

UNIVERSITY OF LUND RADIOCARBON DATES XIX

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INTRODUCTION

Most of the ^{14}C measurements reported here were made between October 1984 and October 1985. 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) except that 23 separate GM-counters used as guard counters were replaced by a single iron multiwire ring-counter filled with $90\text{Ar}/10\text{CH}_4$ to ca 130kPa (ca 1.3atm). Background counts were reduced by ca 12% due to this change. High voltage supply for main detectors was replaced as well.

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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GEOLOGIC SAMPLES

Sweden

Subfossil Pine Series I

Subfossil wood (*Pinus silvestris*) from Bergfors Lakes (68° 10.2' N, 19° 50.2' E) and Abisko Lake (68° 22.2' N, 19° 2.8' E), S of Torneträsk, Lappland.

Coll 1983 and subm by T Bartholin, Lab Wood Anatomy and Dendrochronol, Dept Quaternary Geol, Univ Lund. Trees were found on lake bottom near shore. Dated to help connect different parts of floating pine chronologies for N Sweden. All samples except Lu-2253 and -2254 were charred in nitrogen atmosphere before burning.

Lu-2253. Bergfors Lake 1, Sample 220380 4030 ± 60
 $\delta^{13}C = -25.6\text{‰}$
 Wood from annual rings No. 100 to 147. *Comment:* no pretreatment.

Lu-2254. Bergfors Lake 1, Sample 221170 4100 ± 60
 $\delta^{13}C = -26.2\text{‰}$
 Wood from annual rings No. 5 to 30. *Comment:* no pretreatment.

Lu-2298. Bergfors Lake 1, Sample 22028 3570 ± 60
 $\delta^{13}C = -27.5\text{‰}$
 Wood from annual rings No. 180 to 352. File No. I 14 M. *Comment:* pretreated with NaOH and HCl.

Lu-2299. Bergfors Lake 1, Sample 22029 2910 ± 50
 $\delta^{13}C = -26.4\text{‰}$
 Wood from annual rings No. 100 to 220. File No. I 7 M. *Comment:* pretreated with NaOH and HCl.

Lu-2300. Bergfors Lake 1, Sample 22040 2750 ± 50
 $\delta^{13}C = -27.6\text{‰}$
 Wood from annual rings No. 1 to 20. File No. I 1 M. *Comment:* pretreated with HCl.

Lu-2301. Bergfors Lake 1, Sample 22072 2000 ± 50
 $\delta^{13}C = -26.9\text{‰}$
 Wood from annual rings No. 1 to 25. File No. I 4 M. *Comment:* no pretreatment.

Lu-2302. Bergfors Lake 1, Sample 22095 3150 ± 50
 $\delta^{13}C = -26.5\text{‰}$
 Wood from annual rings No. 50 to 80. File No I 3 M. *Comment:* pretreated with HCl and NaOH.

Lu-2303. Bergfors Lake 4, Sample 22137 3540 ± 60
 $\delta^{13}C = -26.3\text{‰}$
 Wood from annual rings No. 70 to 140. File No. I 13 M. *Comment:* pretreated with NaOH and HCl.

Lu-2304. Bergfors Lake 5, Sample 22173 1760 ± 50
 $\delta^{13}C = -26.6\text{‰}$
 Wood from annual rings No. 1 to 20. File No. I 8 M. *Comment:* pretreated with HCl.

Lu-2305. Bergfors Lake 5, Sample 22176 3390 ± 60
 $\delta^{13}C = -26.7\text{‰}$

Wood from annual rings No. 35 to 95. File No. 1 6 M. *Comment:* pre-treated with HCl.

Lu-2306. Abisko Lake 4, Sample 25045 6050 ± 70
 $\delta^{13}C = -27.8\text{‰}$

Wood from annual rings No. 1 to 22. File No. I 12 M. *Comment:* pre-treated with HCl and NaOH.

Håkulls Mosse series (IV)

Wood fragments from Håkulls Mosse on hill ridge Kullaberg, NW Scania (56° 17' N, 12° 31' E), alt ca 125m. Coll 1983 and subm by G Lemdahl, Dept Quaternary Geol, Univ Lund. Samples taken with piston corer, diam 10cm. Coring Point B8:6. For other dates from Håkulls Mosse, see R, 1978, v 20, p 416–417; 1980, v 22, p 1049–1050; 1984, v 26, p 394–395.

Lu-2354. Håkulls Mosse, H 1 $11,440 \pm 100$
 $\delta^{13}C = -27.0\text{‰}$

Unid. small wood fragments, 401 to 405cm below surface. Early part of Allerød pollen zone according to pollen analysis. *Comment:* no pretreatment.

Lu-2365. Håkulls Mosse, G-I $11,480 \pm 100$
 $\delta^{13}C = -27.6\text{‰}$

Wood (*Salix* sp) id by T Bartholin, 391 to 397cm below surface. Early part of Allerød pollen zone. *Comment:* pretreated with HCl and NaOH.

Åkhultmyren series

Peat from Åkhultmyren, 3km SSW of Aneboda church, Småland (57° 06' N, 14° 32' E). Coll 1983 and subm by G Svensson, Dept Plant Ecol, Univ Lund. Previous study of Åkhultmyren pub by N Malmer (1962). Most samples are from transition bog/mire peat. Depths (cm) refer to mire surface. Von Post humification is given in H1-10 scale. All samples pretreated with HCl and charred in nitrogen atmosphere before burning.

Lu-2389. Åkhultmyren I, 86 to 90 cm 820 ± 45
 $\delta^{13}C = -26.4\text{‰}$

Sphagnum cuspidata-Cyperaceae peat, H 5–6, Coring Point Å 1.

Lu-2390. Åkhultmyren II, 122 to 126cm 1110 ± 45
 $\delta^{13}C = -26.7\text{‰}$

Sphagnum cuspidata peat, H 4, Coring Point Å 1.

Lu-2391. Åkhultmyren III, 97 to 100cm 670 ± 45
 $\delta^{13}C = -26.3\text{‰}$

Sphagnum peat, H5–6, Coring Point Å 2.

