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UNIVERSITY OF LUND RADIOCARBON DATES XV

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INTRODUCTION

Most of the ^{14}C measurements reported here were made between October 1980 and October 1981. 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 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 ($\pm 1\sigma$). When measured activity is less than 2σ above background, minimum age is given. Basis for calculation of age limit is measured net activity plus 3σ. If net activity is negative, only $+3\sigma$ is used for age limit.

Corrections for deviations from $\delta^{13}C = -25.0‰$ in the PDB scale are applied for 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

Hunneberg series (III)

Coarse organic matter (>0.2mm) and mollusk shell fragments washed from sediment from lakes Domsjön (58° 18′ N, 12° 27′ E), Ekelunds Gransjö (58° 19′ N, 12° 25′ E), and Kroppsjön (58° 18′ N, 12° 25′ E) on hill Hunneberg, NW Västergötland. Coll 1980 and subm by G Digerfeldt and S Björck, Dept Quaternary Geol, Univ Lund. For other dates from area,

see R, 1977, v 19, p 425-427; 1981, v 23, p 386-387. Dating is part of study of Late Weichselian shore displacement in area. Isolation of lakes established by diatom analysis. Rept on highest shore-line on Hunneberg pub by Digerfeldt (1979). Series is also of importance for deglaciation chronology (Björck and Digerfeldt, 1981). Depths refer to sediment surface.

Domsjön

All samples consist of coarse organic matter (>0.2mm). Pretreated with HCl.

Lu-1812. Domsjön, 643 to 651cm **11,960 ± 90**
$\delta^{13}C = -16.7‰$

Comment: (3 1-day counts.)

Lu-1813. Domsjön, 651 to 659cm **11,990 ± 90**
$\delta^{13}C = -15.9‰$

Comment: (3 1-day counts.)

Lu-1814. Domsjön, 659 to 667cm **12,140 ± 90**
$\delta^{13}C = -15.7‰$

Comment: (3 1-day counts.)

Lu-1815. Domsjön, 670 to 691cm **12,160 ± 130**
$\delta^{13}C = -18.0‰$

Comment: sample undersized; diluted; 52% sample. (4 1-day counts.)

Ekelunds Gransjö

Lu-1902. Ekelunds Gransjö, Core I **11,870 ± 110**
$\delta^{13}C = -16.3‰$

Coarse organic matter, 664 to 680cm, insoluble fraction. *Comment:* pretreated with HCl and NaOH.

Lu-1902A. Ekelunds Gransjö, Core I **11,750 ± 110**
$\delta^{13}C = -16.2‰$

Acid-precipitated part of NaOH-soluble fraction from Lu-1902, from 664 to 680cm.

Lu-1885. Ekelunds Gransjö, Core I **12,130 ± 100**
$\delta^{13}C = -18.0‰$

Fine detritus, acid-precipitated part of NaOH-soluble matter extr from fraction <0.2mm, from 664 to 680cm. *Comment:* sample undersized; diluted; 88% sample. (3 1-day counts.)

Lu-1903. Ekelunds Gransjö, Core II **12,100 ± 110**
$\delta^{13}C = -0.3‰$

Shell fragments of *Mytilus* from 411 to 422cm. *Comment:* outer 46% removed by acid leaching.

Lu-1904. Ekelunds Gransjö, Core II **11,970 ± 90**
$\delta^{13}C = -0.3‰$

Shell fragments of *Mytilus* from 394 to 404cm. *Comment:* outer 55% removed by acid leaching. (3 1-day counts.)

Kroppsjön

12,170 ± 110

Lu-1906. Kroppsjön, 680 to 689cm $\delta^{13}C = -0.9‰$

Shell fragments of *Mytilus*. *Comment:* outer 43% removed by acid leaching.

12,120 ± 110

Lu-1907. Kroppsjön, 670 to 679cm $\delta^{13}C = -0.5‰$

Shell fragments of *Mytilus*. *Comment:* outer 52% removed by acid leaching.

11,910 ± 110

Lu-1905. Kroppsjön, 660 to 669cm $\delta^{13}C = -16.6‰$

Coarse organic matter, insoluble fraction. *Comment:* pretreated with HCl and NaOH.

11,960 ± 110

Lu-1905A. Kroppsjön, 660 to 669cm $\delta^{13}C = -16.2‰$

Acid-precipitated part of NaOH-soluble fraction from Lu-1905.

12,140 ± 110

Lu-1908. Kroppsjön, 660 to 669cm $\delta^{13}C = -0.3‰$

Shell fragments of *Mytilus*. *Comment:* outer 33% removed by acid leaching.

Bjursjön series

Sediment from Lake Bjursjön (58° 30′ N, 13° 41′ E), E Västergötland. Coll 1980 and subm by G Digerfeldt and S Björck. Dating is part of study of Late Weichselian shore displacement in area. Isolation of lake established by diatom analysis. Depths refer to sediment surface. Pretreated with HCl.

10,620 ± 100

Lu-1829. Bjursjön, 356 to 360cm $\delta^{13}C = -22.9‰$

Clay gyttja.

10,310 ± 100

Lu-1830. Bjursjön, 352 to 356cm $\delta^{13}C = -24.4‰$

Clay gyttja.

Kullsjön series

Sediment from Lake Kullsjön (58° 28′ N, 13° 34′ E), E Västergotland. Coll 1980 and subm by G Digerfeldt and S Björck. Dating is part of same study as Bjursjön series, above. Isolation of lake established by diatom analysis. Depths refer to sediment surface. Pretreated with HCl.

10,480 ± 100

Lu-1831. Kullsjön, 358 to 362cm $\delta^{13}C = -29.6‰$

Clay gyttja.

