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UNIVERSITY OF LUND RADIOCARBON DATES II

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INTRODUCTION

The C^{14} measurements reported here were made in this laboratory between September 1967 and October 1968.

The measuring technique and equipment, and the treatment of samples were the same as reported previously (Radiocarbon, 1968, v. 10, p. 36-37). Age calculations are based on a contemporary value equal to 0.950 of the activity of the NBS oxalic acid standard and on a half-life for C^{14} of 5568 yr. Results are reported in years before 1950 (years B.P.), and in the A.D./B.C. scale. Errors quoted ($\pm 1\sigma$) include the standard deviations of the count rates for the unknown sample, the contemporary standard, and the background. Calculated errors smaller than 100 yr have been increased by rounding to that figure to take some account of the de Vries effect and the possible error in δC^{13}. Corrections for deviations from the normal C^{13}/C^{12} ratio ($\delta C^{13} = -25.0‰$ in the P.D.B. scale) are applied for all samples. δC^{13} values quoted are relative to the P.D.B. standard.

The description of each sample is based on information provided by the person submitting the sample to the laboratory.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Sweden

Lu-85. Lagaoset — **1030 ± 100** — **A.D. 920** — $\delta C^{13} = -26.3‰$

Sandy peat from river bank in mouth of Lagan R., Halland (56° 33′ N Lat, 12° 57′ E Long). Coll. 1967 and subm. by Harald Svensson, Sci. Res. Council, Stockholm. *Comments* (H.S.): sample dated as part of investigation of former outflow of Lagan R. (S.H): HCl and NaOH pretreatment.

Lu-102. Segevången 3 **6920 ± 100**
4970 B.C.
$\delta C^{13} = -26.9‰$

Small pieces of wood from *Alnus* stub in brushwood peat at Segevången, 4 km NE of Malmö, Scania (55° 37′ N Lat, 13° 04′ E Long). Peat layer rested on muddy clay, ca. 1.5 m above sea level, and was overlain by mud. Owing to selective pollen destruction in part of peat layer, pollen-analytical dating is unreliable (Welinder, 1968). Coll. 1967 and subm. by Stig Welinder, Dept. Quaternary Geol., Univ. of Lund. *Comment*: HCl and NaOH pretreatment.

Lu-104. Dösebacka **+450**
24,020
−425
22,070 B.C.
$\delta C^{13} = -29.3‰$

Silty clay from intermoraine sediments at Dösebacka, 3 km NNE of Kungälv, Bohuslän (57° 54′ N Lat, 11° 54′ E Long). Dösebacka area is described by Alin and Sandegren (1947) and Hillefors (1961). Coll. 1967 and subm. by Åke Hillefors, Dept. Geog., Univ. of Lund. *Comment*: only HCl pretreatment. Sample undersized; diluted with about same amount "dead" CO_2 from anthracite coal. Date based on 10 1-day counts.

Ranviken Bay series

Sediment samples from Ranviken Bay of Lake Immeln, ca. 30 km N of town of Kristianstad, NE Scania (56° 17′ N Lat, 14° 18′ E Long). Coll. 1966-1967 and subm. by Gunnar Digerfeldt, Dept. Quaternary Geol., Univ. of Lund. Datings from Ranviken Bay were carried out in connection with an investigation of postglacial development of the lake and vegetation history of surrounding region (Digerfeldt, 1966). Samples come partly from main profile taken in central and deepest part of bay, partly from complementary profile taken in shallow water closer to shore (Livingstone sampler, diam. 60 mm). Dated samples represent mostly pollen-zone boundaries and characteristic horizons in pollen sequence. Some samples are dated to obtain more accurate determination of rate of sediment deposition during different periods of lake development. Water depth at main profile 110 cm, at complementary profile 90 cm. Depths given in sample titles are below lake water level. All samples pretreated with HCl.

Ranviken Bay, main profile:

Lu-121. Ranviken, 765.0 to 770.0 cm **9850 ± 100**
7900 B.C.
$\delta C^{13} = -27.3‰$

Detritus gyttja. At Pre-Boreal *Betula* maximum. *Comment*: date based on 3 1-day counts.

9450 ± 100
Lu-122. Ranviken, 747.5 to 752.5 cm **7500 B.C.**
$\delta C^{13} = -34.2‰$

Detritus gyttja. Just below rational *Corylus* limit. *Comment*: date based on 3 1-day counts.

9310 ± 110
Lu-123. Ranviken, 742.5 to 747.5 cm **7360 B.C.**
$\delta C^{13} = -31.1‰$

Detritus gyttja. Just above rational *Corylus* limit.

8750 ± 100
Lu-117. Ranviken, 714.0 to 718.0 cm **6800 B.C.**
$\delta C^{13} = -30.4‰$

Detritus gyttja. At rational *Alnus* limit.

8570 ± 100
Lu-118. Ranviken, 709.0 to 714.0 cm **6620 B.C.**
$\delta C^{13} = -31.3‰$

Detritus gyttja. Just above rational *Alnus* limit.

8010 ± 100
Lu-119. Ranviken, 680.0 to 685.0 cm **6060 B.C.**
$\delta C^{13} = -30.2‰$

Detritus gyttja. At empirical *Tilia* limit.

7790 ± 100
Lu-120. Ranviken, 672.5 to 677.5 cm **5840 B.C.**
$\delta C^{13} = -31.2‰$

Detritus gyttja. Just above empirical *Tilia* limit.

7390 ± 100
Lu-193. Ranviken, 640.0 to 645.0 cm **5440 B.C.**
$\delta C^{13} = -30.5‰$

Detritus gyttja. Distinct increase of *Quercus*.

6980 ± 100
Lu-124. Ranviken, 602.5 to 607.5 cm **5030 B.C.**
$\delta C^{13} = -30.5‰$

Detritus gyttja. Distinct further increase of *Quercus*.

6140 ± 100
Lu-194. Ranviken, 545.0 to 550.0 cm **4190 B.C.**
$\delta C^{13} = -30.4‰$

Detritus gyttja.