Lu-2392. Åkhultsmyren IV, 117 to 120cm 1150 ± 60
 $\delta^{13}C = -22.9\text{‰}$
Sphagnum cuspidata peat, H 3, Coring Point Å 3. *Comment:* sample undersized; diluted; 72% sample.

Lu-2393. Åkhultsmyren V, 70 to 73cm 970 ± 45
 $\delta^{13}C = -25.8\text{‰}$
Sphagnum acutifolia peat, H 3, Coring Point Å 4.

Lu-2394. Åkhultsmyren VI, 134 to 137cm 990 ± 50
 $\delta^{13}C = -25.7\text{‰}$
Sphagnum cuspidata peat, H 5, Coring Point Å 4. *Comment:* sample undersized; diluted; 92% sample.

Eastern Småland series (II)

Sediment from lakes Flågöl (57° 13' N, 16° 20' E), Hörnegöl (57° 10' N, 16° 11' E), Djupeträsk (57° 16' N, 16° 22' E), Bastgöl (57° 13' N, 16° 19' E), and Skvarran (57° 12' N, 16° 09' E), Kalmar län, E Småland. Coll 1984 and 1985 and subm by N-O Svensson, Dept Quaternary Geol, Univ Lund. Dated as complement to Eastern Småland series (R, 1986, v 28, p 141–143). Depths (cm) refer to sediment surface. Samples were taken with Russian-type corer, diam 10cm. All samples pretreated with HCl. Organic carbon content given in *Comments* is calculated from final yield of CO₂ and based on amount of material remaining after pretreatment. Loss of organic carbon during processing of sample and non-proportional loss during pretreatment may result in somewhat lower values than original ones.

Flågöl

Lu-2415. Flågöl 1, 781.5 to 784cm 9570 ± 90
 $\delta^{13}C = -28.7\text{‰}$
 Clay gyttja. *Comment:* organic carbon content: ca 8%.

Lu-2416. Flågöl 2, 750 to 753cm 9360 ± 90
 $\delta^{13}C = -24.2\text{‰}$
 Clay gyttja. *Comment:* organic carbon content: ca 5%.

Hörnegöl

Lu-2417. Hörnegöl 1, 465 to 468cm $10,920 \pm 100$
 $\delta^{13}C = -26.3\text{‰}$
 Muddy clay. *Comment:* organic carbon content: ca 2%.

Lu-2418. Hörnegöl 2, 456 to 459cm $10,380 \pm 90$
 $\delta^{13}C = -24.1\text{‰}$
 Clay gyttja. *Comment:* organic carbon content: ca 3%.

Lu-2419. Hörnegöl 3, 449.5 to 452cm 9880 ± 90
 $\delta^{13}C = -24.8\text{‰}$
 Clay gyttja. *Comment:* organic carbon content: ca 7%.

Djupeträsk

Lu-2479. Djupeträsk 1, 551 to 559.5cm 9190 ± 80
 $\delta^{13}C = 23.0\text{‰}$
 Clay gyttja. Pollen zone boundary BO 1/BO 2. *Comment:* organic carbon content: ca 2.5%.

Lu-2480. Djupeträsk 2, 488 to 492.5cm. 8440 ± 80
 $\delta^{13}C = -29.5\text{‰}$
 Clayey gyttja. Pollen zone BO 2. *Comment:* organic carbon content: ca 6%.

Bastgöl

Lu-2481. Bastgöl 3, 371.5 to 374.5cm 9470 ± 90
 $\delta^{13}C = -24.5\text{‰}$
 Clay gyttja. Preboreal pollen zone. *Comment:* organic carbon content: ca 12%.

Skvarran

Lu-2482. Skvarran 3, 416.5 to 419.5cm $10,320 \pm 90$
 $\delta^{13}C = -22.2\text{‰}$
 Clay gyttja. Younger Dryas pollen zone. *Comment:* organic carbon content: ca 5%.

Lu-2483. Skvarran 5, 399.5 to 402.5cm $10,080 \pm 90$
 $\delta^{13}C = -21.6\text{‰}$
 Fine detritus gyttja. Preboreal pollen zone. *Comment:* organic carbon content: ca 9%.

Kräckelbäcken series

Peat, sediment, and wood from aapamire 3km SW of Kräckelbäcken, Dalarna (61° 32' N, 14° 13' E), alt ca 630m. Coll 1984 and subm by David Foster, Harvard Univ, Petersham, Massachusetts. Dated as part of proj for study of mire development in Dalarna and Västmanland in collaboration with Nils Malmer, Dept Plant Ecol, Univ Lund. Peat and gyttja samples taken with piston corer, diam 10cm.

Lu-2423. Kräckelbäcken, Sample 1 1640 ± 50
 $\delta^{13}C = -25.0\text{‰}$
 Wood of pine root from stump exposed at base of peat along shore of broad pool. Sample depth ca 1m. *Comment:* pretreated with HCl and NaOH.

- Lu-2424. Kräckelbäcken, Sample 2** 3070 ± 50
 $\delta^{13}C = -25.0\text{‰}$
Wood from pine stump at base of peat, exposed along road cut. Stump rooted in mineral soil below 75cm peat. *Comment:* pretreated with HCl and NaOH.
- Lu-2425. Kräckelbäcken, Sample 3** 2920 ± 50
 $\delta^{13}C = -24.9\text{‰}$
Detrital gyttja, 30 to 40cm, above transition sedge peat (below 40cm) and gyttja (0–40cm) in Fen Pool 1. *Comment:* pretreated with HCl and NaOH.
- Lu-2426. Kräckelbäcken, Sample 4** 3510 ± 60
 $\delta^{13}C = -25.5\text{‰}$
Sedge peat, 45 to 50cm, below transition peat/gyttja in Fen Pool 1. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2427. Kräckelbäcken, Sample 5** 3410 ± 60
 $\delta^{13}C = -26.5\text{‰}$
Detrital gyttja, 50 to 55cm, above transition peat/gyttja in Fen Pool 2. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2428. Kräckelbäcken, Sample 6** 1370 ± 45
 $\delta^{13}C = -26.0\text{‰}$
Detrital gyttja, 15 to 20cm, above transition peat/gyttja in shallow part of Fen Pool 2. *Comment:* pretreated with HCl.
- Lu-2429. Kräckelbäcken, Sample 7** 7830 ± 70
 $\delta^{13}C = -27.4\text{‰}$
Basal sedge peat, 133 to 135cm, Core 2. *Comment:* pretreated with HCl.
- Lu-2430. Kräckelbäcken, Sample 8** 6280 ± 70
 $\delta^{13}C = -27.8\text{‰}$
Basal sedge peat, 113 to 115cm, Core 3. *Comment:* pretreated with HCl. Charred in nitrogen atmosphere before burning.
- Lu-2431. Kräckelbäcken, Sample 9** 5880 ± 70
 $\delta^{13}C = -27.8\text{‰}$
Basal sedge peat, 72 to 79cm, Core 4. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2432. Kräckelbäcken, Sample 10** 5410 ± 60
 $\delta^{13}C = -27.3\text{‰}$
Basal peat, 98 to 100cm, Core 5. *Comment:* pretreated with HCl. Charred in nitrogen atmosphere before burning.