9720 ± 95

Lu-1832. Kullsjön, 352 to 356cm $\delta^{13}C = -31.4‰$

Clay gyttja.

730 ± 55

Lu-1847. Kårsavagge, insoluble $\delta^{13}C = -24.7‰$

Organic matter from fossil soil horizon below 30 to 40cm unsorted avalanche material S of small lake Kaskamus Kårsavaggejaure (68° 20′ N, 18° 31′ E) in Kårsavagge valley. Alt ca 700m. Coll Aug 1980 and subm by R Nyberg, Dept Phys Geog, Univ Lund. Distribution and geomorphologic effect of slush avalanches in Abisko Mt area were studied by submitter (Nyberg, 1980). *Comment:* pretreated with HCl and NaOH. Sample undersized; diluted; 71% sample.

730 ± 50

Lu-1847A. Kårsavagge $\delta^{13}C = -25.4‰$

Acid-precipitated part of NaOH-soluble fraction from Lu-1847.

Nissunvagge series

Salix twigs from blocky material of old debris flow lobe in Nissunvagge valley (68° 16′ N, 18° 52′ E), Abisko area, N Sweden. Alt ca 1000m. Coll July 1980 by A Rapp and R Nyberg; subm by A Rapp, Dept Phys Geog, Univ Lund. Rept about debris flows in Abisko area pub by Rapp and Nyberg (1981). Samples pretreated with HCl.

$\Delta = -0.7 \pm 5.5‰$

Lu-1851. Nissunvagge, Sample 1 $\delta^{13}C = -29.7‰$

Depth 10cm.

$\Delta = -1.0 \pm 5.5‰$

Lu-1852. Nissunvagge, Sample 2 $\delta^{13}C = -26.8‰$

Depth 15cm.

General Comment: Δ values correspond approx to ^{14}C activity in plant material formed during 1953 to 1955.

510 ± 45

Lu-1877. Svalöv $\delta^{13}C = -21.4‰$

Collagen from horse skull found by well-digging in N part of Svalöv, Scania (55° 55′ N, 13° 06′ E). Coll unknown; subm by E Furuby, Stockholm. Stratigraphy and pollen analysis indicated interglacial age (Lundholm, 1953). Collagen extracted as described previously (R, 1976, v 18, p 290). Organic carbon content: 4.1%.

Southern Baltic series

Wood and gyttja dredged by fisherman from bottom of S Baltic Sea at water depth ca 40m, 5.5km E of Stenshuvud (55° 39′ N, 14° 21′ E). Coll 1981 by H Hjelm, Vitemölla; subm by H Alebo, Kivik. Pretreated with HCl and NaOH.

9660 ± 90

Lu-1900. Southern Baltic 7 $\delta^{13}C = -26.4‰$

Wood from 25 innermost tree rings of pine branch, id by T Bartholin. Branch is part of trunk with ca 45 tree rings.

9680 ± 95

Lu-1901. Southern Baltic 8 $\delta^{13}C = -28.3‰$

Gyttja, with seeds of *Nuphar,* attached to fork of tree dated as Lu-1900, above.

General Comment: dates agree well with previous dates for pine stumps from same area (*cf* R, 1972, v 14, p 386; 1974, v 16, p 310-311; 1976, v 18, p 293).

1280 ± 50

Lu-1762. Höckhultesjön $\delta^{13}C = -26.0‰$

Detritus gyttja, 55 to 57.5cm below sediment surface, from Lake Höckhultesjön, Kristdala parish, S Sweden (57° 23′ N, 16° 07′ E). Coll 1979 and subm by M Aronsson and Th Persson, Dept Quaternary Geol, Univ Lund. Water depth at sampling point 9.9m. Dated level shows increase of *Juniperus* and herbs indicating human activity. Pollen analysis by Th Persson. Pretreated with HCl.

Härön (Herrön) series

Peat from shallow depression in W part of Härön I., W Sweden (58° 01′ N, 11° 29′ E). Coll 1980 and subm by Th Persson. Pollen analysis by submitter. Depths given are below surface. Samples received mild pretreatment with NaOH and HCl.

2150 ± 50

Lu-1943. Härön 2, 68 to 71cm $\delta^{13}C = -26.8‰$

Beginning of strong increase of *Calluna.*

730 ± 45

Lu-1942. Härön 1, 30 to 33cm $\delta^{13}C = -27.0‰$

Further increase of *Calluna.*

12,410 ± 130

Lu-1833. Lilla sjö 1 $\delta^{13}C = -22.7‰$

Silty clay with ca 2.4% organic matter, 8.97 to 9.01m below water surface and underlain by muddy silt in small lake at Hästveda, Scania (56° 17′ N, 13° 55′ E). Coll 1980 and subm by S Björck, Dept Quaternary Geol, Univ Lund. Expected ^{14}C age 11,500 to 12,000 yr BP. *Comment:* pretreated with HCl. Sample undersized; diluted 85% sample.

Åsnen series

Coarse organic matter (>0.2mm) washed from sediment from Lake Åsnen, S Småland. Coll 1981 and subm by S Björck. Dating is part of study of deglaciation chronology of S Sweden. Depths refer to water surface. All samples undersized; diluted. Amount of CO_2 from sample is given in *Comments* below as "% sample". No pretreatment. Burned at <600°C to avoid pyrolysis of carbonates that may be present in untreated samples.

11,020 ± 250

Lu-1916. Herrängsviken 1, Åsnen $\delta^{13}C = -25.9‰$

Coarse detritus, mainly water moss, depth 6.15 to 6.25m, from Herrängsviken (56° 42′ N, 14° 38′ E), Åsnen. *Comment:* 24% sample. (3 1-day counts.)

10,530 ± 360

Lu-1917. Herrängsviken 2 $\delta^{13}C = -24.1‰$

Coarse detritus, mainly water moss, depth 6.05 to 6.15m. *Comment:* 16% sample. (3 1-day counts.)

