27-28).

7330 ± 70

Lu-2067. Kungstorp

$\delta^{13}C = -26.2\text{‰}$

Sample from remnants of wooden construction in mouth of small stream near Kungstorp at bay Fotevik, S Scania (55° 26.3' N, 12° 58.3' E). Coll 1982 and subm by L Ersgård, Inst Archaeol, Univ Lund. Pretreated with HCl and NaOH.

5080 ± 60

Lu-2054. Kvarnby 1975, Structure 3

$\delta^{13}C = -24.3\text{‰}$

Charcoal from 4.4m depth in Neolithic flint mine at Kvarnby, S Scania (55° 35' N, 13° 07' E). Coll 1975 and subm by I Håkansson, Inst Archaeol, Univ Lund. For other dates from flint mines in area, see R, 1980, v 22, p 1058; 1981, v 23, p 398. Pretreated with HCl and NaOH.

410 ± 55

Lu-2012. Utvängstorp

$\delta^{13}C = -24.4\text{‰}$

Wood from medieval relic, known as S:t Sigfrid's pilgrim staff, kept in church of Utvängstorp, Mullsjö dist, E Västergötland (58° 02' 30" N,

13° 52' 30" E). Subm by B Hjohlman, Skaraborg Co Mus. *Comment*: no pretreatment; small sample; diluted; 68% sample. (3 1-day counts.)

B. Ireland

Carrowkeel series

Peat and wood from bog in Treanscrabbagh Valley, N of Cairn B and WNW of Cairns C and D of Carrowkeel megalithic cemetery (Burenhult, 1980a, p 112-115), Bricklieve Mts, Co Sligo (54° 03' N, 8° 23' W). Coll Aug 1981 by H Göransson, M Thelaus, and M A Timoney; subm by H Göransson, Dept Quaternary Geol, Univ Lund and G Burenhult, Inst Archaeol, Univ Stockholm. Pollen analysis by H Göransson. Preliminary palynol results reported by Göransson (1981). Dating and palynol are parts of The Carrowmore Project (Burenhult, 1980a; 1980b; 1981). Results of previous study of peat deposits in Treanscrabbagh Valley pub by G F Mitchell (1951). For other dates from area, see R, 1961, v 3, p 28-29. Wood sample coll from surface of minerotrophic peat left after peat-cutting. Peat core coll using Russian-type peat borer. Depths refer to original bog surface at top of remaining peat wall close to sampling point (cf Göransson, 1981, fig 77, p 189).

Lu-1961. Carrowkeel, Sample I **5830 ± 65**
 $\delta^{13}C = -26.5\text{‰}$

Minerotrophic peat, 397.5 to 402.5cm. Temporary decrease of *Quercus*, *Ulmus*, and *Alnus*; strong increase of *Betula* and microscopic charcoal particles. *Comment*: no pretreatment; small sample.

Lu-1962. Carrowkeel, Sample II **5640 ± 65**
 $\delta^{13}C = -26.5\text{‰}$

Minerotrophic peat, 387.5 to 393cm. Very strong temporary increase of *Quercus*; increase of *Ulmus*, *Alnus*, and Gramineae; low *Betula* value. *Comment*: no pretreatment; small sample.

Lu-1963. Carrowkeel, Sample III **5270 ± 60**
 $\delta^{13}C = -26.7\text{‰}$

Minerotrophic peat, 380 to 385cm. Start of *Plantago lanceolata* curve. *Comment*: no pretreatment; small sample.

Lu-1960. Carrowkeel, *Salix* **4010 ± 55**
 $\delta^{13}C = -25.3\text{‰}$

Wood from stump (*Salix*) id by T Bartholin; depth 294cm. *Comment*: pretreated with HCl and NaOH.

Ballygawley Lough series

Gyttja from Ballygawley Lough (see Göransson, 1981, p 181), 5.8km SE of Carrowmore megalithic cemetery and ca 7km S of town of Sligo (54° 12.5' N, 8° 28' W). Coll Aug 1981 by H Göransson and M Thelaus; subm by H Göransson and G Burenhult. Dated as part of same project as Carrowkeel series, above. Depths refer to water surface. Water depth 0.9m at sampling point. No pretreatment; small samples.

Lu-2003. Ballygawley Lough, Sample 1 + 2 **3850 ± 85**
 $\delta^{13}C = -24.9\%$

Algal gyttja (230 to 235cm) and black detritus gyttja (225 to 230cm).
Comment: Samples 1 and 2 were too small to date separately; undersized; diluted; 37% sample. (3 1-day counts.)

Lu-2005. Ballygawley Lough, Sample 3 **2490 ± 110**

Black detritus gyttja, 220 to 225cm. *Comment:* sample undersized; diluted; 22% sample. (3 1-day counts.) No ^{13}C measurement.

Lu-2021. Carrowmore, Strand Hill 1981 **5220 ± 60**
 $\delta^{13}C = -22.8\%$

Peat from deposit exposed at low sea level outside Strand Hill, ca 6km WNW of Carrowmore megalithic cemetery, Co Sligo (54° 16' N, 8° 36' W). Coll 1981 and subm by H Göransson and G Burenhult. For other dates from area, see Carrowmore Series I and II (R, 1981, v 23, p 399-402; 1982, v 24, p 211). Pretreated with HCl.

G. Greece

Lu-2052. Asine, Argolis **2820 ± 50**
 $\delta^{13}C = -24.1\%$

Charcoal from Layer 6b in settlement Area E of acropolis of Asine, Argolis region, NE Peloponnesus (37° 31' 45" N, 22° 52' 30" E). Coll 1972 by S Dietz; subm by B Wells, Dept Classical Studies, Univ Lund. Sample Assoc with Early Protogeometric pottery. Results of excavation will be pub by Wells (ms in preparation). Pretreated with HCl and NaOH.

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