- Lu-2433. Kräckelbäcken, Sample 11** 5510 ± 60
 $\delta^{13}C = -27.4\text{‰}$
Basal peat, 98 to 100cm, Core 6. *Comment:* pretreated with HCl. Charred in nitrogen atmosphere before burning.
- Lu-2434. Kräckelbäcken, Sample 12** 4670 ± 60
 $\delta^{13}C = -27.6\text{‰}$
Basal peat, 78 to 80cm, Core 7. *Comment:* pretreated with HCl. Charred in nitrogen atmosphere before burning.
- Lu-2435. Kräckelbäcken, Sample 13** 3640 ± 60
 $\delta^{13}C = -28.1\text{‰}$
Basal peat, 83 to 89cm, Core 8. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning. Sample under-sized; diluted; 82% sample.
- Lu-2436. Kräckelbäcken, Sample 14** 6980 ± 70
 $\delta^{13}C = -27.8\text{‰}$
Basal peat, 94 to 100cm, Core 9. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2437. Kräckelbäcken, Sample 15** 4680 ± 60
 $\delta^{13}C = -28.4\text{‰}$
Peat, 150 to 155cm, below transition peat/gyttja in drained fen pool, Core 10. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2438. Kräckelbäcken, Sample 16** 9040 ± 80
 $\delta^{13}C = -28.0\text{‰}$
Basal peat, 424 to 430cm, Core 11. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2439. Kräckelbäcken, Sample 17** 7840 ± 80
 $\delta^{13}C = -28.1\text{‰}$
Basal peat, 114 to 120cm, Core 12. *Comment:* pretreated with HCl and NaOH. Charred in nitrogen atmosphere before burning.
- Lu-2463. Odensjön, Sample 1, BP 2** $14,800 \pm 180$
 $\delta^{13}C = -43.5\text{‰}$
Water mosses separated from clay gyttja, 514 to 520cm below sediment surface in Odensjön (Rapp, 1984, p 21), Scania (56° 00' 15" N, 13° 16' 45" E). Coll 1984 by B Berglund; subm by B Berglund and T Persson, Dept Quaternary Geol, Univ Lund. Sample taken with piston core sampler, diam 7cm. Water depth at sampling point 18.7m. Dated to confirm suspected hardwater or old groundwater effect shown by dated surface sediment and recent submersed macrophytes (Håkansson, 1977, p 438–440, 1979). Sample from upper part of Allerød pollen zone. No pretreatment; sample

undersized; diluted; 79% sample. *Comment:* date >3000 yr too early because of suspected effects.

3440 ± 60

$\delta^{13}C = -29.6\text{‰}$

Lu-2466. Nässja I, 1984

Muddy, highly humified fen peat, 100 to 105cm below peat surface at Nässja, Östergötland (58° 20' N, 14° 50' E). Coll 1984 by H Göransson and G Lemdahl; subm by H Göransson, Dept Quaternary Geol, Univ Lund. Dated as complement to Dags Mosse series (R, 1983, v 25, p 877–880; 1984, v 26, 393–394). *Comment:* pretreated with HCl.

6130 ± 70

$\delta^{13}C = -31.4\text{‰}$

Lu-2470. Krageholmssjön

Clay gyttja from 690cm below sediment surface in Krageholmssjön, 10km NNW of Ystad, Scania (55° 30' N, 13° 45' E). Coll 1985 and subm by J Regnell, Dept Quaternary Geol, Univ Lund. Sample pooled from same level in 2 cores taken with Livingstone sampler, diam 6cm. Water depth 7.35m at sampling point. Sample just below *Ulmus* decline according to pollen analysis. Dated to look for possible hardwater effect. Pretreated with HCl. *Comment:* hardwater error ca 1000 yr.

Vasasjön series (II)

Peat and gyttja from ancient Vasasjön, ca 4km N of Sövestad, S Scania (55° 32.2' N, 13° 48.3' E). Coll 1982 and subm by M Hjelmroos, Dept Quaternary Geol, Univ Lund. Dated as complement to Vasasjön series (R, 1986, v 28, p 145). Depths given are below present surface. All samples pretreated with HCl and charred in nitrogen atmosphere before burning.

3770 ± 60

$\delta^{13}C = -28.5\text{‰}$

Lu-2471. Vasasjön 1:85, 294 to 296cm

Slightly humified peat.

3840 ± 60

$\delta^{13}C = -29.2\text{‰}$

Lu-2472. Vasasjön 2:85, 353 to 356cm

Slightly humified peat.

4170 ± 60

$\delta^{13}C = -30.8\text{‰}$

Lu-2473. Vasasjön 3:85, 368 to 371cm

Moderately humified peat. Late part of Early Subboreal time according to pollen analysis.

4310 ± 60

$\delta^{13}C = -30.7\text{‰}$

Lu-2474. Vasasjön 4:85, 389 to 391cm

Moderately humified peat. Middle part of Subboreal time.

4360 ± 60

$\delta^{13}C = -32.2\text{‰}$

Lu-2475. Vasasjön 5:85, 407 to 410cm

Moderately to highly humified peat. Middle part of Early Subboreal time.