Lu-1918. Herrängsviken 4 **9100 ± 320**

Coarse detritus, depth 5.85 to 5.95m. *Comment:* 15% sample. (3 1-day counts.) No ^{13}C measurement. Average $\delta^{13}C$ value for Lu-1916 and -1917 was used: $\delta^{13}C = -25.0‰$.

11,070 ± 200

Lu-1920. Sånnahult 1 + 2, Åsnen $\delta^{13}C = -23.0‰$

Coarse detritus, depth 7.27 to 7.37m, underlain by varved clay, off Sånnahult (56° 35′ N, 14° 48′ E), Åsnen. *Comment:* 40% sample.

10,270 ± 130

Lu-1919. Sånnahult 6 $\delta^{13}C = -24.2‰$

Coarse detritus, mainly water moss, depth 7.07 to 7.12m. *Comment:* 70% sample.

B. Greenland

North Greenland Series II

Bivalve shells from *in situ* marine deposits and from redeposited sediments in terminal moraines. Coll 1980 during Swedish Ymer-80 exped and subm by C Hjort, Dept Quaternary Geol, Univ Lund. Samples are related to study of glacial history of NE-most part of Greenland (Funder and Hjort, 1980). Other samples were dated in Lund (R, 1981, v 23, p 390-391) and in Denmark and UK (Funder, in press).

7490 ± 75

Lu-1874. Hanseraks Fjord $\delta^{13}C = +1.0‰$

Shells and fragments *(Mya truncata, Hiatella arctica, Astarte borealis)* from surface of marine silt deposit, alt 20 to 22m, at Hanseraks Fjord, Holms Land (ca 80° 17′ N, 16° 10′ W). *Comment:* outer 25% removed by acid leaching.

5240 ± 60

Lu-1875. Maagegletscher $\delta^{13}C = +0.7‰$

Redeposited shells *(Mya truncata, Hiatella arctica, Astarte borealis, Astarte elliptica)* from terminal moraine in front of Maagegletscher, Holms Land, Ingolfs Fjord (ca 80° 28′ N, 16° 20′ W). *Comment:* outer 20% removed by acid leaching.

4180 ± 60

Lu-1876. Nordostrundingen $\delta^{13}C = +1.7‰$

Redeposited shells *(Mya truncata, Hiatella arctica, Astarte borealis, Astarte elliptica)* from moraines 2km in front of present margin of Flade Isblink ice cap at Nordostrundingen (ca 81° 27′ N, 11° 25′ W). *Comment:* outer 52% removed by acid leaching.

>40,300

Lu-1884:1. Kilen, inner fraction $\delta^{13}C = +0.5‰$

Shells *(Hiatella arctica)* from heavily shell-bearing bed in sandy and silty sequence, 10m thick, reaching 22m in ice-free enclave Kilen (ca 81° 12′ N, 13° W). Sediment sequence was not disturbed by glacial overriding or covered by any glacial deposits. *Comment:* inner fraction (46% of shells) was used. (3 1-day counts.)

Lu-1884:2. Kilen, outer fraction **>39,000**

Outer fraction of shells used for Lu-1884:1. *Comment:* outer fraction was 46% of shells; outermost 8% removed by acid leaching. (4 1-day counts.)

General Comment: corrections for deviations from $\delta^{13}C = -25‰$ PDB are applied also for shell samples. No corrections are made for apparent age of shells of living marine mollusks. Apparent age of recent shells from East Greenland is reported by Hjort (1973) but value given there needs some revision because of better knowledge of ^{14}C activity during last centuries (Stuiver, 1978; Olsson, 1980).

C. Switzerland

10,980 ± 100

Lu-1953. Bardonnex $\delta^{13}C = -25.0‰$

Charcoal of *Pinus* from fossil soil in loess-like deposit at Bardonnex in Basin of Geneva, Switzerland (46° 14′ N, 6° 14′ E). Alt 407m. Coll 1981 by C Reynaud and G Amberger; subm by C Reynaud, Dept Geol, Univ Geneva. Dated as complement to geotechnical study. Pretreated with HCl and NaOH.

D. Czechoslovakia

Bobrov series

Peat from calcitrophic spring mire, 2km NE of the Bobrov village near Dolný Kubín, NE Czechoslovakia (49° 27′ N, 19° 34′ E). Coll 1971 by E and K Rybníček; subm by E Rybníčková, Dept Ecol Bot, Czechoslovak Acad Sci, Brno. Dating is part of palaeoecol study belonging to IGCP Subproject 158B (Berglund, 1979). Peat is classified by submitter as fen-peat with small Ca content for all samples. Estimated ^{14}C ages given below are based on pollen analysis. Lu-1922, -1923, and -1924 are only pretreated with HCl; all other samples are pretreated with HCl and NaOH.

9830 ± 85

Lu-1922. Bobrov OK-1-B, Sample 1 $\delta^{13}C = -26.7‰$

Depth 204 to 206cm. Estimated ^{14}C age: between 10,100 and 10,800 yr BP.

9480 ± 85

Lu-1928. Bobrov OK-1-B, Sample 6 $\delta^{13}C = -26.5‰$

Depth 175 to 178cm. Estimated ^{14}C age: between 9300 and 10,000 yr BP.

9330 ± 85

Lu-1923. Bobrov OK-1-B, Sample 2 $\delta^{13}C = -21.9‰$

Depth 163 to 165cm. Estimated ^{14}C age: between 8500 and 9500 yr BP.

8660 ± 80

Lu-1924. Bobrov OK-1-B, Sample 3 $\delta^{13}C = -26.4‰$

Depth 141 to 144cm. Estimated ^{14}C age: between 7000 and 8500 yr BP.