5840 ± 100
Lu-125. Ranviken, 487.5 to 492.5 cm **3890 B.C.**
$\delta C^{13} = -31.1‰$

Detritus gyttja. Beginning decrease of *Ulmus*.

5420 ± 100
Lu-126. Ranviken, 467.5 to 472.5 cm **3470 B.C.**
$\delta C^{13} = -29.8‰$

Detritus gyttja. Ending decrease of *Ulmus*.

Lu-195. Ranviken, 420.0 to 425.0 cm **4900 ± 100**
2950 B.C.
$\delta C^{13} = -31.0‰$

Detritus gyttja. Just above further increase of *Quercus*.

Lu-196. Ranviken, 350.0 to 355.0 cm **4130 ± 100**
2180 B.C.
$\delta C^{13} = -31.6‰$

Detritus gyttja.

Lu-127. Ranviken, 295.0 to 300.0 cm **3450 ± 100**
1500 B.C.
$\delta C^{13} = -30.8‰$

Detritus gyttja. At empirical *Fagus* limit.

Lu-128. Ranviken, 262.5 to 267.5 cm **2950 ± 100**
1000 B.C.
$\delta C^{13} = -30.4‰$

Detritus gyttja.

Lu-215. Ranviken, 177.5 to 182.5 cm **2310 ± 100**
360 B.C.
$\delta C^{13} = -30.7‰$

Detritus gyttja. Slight further increase of *Fagus*.

Lu-197. Ranviken, 150.0 to 155.0 cm **1880 ± 100**
A.D. 70
$\delta C^{13} = -30.7‰$

Detritus gyttja. Just below rational *Fagus* limit.

Lu-198. Ranviken, 135.0 to 140.0 cm **1260 ± 100**
A.D. 690
$\delta C^{13} = -31.6‰$

Detritus gyttja. Just above rational *Fagus* limit.

Ranviken Bay, complementary profile:

Lu-129. Ranviken, 192.5 to 197.5 cm **2300 ± 100**
350 B.C.
$\delta C^{13} = -29.5‰$

Detritus gyttja. Just below rational *Fagus* limit.

Lu-130. Ranviken, 182.5 to 187.5 cm **1920 ± 100**
A.D. 30
$\delta C^{13} = -29.9‰$

Detritus gyttja. Just above rational *Fagus* limit.

Lu-131. Ranviken, 160.0 to 165.0 cm **1500 ± 100**
A.D. 450
$\delta C^{13} = -31.1‰$

Detritus gyttja. Distinct further increase of *Fagus*.

Lu-132. Ranviken, 137.5 to 142.5 cm **910 ± 100**
A.D. 1040
$\delta C^{13} = -29.9‰$

Detritus gyttja. Distinct decrease of *Carpinus*; culmination of *Fagus*.

750 ± 100

Lu-133. Ranviken, 112.5 to 117.5 cm **A.D. 1200**

$\delta C^{13} = -29.9‰$

Detritus gyttja. Just below rational *Picea* limit.

Trummen series

Continued from Lund I (Radiocarbon, 1968, v. 10, p. 40-43). Sediment samples from Lake Trummen, near city of Växjö, central S Sweden (56° 52′ N Lat, 14° 50′ E Long). Coll. 1966 and subm. by Gunnar Digerfeldt. Pollen zones according to Nilsson (1964). Water depth 150 cm at sampling point. Depths given are below lake water level. HCl pretreatment of all samples.

8940 ± 100

Lu-189. Trummen, 530.0 to 535.0 cm **6990 B.C.**

$\delta C^{13} = -28.0‰$

Detritus gyttja. Beginning decrease of *Pinus* in Pollen Zone BO 1.

8060 ± 100

Lu-190. Trummen, 460.0 to 465.0 cm **6110 B.C.**

$\delta C^{13} = -30.2‰$

Detritus gyttja. Increase of *Quercus* in Pollen Zone BO 2.

6180 ± 100

Lu-191. Trummen, 395.0 to 400.0 cm **4230 B.C.**

$\delta C^{13} = -30.5‰$

Detritus gyttja. Increase of *Quercus* in Pollen Zone AT.

3120 ± 100

Lu-192. Trummen, 255.0 to 260.0 cm **1170 B.C.**

$\delta C^{13} = -29.6‰$

Detritus gyttja. Minimum of *Quercus* in Pollen Zone SB 2.

Kolbengtserödssjön series, 1965

Sediment samples from Lake Kolbengtserödssjön, Bohuslän (58° 15′ N Lat, 11° 57′ E Long). Stratigraphic sequence from top to bottom: 487 cm lacustrine gyttja, 52 cm marine clay gyttja, 24 cm lacustrine gyttja, 39 cm marine clay gyttja, 51 cm lacustrine gyttja, marine clay gyttja and clay. Samples taken with Livingstone sampler, diam. 36 mm. Water depth ca. 7 m at sampling point. Depths given in sample descriptions are below lake water level. Coll. 1965 and subm. by Gösta Persson, Dept. Quaternary Geol., Univ. of Lund.

6810 ± 120

Lu-136. Kolbengtserödssjön B3 **4860 B.C.**

$\delta C^{13} = -30.2‰$

Lacustrine gyttja, 11.67 to 11.77 m. Rational *Tilia* limit at 11.77 m. *Comment*: date based on 3 1-day counts.

Lu-137. Kolbengtserödssjön B4 **6870 ± 125**
4920 B.C.
$\delta C^{13} = -29.8‰$

Lacustrine gyttja, 11.77 to 11.87 m. *Comment*: date based on 3 1-day counts.

Lu-141. Kolbengtserödssjön D4 **8330 ± 115**
6380 B.C.
$\delta C^{13} = -27.9‰$

Lacustrine gyttja, 13.02 to 13.12 m. Rational *Quercus* limit at 13.02 m. *Comment*: date based on 4 1-day counts.

Lu-140. Kolbengtserödssjön D6 **8400 ± 105**
6450 B.C.
$\delta C^{13} = -25.1‰$

Lacustrine gyttja, 13.22 to 13.32 m. Dates rational *Ulmus* limit. *Comment*: date based on 3 1-day counts.