Lu-2476. Vasasjön 6:85, 432 to 435cm **4630 ± 60**
 $\delta^{13}C = -30.9\text{‰}$

Highly humified peat. First part of Early Subboreal time.

Lu-2477. Vasasjön 7:85, 509 to 510cm **5720 ± 70**
 $\delta^{13}C = -31.8\text{‰}$

Gyttja. Late part of Atlantic time.

Lu-2383. Bysjön **11,220 ± 100**
 $\delta^{13}C = -27.9\text{‰}$

Peat from 8.1 to 8.2m below sediment surface in core from Lake Bysjön, 25km E of Lund, Scania (55° 41' N, 13° 33' E). Coll 1983 and subm by G Digerfeldt, Dept Quaternary Geol, Univ Lund. Peat is overlain by ca 8m lake sediments. Water depth 4.85m at coring point. *Comment:* pretreated with HCl and NaOH.

Bjäresjö series

Peat and gyttja from lake S of Bjäresjö village, 5km NW of Ystad, S Scania (55° 27.5' N, 13° 45.3' E). Coll 1985 and subm by M-J Gaillard, Dept Quaternary Geol, Univ Lund. Dated as part of study of local vegetational changes during last 6000 yr in Ystad area. For previous date from lake, see R, 1983, v 25, p 877. Samples are from Core No. 3, taken with Russian-type corer, diam 10cm. Depts (cm) refer to sediment surface. Water depth ca 1.7m at coring point. All samples pretreated with HCl.

Lu-2486. Bjäresjö 1:85, 369 to 375cm **2680 ± 50**
 $\delta^{13}C = -30.1\text{‰}$

Moderately humified moss peat.

Lu-2487. Bjäresjö 2:85, 361 to 364cm **2690 ± 60**
 $\delta^{13}C = -30.6\text{‰}$

Moderately humified moss peat with remains of Cyperaceae (?). *Comment:* sample undersized; diluted; 77% sample.

Lu-2488. Bjäresjö 3:85, 357 to 360cm **2760 ± 50**
 $\delta^{13}C = -25.8\text{‰}$

Coarse detritus gyttja with many *Potamogeton* fruits and remains of Cyperaceae.

Lu-2489. Bjäresjö 4:85, 302 to 305cm **1810 ± 50**
 $\delta^{13}C = -29.4\text{‰}$

Silty drift gyttja with some sand. Pollen zone SA 1 (Nilsson, 1964).

Lu-2490. Bjäresjö 5:85, 270 to 273cm **1310 ± 45**
 $\delta^{13}C = -29.5\text{‰}$

Drift gyttja (coarse detritus) with fruits of *Potamogeton* and rootlets. Pollen zone boundary SA 1/SA 2.

Lu-2491. Bjäresjö 6:85, 264.5 to 267.5cm **1240 ± 45**
 $\delta^{13}C = -29.3\text{‰}$

Clayey drift gyttja (coarse detritus) with fruits of *Potamogeton*. Pollen zone SA 2.

Iceland

Icelandic Subfossil Marine Shell Series IV

Marine bivalve, gastropod, and balanid shells from W Iceland. Coll 1980 and 1983 and subm by Ó Ingólfsson, Dept Quaternary Geol, Univ Lund. Dated as complement to previous series from area (R, 1983, v 25, p 882; 1984, v 26, p 398–399; 1986, v 28, p 152). Preliminary rept pub by Ingólfsson (1985).

Lu-2371. Árdalsá 2 **12,510 ± 140**
 $\delta^{13}C = -0.2\text{‰}$

Shell fragments (*Balanus* sp, *Nucula tenuis*, *Macoma calcarea*, *Hiatella arctica*, *Mya truncata*) from massive marine silt sequence with sand laminae and occasional dropstones at Árdalsá R, lower part of Borgarfjörður (64° 32' N, 21° 48' W). Mollusks probably *in situ* at ca +47m. *Comment*: outer 14% removed by acid leaching. Sample undersized; diluted; 71% sample.

Lu-2372. Ásbakkar—Ásgil 2 **12,080 ± 120**
 $\delta^{13}C = +1.2\text{‰}$

Shells (*Astarte elliptica*) and shell fragments (*Hiatella arctica*, *Mya truncata*, *Chlamys islandica*) from glacial-marine silt between 2 till beds; ca +3 to 4m at Ásbakkar, N of Akranes (64° 24' N, 22° 02' W). Shells not *in situ*. Sample from same stratigraphic position dated at 11,980 ± 130 BP (Lu-2196; R, 1984, v 26, p 399). *Comment*: outer 13% removed by acid leaching. Sample undersized; diluted; 85% sample.

Lu-2373. Ásbakkar—Ásgil 3 **11,910 ± 140**
 $\delta^{13}C = -0.1\text{‰}$

Shell fragments (*Chlamys islandica*, *Buccinum* sp, *Trophon* sp, *Balanus* sp) from same site and same strat position as Lu-2372, above. *Comment*: outer 10% removed by acid leaching. Sample undersized; diluted; 67% sample.

Lu-2374. Skipanes 2 **12,250 ± 100**
 $\delta^{13}C = +1.2\text{‰}$

Shells (*Hiatella arctica*, *Astarte elliptica*, *Mya truncata*, *Chlamys islandica*, *Macoma calcarea*, *Balanus* sp) from glacial-marine silt below ice-contact complex; +3 to 4m at Skipanes, Melasveit, N of Akranes (64° 24' N, 21° 54' W). Shells probably *in situ*. Sample from top of same sedimentary sequence dated at 10,370 ± 90 BP (Lu-2197; R, 1984, v 26, p 399). *Comment*: outer 27% removed by acid leaching.

Lu-2378. Skipanes 3**10,520 ± 150** $\delta^{13}C = -0.4\text{‰}$

Shells (*Macoma calcarea*, *Mya truncata*, *Tectonatica affinis*) from marine silt; +3 to 4m at Skipanes, N of Akranes (64° 24' N, 21° 54' W). Shells *in situ* in silt deposited after retreat of glaciers from area. Sample from intermediate strat position between Lu-2197 and -2374, above. *Comment*: outer 17% removed by acid leaching. Sample undersized; diluted; 53% sample.