8510 ± 80

Lu-1925. Bobrov OK-1-B, Sample 7 $\delta^{13}C = -25.7‰$

Depth 128 to 131cm. Insoluble fraction. Estimated ^{14}C age: Between 7000 and 8000 yr BP.

8390 ± 80

Lu-1925A. Bobrov OK-1-B, Sample 7 $\delta^{13}C = -26.0‰$

Acid-precipitated part of NaOH-soluble fraction from Sample 7.

7780 ± 75

Lu-1930. Bobrov OK-1-B, Sample 9 $\delta^{13}C = -26.6‰$

Depth 105 to 107cm. Estimated ^{14}C age: between 6000 and 7000 yr BP.

6880 ± 85

Lu-1926. Bobrov OK-1-B, Sample 4 $\delta^{13}C = -26.9‰$

Depth 77 to 80cm. Insoluble fraction. Estimated ^{14}C age: between 4500 and 6000 yr BP. *Comment:* sample undersized; diluted; 73% sample.

6910 ± 70

Lu-1926A. Bobrov OK-1-B, Sample 4 $\delta^{13}C = -26.9‰$

Acid-precipitated part of NaOH-soluble fraction from Sample 4.

4180 ± 55

Lu-1927. Bobrov OK-1-B, Sample 5 $\delta^{13}C = -25.9‰$

Depth 53 to 55cm. Insoluble fraction. Estimated ^{14}C age: between 1800 and 2500 yr BP.

3940 ± 55

Lu-1927A. Bobrov OK-1-B, Sample 5 $\delta^{13}C = -25.1‰$

Acid-precipitated part of NaOH-soluble fraction from Sample 5.

990 ± 45

Lu-1929. Bobrov OK-1-B, Sample 8 $\delta^{13}C = -25.4‰$

Depth 30 to 32cm. Insoluble fraction. Estimated ^{14}C age: between 500 and 2000 yr BP. *Comment:* date probably too late because of possible contamination with recent root material (*cf* Lu-1929A, below).

1260 ± 45

Lu-1929A. Bobrov OK-1-B, Sample 8 $\delta^{13}C = -25.3‰$

Acid-precipitated part of NaOH-soluble fraction from Sample 8. *Comment:* this date may also be somewhat too late because of downward migration of humic matter (*cf,* eg, Lu-1927A and -1927, above).

Vernérovice series

Samples from mire 0.5km S of village Vernéřovice near Broumov, N Czechoslovakia (50° 06′ N, 16° 15′ E). Alt ca 400m. Coll 1973 by M Peichlová, E Rybníčková, and K Rybníček; subm by M Peichlová, Dept Ecol Bot, Czechoslovak Acad Sci, Brno. Dating is part of same IGCP project as Bobrov series, above. Pollen zones according to Firbas (1949). All samples except Lu-1932 and -1936 undersized; diluted. Amount of CO_2 from sample is given in *Comments* below as "% sample". Sample thickness one cm at all levels.

11,790 ± 170

Lu-1931. Vernérovice BV-2-A, Sample 1 $\delta^{13}C = -25.2‰$

Clay with ca 5% organic carbon content. Depth 173cm. Alleröd pollen zone. *Comment:* pretreated with HCl. 42% sample. (3 1-day counts.)

10,460 ± 100

Lu-1937. Vernérovice BV-2-A, Sample 7 $\delta^{13}C = -26.5‰$

Peat with wood fragments, insoluble fraction. Depth 165cm. Alleröd pollen zone. *Comment:* pretreated with NaOH and HCl. 70% sample. (3 1-day counts.)

10,510 ± 130

Lu-1937A. Vernérovice BV-2-A, Sample 7 $\delta^{13}C = -26.3‰$

Acid-precipitated part of NaOH-soluble fraction from Sample 7. *Comment:* 65% sample.

10,160 ± 90

Lu-1932. Vernérovice BV-2-A, Sample 2 $\delta^{13}C = -26.7‰$

Peat with wood fragments. Depth 160cm. Younger Dryas pollen zone. *Comment:* pretreated with HCl.

10,140 ± 130

Lu-1933. Vernérovice BV-2-A, Sample 3 $\delta^{13}C = -26.5‰$

Peat with wood fragments. Depth 150cm. Younger Dryas pollen zone. *Comment:* pretreated with HCl. 59% sample.

9590 ± 150

Lu-1934. Vernérovice BV-2-A, Sample 4 $\delta^{13}C = -26.5‰$

Peat with wood fragments. Depth 130cm. Pre-Boreal period. *Comment:* pretreated with HCl. 47% sample.

8600 ± 80

Lu-1936. Vernérovice BV-2-A, Sample 6 $\delta^{13}C = -26.1‰$

Woody peat. Depth 90cm. Boreal period. *Comment:* no pretreatment.

5220 ± 75

Lu-1935. Vernérovice BV-2-A, Sample 5 $\delta^{13}C = -25.6‰$

Woody peat. Depth 60cm. Atlantic period. *Comment:* no pretreatment. 75% sample.

E. Jamaica

Black River Morass Series I

Peat from coastal wetland at Black R, S Jamaica (18° 05′ N, 77° 50′ W). Coll 1981 and subm by G Digerfeldt, Lund and E Robinson, Dept Geol, Univ West Indies, Kingston, Jamaica. Dating is part of study of development of coastal wetland. Depths given are below surface. All samples pretreated with HCl.

Black River Morass 1

5870 ± 65

Lu-1880. Black R Morass 1, 610 to 620cm $\delta^{13}C = -22.2‰$

Sedge peat, highly humified.

3690 ± 60

Lu-1882. Black R Morass 1, 280 to 290cm $\delta^{13}C = -24.2‰$

Sedge peat, moderately humified.