Lu-139. Kolbengtserödssjön D8 **8710 ± 145**
6760 B.C.
$\delta C^{13} = -29.8‰$

Lacustrine gyttja, 13.42 to 13.52 m. Rational *Alnus* limit at 13.52 m. *Comment*: date based on 4 1-day counts. All samples undersized; diluted with "dead" CO_2 from anthracite coal. HCl pretreatment. Two samples of marine clay gyttja were processed but did not yield enough CO_2 for dating.

Kolbengtserödssjön series, 1968

Sediment samples from Lake Kolbengtserödssjön. Stratigraphic sequence from top to bottom: 252 cm lacustrine gyttja, 7 cm marine clay, 3 cm lacustrine gyttja, 2 cm marine sand, 100 cm lacustrine gyttja, 6 cm marine clay, 165 cm lacustrine gyttja, 5 cm marine clay, lacustrine gyttja. Water depth ca. 8 m at sampling point. Depths given in sample descriptions are below lake water level. Samples were taken with Livingstone sampler, diam. 36 mm, ca. 300 m from sampling point for 1965 series. Coll. 1968 and subm. by Gösta Persson. HCl pretreatment.

Lu-216. Kolbengtserödssjön 1 **8020 ± 100**
6070 B.C.
$\delta C^{13} = -29.8‰$

Lacustrine gyttja, 11.22 to 11.37 m. Dates rational *Quercus* limit.

Lu-217. Kolbengtserödssjön 2 **8590 ± 153**
6640 B.C.
$\delta C^{13} = -29.1‰$

Lacustrine gyttja, 11.54 to 11.64 m. Dates rational *Alnus* limit. *Comment*: sample undersized; diluted.

Lu-218. Kolbengtserödssjön 3 **8980 ± 146**
7030 B.C.
$\delta C^{13} = -29.1‰$

Lacustrine gyttja just below marine clay, 13.40 to 13.50 m. Dates Early Boreal marine transgression. *Comment*: sample undersized; diluted.

Vassbosjön series

Sediment samples from Lake Vassbosjön, Bohuslän (58° 16′ N Lat, 12° 00′ E Long). Stratigraphic sequence from top to bottom: 311 cm lacustrine gyttja, 2 cm marine clay, 95 cm lacustrine gyttja, marine clay. Samples taken with Livingstone sampler, diam. 36 mm. Water depth ca. 4 m at sampling point. Depths given in sample descriptions are below lake water level. Coll. 1968 and subm. by Gösta Persson. HCl pretreatment.

Lu-219. Vassbosjön 1 **9750 ± 103**
7800 B.C.
$\delta C^{13} = -26.3‰$

Lacustrine gyttja, 7.85 to 7.95 m. Rational *Corylus* limit at 7.95 m.

Lu-220. Vassbosjön 2 **9700 ± 111**
7750 B.C.
$\delta C^{13} = -26.9‰$

Lacustrine gyttja, 7.95 to 8.05 m.

Ryssjön series

Sediment samples from Lake Ryssjön situated at coast of central Blekinge, SE Sweden (56° 10′ N Lat, 15° 05′ E Long). Alt 3 m; size 300 × 400 m; max. depth 2.3 m; mean depth 1.7 m. Lacustrine sediments are overlying marine gyttja. Investigated to date some horizons in pollen diagram. Samples were cut from core taken with Livingstone sampler (diam. 60 mm). Water depth 170 cm at sampling point. Depths given in sample titles are below lake water level. Pollen zones according to Berglund (1966). Coll. 1967 and subm. by C. E. Nylander and B. E. Berglund, Dept. Quaternary Geol., Univ. of Lund. HCl pretreatment of all samples.

Lu-187. Ryssjön 0, 360 to 365 cm **4110 ± 100**
2160 B.C.
$\delta C^{13} = -21.3‰$

Brackish, clayey detritus gyttja. Just below isolation level in upper part of SB 1.

Lu-147. Ryssjön 1, 342 to 347 cm **3370 ± 100**
1420 B.C.
$\delta C^{13} = -31.1‰$

Lacustrine detritus gyttja. Just above isolation level in lower part of SB 2.

Lu-154. Ryssjön 2, 337 to 342 cm **3230 ± 100**
1280 B.C.
$\delta C^{13} = -30.1‰$

Lacustrine detritus gyttja. Slightly above Ryssjön 1.

Lu-148. Ryssjön 3, 304 to 309 cm **2860 ± 100**
910 B.C.
$\delta C^{13} = -29.8‰$

Lacustrine detritus gyttja. Distinct increase of *Betula*.

Lu-149. Ryssjön 4, 285 to 290 cm **2700 ± 100**
750 B.C.
$\delta C^{13} = -28.6‰$

Lacustrine detritus gyttja. At empiric *Fagus* limit.

Lu-150. Ryssjön 6, 268 to 273 cm **2430 ± 100**
480 B.C.
$\delta C^{13} = -27.6‰$

Lacustrine detritus gyttja. Level with increased cultural activity.

Lu-151. Ryssjön 7, 245 to 250 cm **1960 ± 100**
10 B.C.
$\delta C^{13} = -28.2‰$

Lacustrine detritus gyttja. Just below rational *Fagus* limit.

Lu-155. Ryssjön 8, 240 to 245 cm **1860 ± 100**
A.D. 90
$\delta C^{13} = -32.2‰$

Lacustrine detritus gyttja. Level with increasing *Fagus* values.

Lu-152. Ryssjön 9, 220 to 225 cm **1160 ± 100**
A.D. 790
$\delta C^{13} = -30.1‰$

Lacustrine detritus gyttja. *Fagus* culmination, rational limit of *Juniperus* and increased cultural activity.

Lu-153. Ryssjön 10, 205 to 210 cm **830 ± 100**
A.D. 1120
$\delta C^{13} = -27.9‰$

Lacustrine detritus gyttja. *Juniperus* culmination.