Lu-2375. Melabakkar—Melar 1**12,350 ± 120** $\delta^{13}C = +1.3\text{‰}$

Shell fragments (*Chlamys islandica*, *Mya truncata*, *Balanus balanus*, and unid. sp) from marine silt, +3 to 20m, underlain by till and overlain by littoral sand at Melabakkar, below Melar farm, Melasveit, N of Akranes (64° 25' N, 22° 02' W). Shells not *in situ*. *Comment*: outer 10% removed by acid leaching. Sample undersized; diluted; 88% sample.

Lu-2376. Ásbakkar 2**11,830 ± 100** $\delta^{13}C = +0.8\text{‰}$

Shells (*Mya truncata*, *Hiatella arctica*) from glacial-marine silt, ca +7m, overlain by till complex at Ásbakkar, N of Akranes (64° 24' N, 22° 02' W). Shells probably *in situ*. *Comment*: outer 17% removed by acid leaching.

Lu-2377. Ásbakkar 3**12,310 ± 110** $\delta^{13}C = +0.6\text{‰}$

Shells (*Chlamys islandica*, *Balanus balanus*) and shell fragments (*Hiatella arctica*, *Astarte montagui*, *Trophon* sp, *Balanus* sp) from glacial-marine silt in complex deposits of ice-contact debris; +3 to 4m at Ásbakkar, near Sulunes, N of Akranes (64° 23' N, 22° 01' W). Shells probably not *in situ*. *Comment*: outer 40% removed by acid leaching.

Lu-2379. Ás**12,380 ± 110** $\delta^{13}C = +1.3\text{‰}$

Shells (*Chlamys islandica*) from glacial-marine silt below complex till sequence, ca +25m at Ás in Melasveit, N of Akranes (64° 24' N, 22° 02' W). Shells probably *in situ*. *Comment*: outer 54% removed by acid leaching. *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. Reservoir age for coastal waters of Iceland pub by Håkansson (1983b).

Akranes series

Sandy peat from 0.7 to 3.2m below present high-tide marks at Höfdavik, just N of Akranes (64° 20' N, 22° 04' W). Coll 1983 and subm by Ó Ingólfsson. Samples pretreated with HCl and NaOH.

Lu-2395. Akranes 1**6130 ± 80** $\delta^{13}C = -26.8\text{‰}$

Sandy peat, 295 to 320cm below present high-tide marks. *Comment*: sample undersized; diluted; 75% sample.

Lu-2396. Akranes 2 **1910 ± 90**
 $\delta^{13}C = -26.8\text{‰}$

Sandy peat, 70 to 95cm below present high-tide marks. *Comment:* sample undersized; diluted; 39% sample.

Southern Iceland Series I

Marine bivalve and balanid shells from S Iceland, coll 1982–1983 and subm by A Hjartarsson, Natl Energy Authority, Reykjavík, Iceland. Dated as part of study of Late Weichselian glacial stratigraphy and chronology of low alt areas around R Thjórsá, S Iceland.

Lu-2399. Sogíð, Bíldsfell **9420 ± 80**
 $\delta^{13}C = -0.4\text{‰}$

Two articulated shell pairs (*Cyprina islandica*) from stratified silt outside end moraines of “Grafningur” stage, + ca 20m at Sogíð (64° 03' N, 20° 59' W), near Bíldsfell. *Comment:* outer 30% removed by acid leaching.

Lu-2400. Dynjandi in Brúará **10,190 ± 90**
 $\delta^{13}C = +0.9\text{‰}$

Shells and large fragments (*Mya truncata*) from stratified silt inside end moraines of “Buði” stage (Kjartansson, Thorarinsson & Einarsson, 1964; Norddahl, 1983, p 6), + ca 60m at Dynjandi in Brúará (64° 09' N, 20° 34' W). *Comment:* outer 51% removed by acid leaching.

Lu-2401. Stóra Laxá at Hrepphólar 1 **10,110 ± 140**
 $\delta^{13}C = -1.2\text{‰}$

Small thin shells (*Macoma calcarea*, *Leda Pernula*) *in situ* in stratified silt underlain by till of “Hólakot” stage (Kjartansson, 1943), +65 to 70m at Hrepphólar, Stóra Laxá (64° 03' N, 20° 20' W). *Comment:* outer 10% removed by acid leaching. Sample undersized; diluted; 52% sample.

Lu-2402. Stóra Laxá at Hrepphólar 2 **9960 ± 160**
 $\delta^{13}C = +0.1\text{‰}$

Shell fragments (*Balanus* sp) from till of “Hólakot” stage, + ca 65m at Hrepphólar, Stóra Laxá (64° 03' N, 20° 20' W). Coll May 1982, Sept and Oct 1983. *Comment:* outer 9% removed by acid leaching. Sample undersized; diluted; 44% sample.

Lu-2403. Thjórsá 1 **10,360 ± 90**
 $\delta^{13}C = +0.8\text{‰}$

Shells (*Mya truncata*, *Balanus* sp) from stratified sand bed overlain by till of “Buði” stage (Younger Dryas), + ca 60m between Thràndarholt and Miðhús farms (64° 02' N, 20° 20' W) (Áskelsson, 1934). *Comment:* outer 44% removed by acid leaching.

Lu-2404. Thjórsá 2, near Minnahof **10,220 ± 90**
 $\delta^{13}C = +0.3\text{‰}$

Shells (*Balanus* sp) found *in situ* on tillite overlain by till of “Buði”

stage (Younger Dryas), + ca 65m near Minnahof bei Thjórsá R (64° 01' N, 20° 18' W).

Lu-2405. Rauðalækur, Rangarthing **10,190 ± 130**
 $\delta^{13}C = +0.8\text{‰}$

Shells and fragments (*Chlamys islandica*) from sandy layer in raised delta of Rángárvellir (Kjartansson, 1943) at Rauðalækur, Rangarthing (63° 50' N, 20° 28' W). *Comment:* outer 10% removed by acid leaching. Sample undersized; diluted; 62% sample.