Black River Morass 2

4880 ± 60

Lu-1881. Black R Morass 2, 320 to 330cm $\delta^{13}C = -26.0‰$

Sedge peat, moderately humified.

2720 ± 55

Lu-1883. Black R Morass 2, 120 to 130cm $\delta^{13}C = -25.3‰$

Sedge peat, highly humified.

Black River Morass 3

4810 ± 65

Lu-1893. Black R Morass 3, 565 to 578cm $\delta^{13}C = -26.1‰$

Sedge peat, highly humified.

Negril Morass Series I

Peat from coastal wetland at Negril, W Jamaica (18° 20′ N, 78° 20′ W). Coll 1981 and subm by G Digerfeldt and E Robinson. Dating is part of same study as Black River Morass series, above. Depths given are below surface. All samples pretreated with HCl.

Negril Morass 1

5000 ± 65

Lu-1878. Negril Morass 1, 610 to 620cm $\delta^{13}C = -19.1‰$

Mangrove peat, highly humified.

2480 ± 55

Lu-1879. Negril Morass 1, 160 to 170cm $\delta^{13}C = -25.6‰$

Sedge peat, moderately humified.

Negril Morass 2

6510 ± 70

Lu-1892. Negril Morass 2, 1047.5 to 1052.5cm $\delta^{13}C = -26.3‰$

Peat.

5850 ± 70

Lu-1894. Negril Morass 2, 897.5 to 902.5cm $\delta^{13}C = -26.7‰$

Peat.

4580 ± 60

Lu-1891. Negril Morass 2, 597.5 to 602.5cm $\delta^{13}C = -25.2‰$

Peat.

710 ± 50

Lu-1895. Negril Morass 2, 147.5 to 152.5cm $\delta^{13}C = -25.5‰$

Peat.

Negril Morass 3

5730 ± 70

Lu-1896. Negril Morass 3, 897.5 to 902.5cm $\delta^{13}C = -26.2‰$

Peat, moderately humified.

4480 ± 60

Lu-1890. Negril Morass 3, 597.5 to 602.5cm $\delta^{13}C = -25.9‰$

Peat, moderately humified.

II. ARCHAEOLOGIC SAMPLES

A. Sweden

Gårdlösa interlaboratory comparison series

Charcoal from Iron age settlement at Gårdlösa, Smedstorp parish, SE Scania (55° 34′ N, 14° 08′ E). Coll 1963-1964 and subm by B Stjernquist, Hist Mus, Univ Lund. Dated to test probability of systematic difference between dates on samples dated by Lund and Uppsala labs for Gårdlösa research project (Stjernquist, 1981). Pretreated with HCl and NaOH.

1370 ± 40

Lu-1825. Gårdlösa 3, House VII $\delta^{13}C = -24.5‰$

Comment: (3 1-day counts.) Part of same sample dated at Uppsala lab as U-1012; 1490 ± 40 BP (R, 1965, v 7, p 327).

1740 ± 40

Lu-1826. Gårdlösa 3, Hearth 40 $\delta^{13}C = -24.5‰$

Comment: (3 1-day counts.) Part of same sample dated at Uppsala lab as U-534; 1760 ± 80 BP (R, 1967, v 9, p 466).

1660 ± 40

Lu-1827. Gårdlösa 3, Hearth 102 $\delta^{13}C = -24.9‰$

Comment: (3 1-day counts.) Part of same sample dated at Uppsala lab as U-536; 1670 ± 70 BP (R, 1967, v 9, p 466).

General Comment: six samples from different structures were included in comparison and agreement between the two laboratories was very good (Olsson, 1981) indicating that systematic difference is highly unlikely.

Önsvala series (II)

Human bones from Late Roman Iron age and Viking period grave field at Önsvala 5:1, Nevishög parish, S Scania (55° 37′ 30″ N, 13° 13′ 50″

E). Coll 1968 by J Pettersson; subm by L Larsson, Hist Mus, Univ Lund. For other dates from Önsvala, see R, 1973, v 15, p 512. Collagen extracted as described previously (R, 1976, v 18, p 290), including NaOH treatment for Lu-1794 and -1795.

1380 ± 50

Lu-1794. Önsvala 5:1, Structure 02 $\delta^{13}C = -18.8‰$

Collagen from well-preserved human tibia from grave destroyed by gravel exploitation. No assoc artifacts. *Comment:* organic carbon content: 4.9%.

1090 ± 50

Lu-1795. Önsvala 5:1, Structure 03 $\delta^{13}C = -18.1‰$

Collagen from well-preserved human humerus. No assoc artifacts. *Comment:* organic carbon content: 4.3%.

1430 ± 50

Lu-1796. Önsvala 5:1, Structure 7 $\delta^{13}C = -19.0‰$

Collagen from ill-preserved fragments of human femur and skull from undestroyed grave. No grave gifts. *Comment:* sample undersized; diluted; 91% sample. Organic carbon content: 1.3%.

1230 ± 50

Lu-1797. Önsvala 5:1, Structure 12 $\delta^{13}C = -20.1‰$

Collagen from ill-preserved human femur from undestroyed grave. Assoc with glass and amber beads. *Comment:* sample undersized; diluted; 93% sample. Organic carbon content: 2.3%.

1010 ± 60

Lu-1798. Önsvala 5:1, Structure 91 $\delta^{13}C = -20.1‰$

Collagen from various ill-preserved human bone fragments from undestroyed grave. Assoc with sherds of pottery. *Comment:* sample undersized; diluted; 74% sample. Organic carbon content: 3.1%.

990 ± 50

Lu-1800. Önsvala 5:1, Structure 97B $\delta^{13}C = -18.8‰$

Collagen from ill-preserved human femur from undestroyed grave. No grave gifts. *Comment:* sample undersized; diluted; 83% sample. Organic carbon content: 0.9%.