Lu-188. Ryssjön 11, 187 to 192 cm **610 ± 100**
A.D. 1340
$\delta C^{13} = -28.6‰$

Lacustrine detritus gyttja. Decrease of *Juniperus* and empiric limit of *Picea*.

Högestad series

Peat samples from spring mire at Högestad, ca. 11 km NNE of Ystad, Scania (55° 31′ N Lat, 13° 54′ E Long). Site described by Kurck (1922). Coll. 1919 by C. Kurck; subm. by Tage Nilsson, Dept. Quaternary Geol., Univ. of Lund.

Lu-175. Högestad, Layer 2 **9950 ± 100**
8000 B.C.
$\delta C^{13} = -28.9‰$

Highly humified *Amblystegium* peat, almost non-calcareous, from bottom of Layer 2. *Comments* (T.N.): Layer 2 dated by pollen analysis to transition between Scanian Pollen Zones PB and BO 1. (S.H.): HCl pretreatment.

Lu-174. Högestad, Layer 4 **9370 ± 110**
7420 B.C.
$\delta C^{13} = -29.5‰$

Slightly humified *Amblystegium* peat from Layer 4. Thin layers of highly calcareous mud (Swed. *bleke*) were intercalated in peat. *Comments* (T.N.): Layer 4 dated by pollen analysis to upper part of Scanian Pollen Zone BO 1. (S.H.): HCl pretreatment. Sample charred in nitrogen atmosphere prior to burning. Slightly undersized; diluted with "dead" CO_2 from anthracite coal.

Evensås series, fossil marine shells

Shells from 2 shell beds at Evensås on island of Skaftölandet, Bohuslän (58° 16′ N Lat, 11° 30′ E Long). Shell beds described by De Geer (1910), Antevs (1917), and Nilsson (1927). Alt of shell bed Evensås I 35 m; alt of shell bed Evansås III ca. 29 m; distance between shell beds ca. 100 m. Shell bed Evensås III is divided into lower and upper part, with faunas differing from each other and from fauna in Evensås I. Selected thick shells were dated. Coll. 1926 and subm. by Tage Nilsson.

Lu-157. Evensås I, *Littorina* + *Patella*, i **9030 ± 100**
7080 B.C.
$\delta C^{13} = +0.1‰$

Littorina littorea, L. obtusata, and *Patella vulgata* from Evensås I. *Comments* (T.N.): Evensås I contains fairly homogeneous fauna without significant differences among different layers. (S.H.): inner 50% of shell thickness was used.

Lu-158. Evensås I, *Littorina* + *Patella*, o **9040 ± 110**
7090 B.C.
$\delta C^{13} = +2.2‰$

Shell layer surrounding part used for Lu-157. *Comment*: layer corresponds to 34% of shells; 16% removed by acid washing. Sample undersized; diluted with "dead" CO_2 from anthracite coal. Date based on 3 1-day counts.

Lu-159. Evensås I, *Saxicava arctica*, i **11,110 ± 100**
9160 B.C.
$\delta C^{13} = +0.9‰$

Saxicava arctica from Evensås I. *Comment*: inner 47% of shell thickness was used. Date based on 3 1-day counts.

Lu-160. Evensås I, *Saxicava arctica*, o **10,960 ± 115**
9010 B.C.
$\delta C^{13} = +0.9‰$

Shell layer surrounding part used for Lu-159. *Comment*: layer corresponds to 31% of shells; 22% removed by acid washing.

Lu-161. Evensås I, *Mya truncata*, i **11,220 ± 110**
9270 B.C.
$\delta C^{13} = +0.9‰$

Mya truncata from Evensås I. *Comment*: inner 42% of shell thickness was used.

Lu-162. Evensås I, *Mya truncata*, o **10,970 ± 105**
9020 B.C.
$\delta C^{13} = +0.5‰$

Shell layer surrounding part used for Lu-161. *Comment*: layer corresponds to 33% of shells; 25% removed by acid washing.

Lu-163. Evensås III, *Pecten islandicus*, Sample 1 **11,460 ± 115**
9510 B.C.
$\delta C^{13} = +1.9‰$

One well-preserved shell of *Pecten islandicus* from presumably lower part of Evensås III. *Comment*: inner 68% of shell thickness was used.

Lu-164. Evensås III, *Pecten islandicus*, Sample 2 **12,330 ± 125**
10,380 B.C.
$\delta C^{13} = +2.5‰$

One well-preserved shell of *Pecten islandicus* from presumably lower part of Evensås III. *Comment*: inner 90% of shell thickness was used.

General Comments (T.N.): shell beds are now generally realized to be accumulations containing mixed, partly redeposited fauna. Especially the large *Saxicava arctica, Mya truncata,* and *Pecten islandicus,* considered to indicate arctic or subarctic environment, are thought to be redeposited. The first two are ca. 2000 yr older than are *Littorina* and *Patella* from same section. (S.H.): corrections for deviations from normal C^{13}/C^{12} ratio for terrestrial plants ($\delta C^{13} = -25.0‰$ in P.D.B. scale) are applied also for shell samples. No corrections are made for apparent age of sea water (cf. Lu-234 through Lu-236).

Fjärås bräcka series, fossil shells

Shells from S part of Fjärås bräcka, Fjärås parish, 10 km SE of Kungsbacka, Halland (57° 27′ N Lat, 12° 11′ E Long). Layers with shells overlie glaciofluvial gravel and are overlain by laminated sand; alt ca. 56 m. Coll. 1965 by Per Wedel; subm. by Tage Nilsson.

Lu-165. Fjärås bräcka, *Mytilus*, i **13,090 ± 130**
11,140 B.C.
$\delta C^{13} = \pm 0‰$

Mytilus shells from Fjärås bräcka. *Comment*: inner 25% of shell thickness was used.

13,250 ± 135
Lu-166. Fjärås bräcka, *Mytilus*, o **11,300 B.C.**
$\delta C^{13} = -0.3‰$

Shell layer surrounding part used for Lu-165. *Comment*: layer corresponds to 35% of shells; 40% removed by acid washing.