Lu-2406. Ytri-Rangá at Bjarg **10,380 ± 90**
 $\delta^{13}C = +1.0\text{‰}$

Shell fragments (*Hiatella arctica*, *Balanus* sp) from sand layer in raised delta of Rángárvellir, +30 to 35m at Bjarg, Ytri-Rangá (63° 50' N, 20° 25' W). *Comment:* outer 33% removed by acid leaching. *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. Reservoir age for coastal waters of Iceland pub by Håkansson (1983b).

Spitsbergen

Bohemanflya series (II)

Marine bivalve shells from Bohemanflya, Isfjorden, W Spitsbergen. Coll 1984 by members of Univ Lund field expedition to Spitsbergen; subm by C Hjort, Dept Quaternary Geol, Univ Lund. For other dates from area, see R, 1984, v 26, p 399–400.

Lu-2363. Bohemanflya 5 **9650 ± 90**
 $\delta^{13}C = +1.2\text{‰}$

Shells (*Mya truncata*) from solifluction deposit in recent coastal cliff at Bohemanflya (78° 26' N, 14° 40' E); +0 to lm. *Comment:* outer 60% removed by acid leaching.

Lu-2364. Bohemanflya 6 **9950 ± 90**
 $\delta^{13}C = +0.7\text{‰}$

Shells (*Hiatella arctica*) from frostballs on “20m-plane.” Previous date on shell from alt 18 to 20m is 9630 ± 90 BP (Lu-2138; R, 1984, v 26, p 399). *Comment:* outer 64% removed by acid leaching. *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. Revised reservoir age for coastal waters of Spitsbergen pub by Olsson (1980, fig 6, p 673).

German Federal Republic

River Schlei series

Sediment from estuary of R Schlei, near town of Schleswig, Schleswig-Holstein, N Germany (54° 30' 43" N, 9° 33' 06" E). Coll 1981 by T Persson

and M Enell; subm by W Ripl, Dept Limnol, Technol Univ, Berlin. Dated to establish chronology of sediment used for study of environmental changes in area. Coring point in comparatively sheltered position. Water depth 1.5m. Samples taken with Livingstone sampler, diam 6cm. Depths (cm) refer to sediment surface. Samples pretreated with HCl; undersized; diluted.

Lu-2407. R Schlei Estuary 1 **4990 ± 70**
 $\delta^{13}C = -29.5\text{‰}$

Gyttja, 405 to 412.5cm, Sample AP 76–77 and AP 77. *Comment:* 76% sample.

Lu-2446. R Schlei Estuary 2 **4650 ± 80**
 $\delta^{13}C = -28.0\text{‰}$

Gyttja, 305 to 312.5cm, Sample AP 56–57 and AP 57. *Comment:* 58% sample.

Lu-2447. R Schlei Estuary 3 **3560 ± 80**
 $\delta^{13}C = -27.6\text{‰}$

Gyttja, 235 to 242.5cm, Sample AP 42–43 and AP 43. *Comment:* 58% sample.

Lu-2408. R Schlei Estuary 4 **2350 ± 50**
 $\delta^{13}C = -29.5\text{‰}$

Gyttja, 145 to 152.5cm, Sample AP 24–25 and AP 25. *Comment:* 91% sample.

Bulgaria

Lake Blatniza Series II

Sediment and peat from Lagoon-lake Blatniza (Durankulak), W shore of Black Sea, NE Bulgaria (43° 15' 04" N, 28° 23' 02" E). Coll Aug 1982 by E Bozilova, Biol Fac, Univ Sofia; subm by B Berglund. Dated as complement to Lake Blatniza Series I (R, 1986, v 28, p 153–154). Depths refer to sediment surface. Samples pretreated with HCl.

Lu-2381. Lake Blatniza, 400 to 420cm **6170 ± 150**
 $\delta^{13}C = -26.0\text{‰}$

Calcareous gyttja with small organic content. NAP pollen (*Artemisia*, Chenopodiaceae, Poaceae) dominating. Sample pooled from 2 core pieces (diam ca 2.5cm) from same level. *Comment:* prolonged HCl treatment necessary for removal of carbonates. Sample undersized; diluted; 33% sample.

Lu-2382. Lake Blatniza, 200 to 215cm **2290 ± 50**
 $\delta^{13}C = -24.7\text{‰}$

Phragmites peat. Pollen of *Quercetum mixtum*, Chenopodiaceae, Poaceae, and Asteraceae indicating Subatlantic time.

Czechoslovakia

Zlatnická dolina series

Samples from peat bog ca 5km NW of village of Mútné, near Dolný Kubín (district town), NE Czechoslovakia (49° 31' N, 19° 17' E), alt ca 860m. Coll 1977 by E Rybníčková and K Rybníček; subm by E Rybníčková, Bot Inst, Czechoslovak Acad Sci, Brno. For other dates from area, see Bobrov series (R, 1982, v 24, p 200–201; 1986, v 28, p 153). All samples pretreated with HCl. Depths refer to present bog surface. Core designation OK-9-A. Pollen zones after Firbas (1949).

Lu-2410. Zlatnicka dolina, 330 to 335cm **7450 ± 130**
 $\delta^{13}C = -28.4\text{‰}$

Moderately humified clayey peat with small wood fragments. Older than Atlantic period (9000–7000 BP). *Comment:* sample undersized; diluted; 46% sample.

Lu-2411. Zlatnicka dolina, 299 to 303cm **6060 ± 70**
 $\delta^{13}C = -27.5\text{‰}$

Highly humified peat with small clay content. Pollen zone AT 2.

Lu-2412. Zlatnicka dolina, 270 to 272cm **4300 ± 70**
 $\delta^{13}C = -27.1\text{‰}$

Moderately humified *Carex* peat. Beginning of closed *Abies* pollen curve. Subboreal pollen zone. *Comment:* sample undersized; diluted; 80% sample.

Lu-2413. Zlatnicka dolina, 248 to 250cm **3800 ± 60**
 $\delta^{13}C = -28.0\text{‰}$

Moderately humified *Carex* peat with *Phragmites* and *Equicetum*. Lower boundary of Older Subatlantic pollen zone. First traces of human activity in area. *Comment:* >1000 yr older than expected.