1460 ± 50

Lu-1801. Önsvala 5:1, Structure 116:I $\delta^{13}C = -18.3‰$

Collagen from very well-preserved human femur from partly destroyed grave. Assoc with bronze ring. *Comment:* organic carbon content: 6.6%.

Skateholm Series I

Charcoal, charred hazel-nut shells, and bones from settlement area with grave field (Early Ertebølle culture) ca 600m from Baltic Sea, alt 4 to 6m, at Skateholm, Tullstorp parish, S Scania (55° 23′ 10″ N, 13° 29′ E). Coll May to Sept 1980 and subm by L Larsson. Preliminary results of excavation pub by submitter (Larsson, 1980).

6240 ± 85

Lu-1834. Skateholm, Sample 1 $\delta^{13}C = -20.1‰$

Collagen from ill-preserved human femur from Structure 2 (grave). *Comment:* collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. Sample undersized; diluted; 55% sample. (3 1-day counts.) Organic carbon content: 0.8%.

6290 ± 95

Lu-1835. Skateholm, Sample 2 $\delta^{13}C = -25.5‰$

Charcoal, mainly from below cultural layer; x = 104, y = 117; x = 104, y = 118. Assoc with burned bones. *Comment:* mild pretreatment with HCl and NaOH. Sample undersized; diluted; 63% sample.

5790 ± 70

Lu-1848. Skateholm, Sample 3 $\delta^{13}C = -24.1‰$

Charcoal from cultural layer; x = 104, y = 124. *Comment:* mild pretreatment with HCl and NaOH.

5800 ± 70

Lu-1849. Skateholm, Sample 4 $\delta^{13}C = -23.7‰$

Charcoal from cultural layer; x = 104, y = 121. *Comment:* mild pretreatment with HCl and NaOH.

6020 ± 70

Lu-1853. Skateholm, Sample 5 $\delta^{13}C = -23.1‰$

Charred hazel-nut shells from pit below cultural layer; x = 98, y = 124. *Comment:* pretreated with HCl.

5930 ± 125

Lu-1886. Skateholm, Sample 6 $\delta^{13}C = -24.3‰$

Charcoal from grave structure below cultural layer; x = 100, y = 126. *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 45% sample.

6900 ± 80

Lu-1887. Skateholm, Sample 7 $\delta^{13}C = -26.4‰$

Charcoal from Test Pit A with sandy gyttja. *Comment:* no pretreatment; undersized; diluted; 72% sample. (3 1-day counts.)

6220 ± 100

Lu-1888. Skateholm, Sample 8 $\delta^{13}C = -23.7‰$

Charcoal from Grave 9, Structure 15, below cultural layer. *Comment:* no pretreatment; sample undersized; diluted; 47% sample. (3 1-day counts.)

6640 ± 85

Lu-1802. Bulltoftagården, *Cervus elaphus* $\delta^{13}C = -21.2‰$

Collagen from moderately well-preserved calcaneus and tibia fragment of red deer from Sq 56/14, St 5B, at Bulltoftagården, Malmö, S Scania (55° 35′ 40″ N, 13° 04′ 20″ E). Coll 1973 and subm by L Larsson. Assoc with transverse arrowheads, handle-cores, and blade tools (Late Kongemose culture). Site described by submitter (Larsson, in press). Hazelnut shells from same site were dated at 6660 ± 80 BP (R, 1980, v 22, p

1062). Collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. *Comment:* sample undersized; diluted; 75% sample. Organic carbon content: 3%.

Löddesborg series

Charcoal from settlement area at Skarorna, Löddesborg, W Scania (55° 43′ N, 12° 59′ E). Coll 1964 by C A Mildner and 1966 by P U Hörberg; subm by K Jennbert-Spång, Hist Mus, Univ Lund. Assoc pottery and flints indicate Ertebølle culture.

Lu-1842. Löddesborg, Sample 1 **5260 ± 80** $\delta^{13}C = -30.1‰$

Charcoal from Layer 2UN (clay floor), x = 44.35 to 45.35, y = 205.5 to 206.75. *Comment:* sample received mild pretreatment with NaOH and HCl; undersized; diluted; 69% sample.

Lu-1843. Löddesborg, Sample 2 **1190 ± 50** $\delta^{13}C = -25.3‰$

Charcoal of *Corylus avellana,* id by T Bartholin, from Layer 2, x = 26, y = 129. *Comment:* normal pretreatment with HCl and NaOH.

Lu-1850. Ingelstorp 10, Sample 1:80 **4220 ± 115** $\delta^{13}C = -25.0‰$

Charcoal from offering feature assoc with Grave 4 on Late Neolithic grave field at Ingelstorp 10, Ingelstorp parish, S Scania (55° 25′ N, 14° 03′ E). Coll 1974 and subm by M Strömberg, Hist Mus, Univ Lund. Preliminary excavation rept pub by submitter (Strömberg, 1977). Sample assoc with stone with three cup marks, flint implements, and burned bones. *Comment:* no pretreatment; sample undersized; diluted; 36% sample.

Lu-1854. Hedvigsdal, Sample 2:80 **2480 ± 45** $\delta^{13}C = -24.2‰$

Charcoal from cremation grave (No. 83/F4) at Hedvigsdal, Mållevången, Ingelstorp parish, S Scania (55° 25′ N, 14° 03′ E). Coll 1980 and subm by M Strömberg. Assoc with pieces of resin and burned bones. Archaeol estimate: Late Bronze age/Early Iron age. *Comment:* pretreated with HCl and NaOH. (3 1-day counts.)