12,850 ± 130
Lu-167. Fjärås bräcka, *Balanus*, i **10,900 B.C.**
$\delta C^{13} = -1.9‰$

Balanus shells from Fjärås bräcka. *Comment*: inner 25% of shell thickness was used.

12,620 ± 130
Lu-168. Fjärås bräcka, *Balanus*, o **10,670 B.C.**
$\delta C^{13} = -3.1‰$

Shell layer surrounding part used for Lu-167. *Comment*: layer corresponds to 38% of shells; 37% removed by acid washing.

12,310 ± 650
Lu-169. Fjärås bräcka, *Balanus*, organic **10,360 B.C.**
$\delta C^{13} = -19.7‰$

Balanus shells from Fjärås bräcka. *Comment*: organic fraction from ca. 1 kg shells was used; yielded ca. 13% of quantity needed for normal filling. Diluted with "dead" CO_2 from anthracite coal. Date based on 3 1-day counts.

General Comments: corrections for deviations form normal C^{13}/C^{12} ratio for terrestrial plants ($\delta C^{13} = -25.0‰$ in P.D.B. scale) are applied also for shell samples and organic shell fraction. No corrections are made for apparent age of sea water (cf. Lu-234 through Lu-236).

11,610 ± 115
Lu-170. Hjälmared, *Balanus* + *Mytilus*, i **9660 B.C.**
$\delta C^{13} = -3.1‰$

Balanus and *Mytilus* shells from Hjälmared, 7 km NE of Kungsbacka, Halland (57° 32′ N Lat, 12° 10′ E Long). Stratigraphic sequence from bottom to top: glaciofluvial gravel, brown varved clay, bluish clay with shells, washed gravel; alt ca. 30 m. Coll. 1968 by Per Wedel; subm. by Tage Nilsson. *Comment*: inner 23% of shell thickness was used.

11,470 ± 110
Lu-171. Hjälmared, *Balanus* + *Mytilus*, o **9520 B.C.**
$\delta C^{13} = -1.5‰$

Shell layer surrounding part used for Lu-170. *Comment*: layer corresponds to 22% of shells; 55% removed by acid washing.

11,590 ± 110
Lu-200. Hjärtumåsen, *Mya truncata*, i **9640 B.C.**
$\delta C^{13} = +0.8‰$

Shells of *Mya truncata* from Hjärtumåsen, Hjärtum parish, Bohuslän (58° 11′ N Lat, 12° 06′ E Long). Shells were from undistinctly varved

gray glacial marine clay, overlying glaciofluvial sand and gravel; alt ca. 80 m. Ref. Hillefors (1968). Coll. 1963 and subm. by Åke Hillefors, Dept. Geog., Univ. of Lund. *Comment*: inner 35% of shell thickness was used.

Lu-199. Hjärtumåsen, *Mya truncata*, o **11,540 ± 100**
9590 B.C.
$\delta C^{13} = +0.2‰$

Shell layer surrounding part used for Lu-200. *Comment*: layer corresponds to 37% of shells; 28% removed by acid washing. Date based on 3 1-day counts.

Contemporary marine shells series

Lu-235. Rörö, *Buccinum undatum* **Apparent Age 410 ± 46**
$\delta C^{13} = -0.5‰$

Buccinum undatum shells from Rörö, N archipelago of Göteborg (57° 47′ N Lat, 11° 37′ E Long). Coll. probably between 1920 and 1940; subm. by Bengt Hubendick, Naturhist. Mus., Göteborg. *Comment*: inner 72% of shell thickness was used.

Lu-234. Rörö, *Balanus* **Apparent Age 370 ± 57**
$\delta C^{13} = -0.5‰$

Small *Balanus* shells found on *Buccinum* shells used for Lu-235. *Comment*: 100% of shells were used. Sample undersized; diluted.

Lu-236. Härön, *Mytilus* **Apparent Age 430 ± 46**
$\delta C^{13} = +0.1‰$

Mytilus shells from Härön, Bohuslän (58° 01′ N Lat, 11° 31′ E Long). Coll. 1968 and subm. by Åke Hillefors. *Comment*: inner 80% of shell thickness was used. Sample taken ca. ½ m below surface of accumulation of clam shells. Clams were used as fishing bait during period 1920 to 1950. *General Comment*: corrections for deviations from normal C^{13}/C^{12} ratio for terrestrial plants ($\delta C^{13} = -25.0‰$ in P.D.B. scale) are applied also for these shell samples. Unaugmented counting errors are given.

Abisko series

Sediment samples (Livingstone core sampler, diam. 36 mm) from Lake Vuolep Njakajaure, near Abisko, Torne Lappmark, N Sweden (68° 20′ N Lat, 18° 45′ E Long). Alt 408 m; size ca. 500 × 600 m. Samples taken from 2 profiles, one 75 to 100 m from SE shore (Gp 1, depth of water 4.45 m), other approx. in middle of lake (Gp 3, depth 12.5 m). Peat samples from mire near lake (Bp 100, 101). Coll. 1963 to 1966 and subm. by Mats Sonesson, Dept. of Plant Ecol., Univ. of Lund. Dating is part of current investigations on vegetational dynamics of Torneträsk area. Dated samples refer to boundaries of pollen zones described by Sonesson (1968). Depths given in sample titles are below water level and surface of mire respectively.

Lu-176. Vuolep Njakajaure, Gp 1, 665 to 675 cm — **9420 ± 130 / 7470 B.C.**

$\delta C^{13} = -29.8‰$

Detritus gyttja. From lower part of Pollen Zone T 1 at mineral substratum. Low frequencies of *Pinus,* high of *Betula,* decreasing *Hippophae* and low frequencies of *Juniperus. Comment*: date based on 3 1-day counts.

Lu-205. Vuolep Njakajaure, Gp 1, 660 to 665 cm — **9240 ± 180 / 7290 B.C.**

$\delta C^{13} = -32.5‰$

Detritus gyttja. From middle part of Zone T 1. Low frequencies of *Pinus,* high of *Betula,* increasing *Juniperus. Comment*: date based on 3 1-day counts.