Lu-2414. Zlatnicka dolina, 48 to 50cm **1030 ± 45**
 $\delta^{13}C = -27.4\text{‰}$

Eriophorum peat with many rootlets. Boundary between Younger and Older Subatlantic pollen zones. Beginning of closed pollen curve of *Cerealia*; decrease of *Abies* pollen percentages.

Jamaica

Black River Morass Series III

Peat from coastal wetland at Black R, S Jamaica (18° 05' N, 77° 50' W). Coll 1982 and subm by G Digerfeldt, Dept Quaternary Geol, Univ Lund. Dated as complement to Black River Morass series (R, 1982, v 24, p 203; 1984, v 26, p 401–404). Depths given are below present surface. Pretreated with HCl.

Lu-2440. Black R Morass, B 14, 55 to 65cm $\Delta_{(\text{NBS } 1950)} = -8.0 \pm 5.1\text{‰}$
 $\delta^{13}\text{C} = -25.9\text{‰}$

Moderately humified sedge peat. *Comment:* modern sample. For definition of $\Delta_{(\text{NBS } 1950)}$, see R, 1981, v 23, p 394.

Lu-2441. Black R Morass, B 3, 140 to 150cm $\delta^{13}\text{C} = -25.8\text{‰}$
 3850 ± 60

Moderately humified sedge peat.

ARCHAEOLOGIC SAMPLES

Sweden

Lu-2384. Kroknäs, SM 6250 $\delta^{13}\text{C} = -25.8\text{‰}$
 4200 ± 60

Wood (*Pinus* sp) id by T Bartholin, from paddle from Kroknäs, Skellefteå, N Sweden (64° 32' N, 21° 12' E). Coll before 1945 by workers during ditching; subm by P Gustafsson, Skellefteå Mus, Skellefteå. Paddle seems to be worked by stone tools and old notes about pollen analysis indicated "transition Stone/Bronze Age." *Comment:* pretreated with HCl and NaOH.

Kämpinge series

Charcoal from excavation of Medieval settlement area probably connected with adjacent earthwork (wall) built of turf and stone in 2 stages at Kämpinge village, 5km S of Foteviken, SW Scania (55° 24' N, 12° 59' E). Coll 1983 and subm by L Ersgård, Inst Archaeol, Univ Lund. Study is continuation of survey work 1982 at Foteviken (R, 1983, v 25, p 888; 1984, v 26, p 408–409). All samples pretreated with HCl and NaOH.

Lu-2385. Kämpinge 1:1983 $\delta^{13}\text{C} = -26.0\text{‰}$
 1000 ± 45
 Charcoal from cultural layer, Tr C.

Lu-2386. Kämpinge 2:1983 $\delta^{13}\text{C} = -26.2\text{‰}$
 900 ± 45
 Charcoal from hearth, Tr C.

Lu-2387. Kämpinge 3:1983 $\delta^{13}\text{C} = -26.4\text{‰}$
 850 ± 45
 Sample from charcoal concentration at basal part of cultural layer, Tr C.

Lu-2388. Kämpinge Sandeplan 4:1983 $\delta^{13}\text{C} = -25.8\text{‰}$
 2970 ± 50
 Charcoal from cultural layer at Kämpinge Sandeplan (55° 25' N, 12° 59' E). Assoc with artifact assemblage indicating Bronze Age.

Skateholm Series V

Charcoal from settlement area and grave field (Early Ertebølle culture) at Skateholm, Tullstorp parish, S Scania (55° 23' N, 13° 29' E). Coll 1983–1984; subm by L Larsson, Inst Archaeol, Univ Lund. Dated as complement to previous Skateholm series (R, 1982, v 24, p 205–206; 1983, v 25, p 887; 1984, v 26, p 405–406; 1986, v 28, p 155).

Lu-2443. Skateholm II, Grave IX **5460 ± 110**
 $\delta^{13}C = -25.1\text{‰}$

Charcoal assoc with Construction 17, Grave IX (Larsson, 1983, p 28). Coll 1983 by R Ristmar. *Comment:* no pretreatment; sample undersized; diluted; 41% sample.

Lu-2444. Skateholm II, Grave XV **5900 ± 140**
 $\delta^{13}C = -25.8\text{‰}$

Charcoal from Construction 33, Grave XV (Larsson, 1984, p 62–64). Coll 1984 by A Götz. *Comment:* no pretreatment; sample undersized; diluted; 21% sample. (4 1-day counts.)

Lu-2445. Skateholm II, Construction 16 **5660 ± 110**
 $\delta^{13}C = -25.6\text{‰}$

Charcoal from Construction 16, above grave. Coll 1983 by A Götz. *Comment:* no pretreatment; sample undersized; diluted; 33% sample. (3 1-day counts.)

Lu-2478. Skateholm II, Construction III **6300 ± 100**
 $\delta^{13}C = -25.5\text{‰}$

Charcoal from Construction III. Coll 1984 by A Carlie. *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 43% sample. (3 1-day counts.)

Bredasten series

Charcoal from settlement area (Ertebølle culture) at Bredasten, E part of Öja-Herrestad mosse, ENE of Ystad (55° 27' N, 13° 55.5' E). Coll 1984 by M Larsson and A Carlie; subm by L Larsson. Assoc artifact assemblage indicates about same age as for earliest use of Skateholm I (Larsson, 1984, p 76). Samples received mild pretreatment with NaOH and HCl.

Lu-2420. Bredasten, Construction 14 **5340 ± 70**
 $\delta^{13}C = -25.7\text{‰}$

Charcoal (*Fraxinus*, *Prunus*, *Corylus*, *Alnus*, & *Pomoideae*) id by T Bartholin, from Construction 14, lower layer. *Comment:* sample undersized; diluted; 77% sample.

Lu-2422. Bredasten, Construction 4 **5170 ± 60**
 $\delta^{13}C = -27.2\text{‰}$

Charcoal (*Corylus*, *Alnus*, *Pinus*, *Fraxinus*, *Prunus*, & *Pomoideae*) id by T Bartholin, from Sq F, Construction 4 (“Ringen”).

General Comment (LL): dates younger than expected judging from assoc archaeol finds.