Gislöv series

Charcoal and bones from settlement area at Gislöv 7, Ö Nöbbelöv parish, Scania (55° 29′ N, 14° 17′ E). Coll 1980 and subm by M Strömberg. Assoc artifacts indicate Late Vendel period or Viking age. For other date from Gislöv 7, see R, 1980, v 22, p 1062. Bone collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. Charcoal samples pretreated with HCl and NaOH.

Lu-1855. Gislöv 7, Sample 3:80 **1360 ± 50** $\delta^{13}C = -24.3‰$

Charcoal from basal layer in House 1:80. Assoc with pottery, iron and bronze objects, and bones.

1360 ± 50

Lu-1857. Gislöv 7, Sample 5:80 $\delta^{13}C = -19.4‰$

Collagen from rib fragments, small vertebrae, and other bone fragments of domestic animals, id by O Persson, from basal layer in House 1:80. Assoc with pottery and iron and bronze objects. *Comment:* organic carbon content: 2.9%.

1250 ± 50

Lu-1858. Gislöv 7, Sample 6:80 $\delta^{13}C = -19.0‰$

Collagen from ill-preserved bone fragments of domestic animals from upper filling material in House 1:80. Assoc with pottery. *Comment:* organic carbon content: 1.8%.

1180 ± 50

Lu-1856. Gislöv 7, Sample 4:80 $\delta^{13}C = -24.4‰$

Charcoal from hearth N of House 1:80. No artifacts.

Ystad series (II)

Charcoal from settlement area at Block Tankbåten in W part of Ystad town, S Scania (55° 25′ N, 13° 48′ E). Coll 1980 and subm by M Strömberg. Preliminary excavation repts pub by Strömberg (1978; 1980). For other dates from Block Tankbåten, Ystad, see R, 1979, v 21, p 398-399. Artifact assemblage indicates Late Iron age. Samples pretreated with HCl and NaOH.

1640 ± 50

Lu-1859. Kv Tankbåten, Sample 7:80 $\delta^{13}C = -23.8‰$

Charcoal from Hearth 1. Assoc with iron slag and bones.

1490 ± 50

Lu-1860. Kv Tankbåten, Sample 8:80 $\delta^{13}C = -24.2‰$

Charcoal from Hearth 2.

1350 ± 50

Lu-1861. Kv Tankbåten, Sample 9:80 $\delta^{13}C = -24.1‰$

Charcoal from hearth in Pit-house 1:80. Assoc with iron objects, pottery, and bones.

4860 ± 60

Lu-1866. Bronsyxegatan, Structure 1 $\delta^{13}C = -24.2‰$

Charcoal of *Betula* sp, *Fraxinus excelsior, Quercus* sp, and Pomoideae, id by T Bartholin, from refuse pit in Stone age settlement area at Bronsyxegatan, Fosie parish, S Scania (55° 33.5′ N, 13° 02.5′ E). Coll 1969 by B Salomonsson, Malmö Mus; subm by M Larsson. Assoc with flint tools and pottery indicating Funnel-Beaker culture, Face C. *Comment:* no pretreatment; small sample.

Sturup series

Charcoal from Settlement 62 at Sturup 1[88], Börringe parish, Scania (55° 33′ N, 13° 22.5′ E). Coll 1970 by K Christofferson; subm by M Larsson, Hist Mus, Univ Lund. Artifact assemblage indicates Funnel-Beaker culture, Face A.

3420 ± 95

Lu-1864. Sturup 1[88], Sample 1 $\delta^{13}C = -23.4‰$

Charcoal of *Ulmus* sp and *Fraxinus excelsior,* id by T Bartholin, from refuse pit without visible stratigraphy. Assoc with pottery and flint tools. *Comment:* no pretreatment; sample undersized; diluted; 42% sample.

3250 ± 60

Lu-1865. Sturup 1[88], Sample 2 $\delta^{13}C = -24.1‰$

Charcoal from root wood of unid. sp from same refuse pit as Lu-1864, above. *Comment:* mild pretreatment with NaOH and HCl.

General Comment: dates ca 1300 and 1500 yr later than expected.

Yngsjö Series II

Charcoal from coastal settlement area at Yngsjö 1:167, Åhus parish, Scania (55° 54′ 44″ N, 14° 15′ 56″ E). Coll 1980 and subm by J Callmer, Hist Mus, Univ Lund. Dated as complement to Yngsjö Series I (R, 1981, v 23, p 398-399).

1350 ± 60

Lu-1869. Yngsjö 1:167, Sample 1:80 $\delta^{13}C = -23.5‰$

Sample from lower charcoal layer in fill of pit (Structure 5:4). Assoc with glass and metal debris, slag, crucibles, and animal bones. Artifact assemblage indicates Late Vendel period. *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 72% sample.

1910 ± 65

Lu-1870. Yngsjö 1:167, Sample 2:80 $\delta^{13}C = -22.7‰$

Charcoal from hearth (Structure 11) in lower part of cultural layer. Assoc with burned daub and flint. No diagnostic artifacts. *Comment:* no pretreatment; sample undersized; diluted; 64% sample.

1210 ± 75

Lu-1871. Yngsjö 1:167, Sample 3:80 $\delta^{13}C = -24.3‰$

Charcoal from Structure 13 (post-hole). Assoc with daub and flint. No diagnostic artifacts. *Comment:* no pretreatment; sample undersized; diluted; 51% sample.

2360 ± 55

Lu-1872. Yngsjö 1:167, Sample 4:80 $\delta^{13}C = -24.8‰$

Charcoal from Structure 14 (hearth) overlain by Structure 5. No assoc artifacts. *Comment:* no pretreatment; sample undersized; diluted; 94% sample.

1610 ± 80

Lu-1873. Yngsjö 1:167, Sample 5:80 $\delta^{13}C = -24.5‰$

Charcoal from floor level of house (Structure 15:6). Assoc with daub, pottery, and knife. *Comment:* no pretreatment; sample undersized; diluted; 45% sample.