Lu-177. Vuolep Njakajaure, Gp 1, 600 to 610 cm — **6690 ± 125 / 4740 B.C.**

$\delta C^{13} = -33.1‰$

Detritus gyttja. Distinctly increasing *Pinus,* decreasing *Betula* and *Alnus,* just below Zone Boundary T 2/T 3.

Lu-178. Vuolep Njakajaure, Gp 1, 590 to 600 cm — **6600 ± 100 / 4650 B.C.**

$\delta C^{13} = -33.8‰$

Detritus gyttja. Distinctly increasing *Pinus* and decreasing *Betula,* just above Zone Boundary T 2/T 3. *Comment*: date based on 3 1-day counts.

Lu-179. Vuolep Njakajaure, Gp 1, 505 to 515 cm — **3580 ± 100 / 1630 B.C.**

$\delta C^{13} = -31.6‰$

Detritus gyttja. Distinctly decreasing *Pinus* and increasing *Betula,* just below Zone Boundary T 3/T 4.

Lu-180. Vuolep Njakajaure, Gp 1, 495 to 505 cm — **3360 ± 100 / 1410 B.C.**

$\delta C^{13} = -30.1‰$

Detritus gyttja. Distinctly decreasing *Pinus* and increasing *Betula,* just above Zone Boundary T 3/T 4.

Lu-181. Vuolep Njakajaure, Gp 1, 472 to 482 cm — **2370 ± 100 / 420 B.C.**

$\delta C^{13} = -29.5‰$

Detritus gyttja. Increase of *Pinus,* decrease of *Betula,* at Sub-Zone Boundary T 4a/b.

Lu-201. Vuolep Njakajaure, Gp 3, 1550 to 1563 cm — **8980 ± 100 / 7030 B.C.**

$\delta C^{13} = -30.7‰$

Detritus gyttja. Below rational frequencies of *Alnus* at Zone Boundary T 1/T 2.

Lu-206. Vuolep Njakajaure, Gp 3, 1495 to 1505 cm — **6500 ± 140 / 4550 B.C.**

$\delta C^{13} = -33.2‰$

Detritus gyttja. Distinctly increasing *Pinus,* decreasing *Betula* and *Alnus,* just below Zone Boundary T 2/T 3. *Comment*: only NaOH-soluble fraction used for dating.

Lu-202. Vuolep Njakajaure, Gp 3, 1485 to 1495 cm — **6190 ± 100 / 4240 B.C.**

$\delta C^{13} = -31.3‰$

Detritus gyttja. Distinctly increasing *Pinus* and decreasing *Betula,* just above Zone Boundary T 2/T 3.

Lu-203. Vuolep Njakajaure, Gp 3, 1360 to 1370 cm — **3380 ± 100 / 1430 B.C.**

$\delta C^{13} = -31.3‰$

Detritus gyttja. Distinctly decreasing *Pinus* and increasing *Betula,* just below Zone Boundary T 3/T 4.

Lu-204. Vuolep Njakajaure, Gp 3, 1325 to 1335 cm — **2410 ± 100 / 460 B.C.**

$\delta C^{13} = -32.1‰$

Detritus gyttja. Decrease of *Pinus,* increase of *Betula,* just above Sub-Zone Boundary T 4a/b.

Lu-228. Abisko, Bp 100, 101; 285 to 298 cm — **6330 ± 100 / 4380 B.C.**

$\delta C^{13} = -26.8‰$

Sphagnum peat. Increasing *Pinus,* decreasing *Betula* and *Alnus,* just above mineral substratum. *Comment*: date based on 3 1-day counts.

Lu-229. Abisko, Bp 100, 101; 95 to 115 cm — **2470 ± 100 / 520 B.C.**

$\delta C^{13} = -26.5‰$

Scorpidium peat. Distinctly decreasing *Pinus* and increasing *Betula,* at Zone Boundary T 3/T 4. *Comment*: date based on 3 1-day counts. *Comment on treatment*: all samples except Lu-201 and Lu-202 undersized; diluted with "dead" CO_2 from anthracite coal. HCl pretreatment of all samples. Possibility of contamination with graphite was studied on material just below sample Lu-176 (Sonesson, 1968). In one case (Sample Lu-206) NaOH-soluble fraction was dated for same reason.

Vassijaure series

Peat samples coll. by digging from mire ca. 1 km N of Vassijaure R.R. Sta., Torne Lappmark, N Sweden (68° 25′ N Lat, 18° 20′ E Long). Coll. 1963 and subm. by Mats Sonesson. Dating is part of current investigations on vegetational dynamics of Torneträsk area. Depths given refer to surface of mire.

Lu-182. Vassijaure, 195 to 198 cm, peat **8200 ± 100**
6250 B.C.
$\delta C^{13} = -26.9‰$

Scorpidium peat. Lower limit of peat composed mainly of *Scorpidium scorpioides* and *Calliergon trifarium* (slightly humified), just above mineral substratum. *Comment*: HCl and NaOH pretreatment.

Lu-182A. Vassijaure, 195 to 198 cm, humic acid **8100 ± 100**
6150 B.C.
$\delta C^{13} = -26.9‰$

NaOH-soluble fraction from material used for Lu-182.

Lu-183. Vassijaure, 145 to 146 cm, peat **5860 ± 100**
3910 B.C.
$\delta C^{13} = -26.4‰$

Scorpidium peat. Upper limit of peat composed mainly of *Scorpidium scorpioides* and *Calliergon trifarium* (slightly humified). *Comment*: HCl and NaOH pretreatment.

Lu-183A. Vassijaure, 145 to 146 cm, humic acid **5740 ± 100**
3790 B.C.
$\delta C^{13} = -29.3‰$

NaOH-soluble fraction from material used for Lu-183.

Lu-184. Vassijaure, 120 to 121 cm, peat **4630 ± 100**
2680 B.C.
$\delta C^{13} = -26.8‰$

Sphagnum peat. Decreasing *Pinus* and increasing *Betula*. Lower limit of peat composed mainly of *S. teres* (slightly humified). *Comment*: HCl and NaOH pretreatment.

Lu-184A. Vassijaure, 120 to 121 cm, humic acid **4520 ± 100**
2570 B.C.
$\delta C^{13} = -27.0‰$

NaOH-soluble fraction from material used for Lu-184.

Lu-185. Vassijaure, 80 to 81 cm, peat **4030 ± 100**
2080 B.C.
$\delta C^{13} = -28.5‰$

Sphagnum peat. Empiric *Picea* limit in pollen profile. Upper limit of peat composed mainly of *S. teres* (slightly humified). *Comment*: HCl and NaOH pretreatment.

Lu-185A. Vassijaure, 80 to 81 cm, humic acid **4050 ± 100**
2100 B.C.
$\delta C^{13} = -28.0‰$

NaOH-soluble fraction from material used for Lu-185.

Lu-186. Vassijaure, 10 to 11 cm, peat **101.9 ± 0.6 % modern**
$\delta C^{13} = -30.1‰$

Sphagnum peat. Distinctly decreasing *Pinus* and increasing *Betula*. *Comment*: HCl and NaOH pretreatment.

Lu-186A. Vassijaure, 10 to 11 cm, humic acid **101.2 ± 0.6 % modern**
$\delta C^{13} = -28.3‰$

NaOH-soluble fraction from material used for Lu-186.

B. Norway

Finnmark series, permafrost forms

Continued from Lund I (Radiocarbon, 1968, v. 10, p. 44-45). Peat samples from bottom of polygon furrows from sites in Finnmark, N Norway. Ref. Svensson (1963). Coll. 1967 and subm. by Harald Svensson, Sci. Res. Council, Stockholm.

Lu-115. Båtsfjord, Finnmark, peat **<180**
$\delta C^{13} = -26.6‰$

Peat from bottom of polygon furrow at Båtsfjord, Finnmark (70° 35′ N Lat, 29° 40′ E Long). *Comment*: HCl and NaOH pretreatment; 3σ is used for calculation of age limit.

Lu-115A. Båtsfjord, Finnmark, humic acid **<330**
$\delta C^{13} = -27.9‰$

NaOH-soluble fraction from material used for Lu-115.

Lu-116. Bussesund, Finnmark, peat **4840 ± 100**
2890 B.C.
$\delta C^{13} = -28.0‰$

Peat from bottom of polygon furrow at Bussesund, Finnmark (70° 20′ N Lat, 31° 00′ E Long). *Comment*: HCl and NaOH pretreatment.

Lu-116A. Bussesund, Finnmark, humic acid **4890 ± 100**
2940 B.C.
$\delta C^{13} = -27.6‰$

NaOH-soluble fraction from material used for Lu-116.

II. ARCHAEOLOGIC SAMPLES

Sweden

Gårdlösa series

Charcoal samples from Gårdlösa No. 3, Smedstorp parish, Scania (55° 34′ N Lat, 14° 08′ E Long). Coll. 1963 to 1966 and subm. by Berta Stjernquist, Hist. Mus., Univ. of Lund. Several samples from this site have been dated in Uppsala (Radiocarbon, 1965, v. 7, p. 326-327 and Radiocarbon, 1967, v. 9, p. 465-467). HCl pretreatment of all samples.

1490 ± 100

Lu-90. Gårdlösa 3, House VIII **A.D. 460**

$\delta C^{13} = -24.7‰$

Charcoal from Gårdlösa 3, House VIII, from cultural layer in house foundation. Coll. 1963.

1380 ± 100

Lu-91. Gårdlösa 3, House XIV **A.D. 570**

$\delta C^{13} = -25.1‰$

Charcoal from Gårdlösa 3, House XIV, from house foundation, floor level. Coll. 1964.

1680 ± 100

Lu-92. Gårdlösa 3, House XVII **A.D. 270**

$\delta C^{13} = -25.2‰$

Charcoal from Gårdlösa 3, House XVII, from hearth in house foundation. Coll. 1964.

1470 ± 100

Lu-93. Gårdlösa 3, House XXIII **A.D. 480**

$\delta C^{13} = -22.6‰$

Charcoal from Gårdlösa 3, House XXIII, from cultural layer in house foundation. Coll. 1965.

1260 ± 100

Lu-94. Gårdlösa 3, House XXVI **A.D. 690**

$\delta C^{13} = -24.4‰$

Charcoal from Gårdlösa 3, House XXVI, from hearth in house foundation. Coll. 1965.

1420 ± 100

Lu-95. Gårdlösa 3, House XXXII **A.D. 530**

$\delta C^{13} = -26.9‰$

Charcoal from Gårdlösa 3, House XXXII, from cultural layer in house foundation. Coll. 1965.

1240 ± 100

Lu-96. Gårdlösa 3, House XXXIV **A.D. 710**

$\delta C^{13} = -25.7‰$

Charcoal from Gårdlösa 3, House XXXIV, from cultural layer in house foundation. Coll. 1965.

1450 ± 100

Lu-97. Gårdlösa 3, House XXXV **A.D. 500**

$\delta C^{13} = -26.6‰$

Charcoal from Gårdlösa 3, House XXXV, from hearth in house foundation. Coll. 1965.

1370 ± 100

Lu-98. Gårdlösa 3, House XXXVIII **A.D. 580**

$\delta C^{13} = -26.3‰$

Charcoal from Gårdlösa 3, House XXXVIII, from cultural layer in house foundation. Coll. 1965.

Lu-99. Gårdlösa 3, House XLVIII **1270 ± 100**
A.D. 680
$\delta C^{13} = -24.8‰$

Charcoal from Gårdlösa 3, House XLVIII, from cultural layer in house foundation. Coll. 1964.

Lu-100. Gårdlösa 3, House L **1270 ± 100**
A.D. 680
$\delta C^{13} = -25.1‰$

Charcoal from Gårdlösa 3, House L, from hearth in house foundation. Coll. 1966.