Nymölla series

Finely dispersed charcoal and ash from coastal Pitted Ware culture settlement at Nymölla 12[35], Gualöv parish, NE Scania (56° 02′ N, 14° 28′ E). Coll 1980 and subm by B Wyszomirski, Hist Mus, Univ Lund. Dated as complement to Möllehusen series (R, 1976, v 18, p 309-310). Site described by submitter (Wyzsomirski, 1979). It was not possible to separate charcoal and ash from sand, and samples were too small to allow pretreatment. Burned at <600°C in order to avoid pyrolysis of carbonates that may be present in unseparated samples.

Lu-1909. Nymölla 12[35], Sample 1 **2020 ± 65** $\delta^{13}C = -26.3‰$

Charcoal fragments in sand from cultural layer near hearth, Sq V15. *Comment:* sample undersized; diluted; 63% sample.

Lu-1910. Nymölla 12[35], Sample 2 **1830 ± 50** $\delta^{13}C = -25.7‰$

Charcoal fragments and ash in sand from hearth in cultural layer, Sq V14, x = 13.2, y = 15.5; x = 13.25, y = 15.05; alt ca 3.5m. Assoc with animal bones, yellow ocher, flint implements, and Pitted Ware potsherds.

Lu-1911. Nymölla 12[35], Sample 3 **1930 ± 50** $\delta^{13}C = -24.0‰$

Charcoal fragments and ash in sand from hearth in cultural layer, Sq V14, x = 13.3, y = 15.3; alt ca 3.5m.

Lu-1944. Hembyn, Bursiljum **110 ± 40** $\delta^{13}C = -23.2‰$

Wood (*Pinus* sp) id by T Bartholin, from primitive oarlock found by ditching at Hembyn, Bursiljum, Burträsk parish, Västerbotten (64° 29′ N, 20° 51.5′ E). Coll 1964 by G Marklund; subm by A Huggert, Västerbottens Mus, Umeå. No pretreatment. Sample undersized; diluted; 59% sample. (3 1-day counts.) *Comment:* according to measurements by Stuiver (1978, p 271), 110 ± 40 BP corresponds to AD 1670 to 1740 or AD 1800 to 1940.

Tofta högar series

Charcoal from Bronze and Iron age cult and burial place Tofta Högar, Hovs parish, NW Scania (56° 27′ N, 12° 43′ E). Coll 1979 and subm by G Burenhult, Dept Archaeol, Univ Stockholm. Pretreated with HCl and NaOH. Site described by submitter (Burenhult, 1975).

Lu-1777. Tofta Högar, Wall 2, Structure I **1070 ± 50** $\delta^{13}C = -24.7‰$

Charcoal in rectangular wall with stone foundation.

Lu-1778. Tofta Högar, Wall 2, Structure II **880 ± 50** $\delta^{13}C = -25.1‰$

Charcoal in same wall as Lu-1777, above.

4960 ± 95

Lu-1776. Gladsax No. 18 $\delta^{13}C = -24.8‰$

Charcoal from surface of former soil horizon below large stones in passage grave, Sq 24 and 30; x + 13.0, y + 13.6, at Gladsax No. 18, SE Scania (55° 34′ 20″ N, 14° 16′ 20″ E). Coll 1979 and subm by G Burenhult. No pretreatment; sample undersized; diluted; 53% sample.

B. Denmark

4500 ± 55

Lu-1952. Store Harreskov $\delta^{13}C = -19.6‰$

Collagen from mixture of human and animal bones from below floor of flat stones in megalithic construction "Tre kroner" at Store Harreskov, NW of Copenhagen (55° 46′ N, 12° 17.5′ E). Coll 1980 and subm by E Laumann Jörgensen, Værlöse Mus, Værlöse. Collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. *Comment:* organic carbon content: 4%.

C. Ireland

Carrowmore Series II

Charcoal from settlement remains and grave at Carrowmore area, Co Sligo, Ireland. Coll 1979-81 and subm by G Burenhult, Inst Archaeol, Univ Stockholm. Dated as complement to Carrowmore Series I (R, 1981, v 23, p 399-402). Results of excavations 1977-79 reported by submitter (Burenhult, 1980).

2020 ± 55

Lu-1862. Luffertan, Settlement 8 $\delta^{13}C = -23.7‰$

Charcoal from Settlement 8, Field VIII, at Luffertan (54° 15′ N, 8° 32′ W), x − 30.15, y + 0.8; 60.82m above OD (Burenhult, 1980, p 101; map 15, p 104). *Comment:* no pretreatment; sample undersized; diluted; 89% sample.

1260 ± 50

Lu-1863. Carrowmore, Cist B $\delta^{13}C = -23.1‰$

Charcoal from Cist B, Structure 10, level 52.5 to 52.7m, at Carrowmore Megalithic cemetery (54° 15′ N, 8° 32′ W). *Comment:* pretreated with HCl and NaOH.

4250 ± 75

Lu-1947. Knocknarea North, Hut Site I $\delta^{13}C = -24.6‰$

Charcoal (Samples 9, 10, and 12) from basal cultural layer (floor) at Hut Site I, Knocknarea North (54° 15′ N, 8° 35′ W). Assoc with hollow-scrapers and leaf-shaped arrowhead. *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 47% sample. (3 1-day counts.)

3970 ± 75

Lu-1948. Culleenamore, Settlement 15 $\delta^{13}C = -24.4‰$

Charcoal (Sample 30) from hearth in basal layer of shell midden, 0.95m above OD, Settlement 15, Culleenamore (Burenhult, 1980, p 91). *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 47% sample. (3 1-day counts.)

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