Hagestad series

Continued from Lund I (Radiocarbon, 1968, v. 10, p. 48-50). Samples from excavations at Hagestad, Löderup parish, Scania. Coll. 1961 to 1966 and subm. by Märta Strömberg, Hist. Mus., Univ. of Lund. Investigated area described by submitter (Strömberg, 1961, 1963).

Lu-105. Hagestad No. 19[2], House 1 **1280 ± 100**
A.D. 670
$\delta C^{13} = -25.7‰$

Charcoal from lower floor level, House 1, at Hagestad No. 19[2], on field S of No. 19[3] A (55° 24′ N Lat, 14° 10′ E Long). Coll. 1961.

Lu-106. Hagestad No. 19[2], House 4 **1230 ± 100**
A.D. 720
$\delta C^{13} = -28.2‰$

Charcoal from hearth, House 4, at Hagestad No. 19[2], on field S of No. 19[3] A (55° 24′ N Lat, 14° 10′ E Long). Coll. 1962.

Lu-107. Hagestad No. 19[2], House 5 **1180 ± 100**
A.D. 770
$\delta C^{13} = -25.1‰$

Charcoal from oven, N trench, House 5, at Hagestad No. 19[2], on field S of No. 19[3] A (55° 24′ N Lat, 14° 10′ E Long). Coll. 1962. *Comment*: sample undersized; diluted with "dead" CO_2 from anthracite coal. Date based on 3 1-day counts.

Lu-108. Hagestad No. 38[6], House 1 **1150 ± 100**
A.D. 800
$\delta C^{13} = -26.3‰$

Charcoal from hearth, House 1, at Hagestad No. 38[6], on field SE of No. 38[2] (55° 24′ N Lat, 14° 11′ E Long). Coll. 1966.

Lu-109. Hagestad No. 38[6], House 3 **1050 ± 100**
A.D. 900
$\delta C^{13} = -26.5‰$

Charcoal from hearth, House 3, at Hagestad No. 38[6], on field SE of No. 38[2] (55° 24′ N Lat, 14° 11′ E Long). Coll. 1966. *Comment*: sample undersized; diluted. Date based on 3 1-day counts.

2920 ± 100

Lu-110. Hagestad No. 33⁴ A, Trench 4 **970 B.C.**

$\delta C^{13} = -23.4‰$

Charcoal from hut floor, Trench 4, at Hagestad No. 33⁴ A (55° 24′ N Lat, 14° 11′ E Long). Coll. 1963. *Comment*: sample undersized; diluted. Date based on 3 1-day counts.

1990 ± 100

Lu-111. Hagestad No. 6³ **40 B.C.**

$\delta C^{13} = -24.3‰$

Charcoal from big hearth, at Hagestad No. 6³, on field S of coast rd. (55° 23′ N Lat, 14° 09′ E Long). Coll. 1962.

1880 ± 100

Lu-112. Hagestad No. 6⁴ **A.D. 70**

$\delta C^{13} = -23.7‰$

Charcoal from cultural layer, Square x = −15, y = +20, at Hagestad No. 6⁴ (55° 23′ N Lat, 14° 09′ E Long). Coll. 1962.

2830 ± 100

Lu-113. Hagestad No. 43⁸, Grave 3 **880 B.C.**

$\delta C^{13} = -23.5‰$

Charcoal from Grave 3 (urn grave) at Hagestad No. 43⁸ (55° 23′ N Lat, 14° 08′ E Long). Coll. 1962. *Comment*: sample undersized; diluted. Date based on 3 1-day counts.

1260 ± 100

Lu-114. Hagestad No. 19³ A, Trench 5 **A.D. 690**

$\delta C^{13} = -23.7‰$

Charcoal from Trench 5 at Hagestad No. 19³ A (55° 24′ N Lat, 14° 10′ E Long). Coll. 1961.

General Comments (M.S.): all dates correspond well with archaeologic results. (S.H.): HCl pretreatment of all samples.

Bussevik—Senoren series, submarine blockings

Continued from Lund I (Radiocarbon, 1968, v. 10, p. 50). Wood samples from artificial blockings found in natural channel between Torhamn Peninsula and Senoren I., E Blekinge (56° 07′ N Lat, 15° 47′ E Long). Coll. 1967 and subm. by B. E. Berglund, Dept. Quaternary Geol., Univ. of Lund.

920 ± 100

Lu-143. Bussevik-Senoren 4 **A.D. 1030**

$\delta C^{13} = -25.4‰$

Wood from oak pile. Sample taken from 10 youngest annual rings of 90-yr old trunk.

910 ± 100

Lu-144. Bussevik-Senoren 5 **A.D. 1040**

$\delta C^{13} = -29.5‰$

Wood from oak pile. Sample taken from 10 youngest annual rings of 80-yr old trunk.

Lu-145. Bussevik-Senoren 6 **1000 ± 100**
A.D. 950
$\delta C^{13} = -29.2‰$

Wood from oak pile. Sample taken from 20 youngest annual rings of 130-yr old trunk.

Lu-146. Bussevik-Senoren 7 **910 ± 100**
A.D. 1040
$\delta C^{13} = -27.6‰$

Wood from aspen pile. Sample taken from 10 youngest annual rings of 40-yr old trunk.

General Comments (B.E.B.): new dates confirm older ones. (S.H.): HCl pretreatment. All samples charred in nitrogen atmosphere prior to burning.

Lu-103. Gudahagen, Näsum, human bone **1030 ± 100**
A.D. 920
$\delta C^{13} = -19.4‰$

Collagen from human femur from Gudahagen, Näsum parish, Scania (56° 10′ N Lat, 14° 30′ E Long). Whole skeleton was found in stone cist. Cist was covered by ca. ½ m of gravel and stones. Coll. 1967 and subm. by Claes Wahlöö, Hist. Mus., Univ. of Lund. *Comments* (C.W.): expected age 1000 to 1500 yr. (S.H.): collagen fraction treated with cold 0.5% NaOH solution for extraction of humic acid.

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