Östra Vemmenhög series (II)

Charcoal from settlement area at Ö Vemmenhög 7:40, S Scania (55° 23' 30" N, 13° 29' 20" E). Coll 1984 and subm by L Larsson. Samples are from cultural layer with artifact assemblage indicating Funnel Beaker culture, Middle Neolithic Period IV. For other dates from Ö Vemmenhög, see R, 1986, v 28, p 155–156. Pretreated with HCl and NaOH.

Lu-2397. Ö Vemmenhög 7:40/1 **4130 ± 70**
 $\delta^{13}C = -26.3\text{‰}$

Charcoal from Sq x = 104, y = 119. Assoc with pottery and flint artifacts.

Lu-2398. Ö Vemmenhög 7:40/2 **3470 ± 60**
 $\delta^{13}C = -26.4\text{‰}$

Charcoal from Sqs x = 104, y = 117; x = 104, y = 118. Assoc with pottery and flint artifacts. *Comment* (LL): younger than expected.

Lu-2464. St Beddinge, No. 27476:N **3740 ± 60**
 $\delta^{13}C = -21.1\text{‰}$

Collagen from human bone from grave at St Beddinge, S Scania (55° 23' N, 13° 27' E). Coll 1936 by F Hansen; subm by L Larsson. Grave finds indicate Battle Axe culture (Malmer, M P, 1962). *Comment*: organic carbon content: 1%. Collagen extracted as described previously (R, 1976, v 18, p 290) without NaOH treatment. Sample undersized; diluted; 91% sample.

St Köpinge Series II

Charcoal from Bronze and Iron Age sites in St Köpinge parish, S Scania. Dated as complement to St Köpinge Series I (R, 1986, v 28, 156–158). Coll 1979 and 1982 (Lu-2449) and subm by S Tesch, Inst Archaeol, Univ Lund. Charcoal id by T Bartholin, Dept Quaternary Geol, Univ Lund.

Lu-2451. Köpinge 15:22, A 333 **1250 ± 45**
 $\delta^{13}C = -27.5\text{‰}$

Charcoal (*Betula* sp) from hearth at Köpinge 15:22 (55° 26' N, 13° 59' E). Assoc artifacts indicate Iron Age. *Comment*: pretreated with HCl and NaOH.

Lu-2450. Köpinge 15:22, A 435 **1140 ± 45**
 $\delta^{13}C = -27.2\text{‰}$

Charcoal (*Alnus* sp) from hearth at same site as Lu-2451, above. Assoc artifacts indicate Iron Age. *Comment*: pretreated with HCl and NaOH.

Lu-2460. L:a Köpinge 19:1, A 30 **2530 ± 90**
 $\delta^{13}C = -26.0\text{‰}$

Charcoal (*Quercus* sp, *Fraxinus* sp, & *Pinus* sp) from Bronze Age pit at

L:a Köpinge 19:1 (55° 26' N, 13° 56' E) (Tesch, 1983, p 46–48). *Comment:* no pretreatment; sample undersized; diluted; 42% sample.

Lu-2461. L:a Köpinge 19:1, A 216 **2790 ± 60**
 $\delta^{13}C = -26.8\text{‰}$

Charcoal (*Quercus* sp, *Corylus avellana*, *Alnus* sp, *Fraxinus excelsior*, & *Betula* sp) from hearth in House II at same site as Lu-2460, above. Assoc artifacts indicate Late Bronze or Early Iron Age. *Comment:* pretreated with HCl and NaOH. Sample undersized; diluted; 93% sample.

Lu-2455. L:a Köpinge 19:1, A 292 **2780 ± 90**
 $\delta^{13}C = -26.9\text{‰}$

Charcoal (*Alnus* sp & unid.) from post hole at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comment:* no pretreatment; sample undersized; diluted; 43% sample

Lu-2459. L:a Köpinge 19:1, A 332 **3350 ± 100**
 $\delta^{13}C = -26.2\text{‰}$

Unid. small charcoal particles from post hole (?) at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 37% sample.

Lu-2458. L:a Köpinge 19:1, A 335 **3760 ± 60**
 $\delta^{13}C = -25.5\text{‰}$

Unid. small charcoal particles from soot pit at same site as Lu-2460, above. Archaeol estimate: Late Bronze Age or Early Iron Age. *Comments:* pretreated with HCl and NaOH. (ST): older than expected from assoc archaeol finds.

Lu-2462. L:a Köpinge 19:1, A 388 **2700 ± 90**
 $\delta^{13}C = -26.2\text{‰}$

Charcoal (*Quercus* sp, *Betula* sp, *Fraxinus* sp, *Corylus avellana*, *Acer* sp, *Alnus* sp, & *Tilia* sp) from post hole at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comment:* no pretreatment; sample undersized; diluted; 41% sample.

Lu-2454. L:a Köpinge 19:1, A 425 **3130 ± 70**
 $\delta^{13}C = -26.7\text{‰}$

Charcoal (*Corylus avellana*, *Alnus* sp, *Prunus* sp, Pomoideae, & unid.) from hearth at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comment:* pretreated with HCl and NaOH.

Lu-2453. L:a Köpinge 19:1, A 581 **2780 ± 90**
 $\delta^{13}C = -27.3\text{‰}$

Charcoal (*Alnus* sp) from hearth at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comment:* no pretreatment; sample undersized; diluted; 41% sample.

Lu-2457. L:a Köpinge 19:1, A 591 **1920 ± 50**
 $\delta^{13}C = -26.8\text{‰}$

Charcoal (*Betula* sp & *Alnus* sp) from hearth at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comments*: pretreated with HCl and NaOH. (ST): somewhat later than expected.

Lu-2452. L:a Köpinge 19:1, A 860 **1690 ± 50**
 $\delta^{13}C = -28.4\text{‰}$

Charcoal (*Alnus* sp) from hearth at same site as Lu-2460, above. Archaeol estimate: Late Bronze or Early Iron Age. *Comments*: pretreated with HCl and NaOH. (ST): later than expected from assoc archaeol finds.

Lu-2449. Köpinge 66:1, A 1 **2480 ± 60**
 $\delta^{13}C = -25.4\text{‰}$

Charcoal (*Corylus avellana*) from Construction No. 1 at Köpinge 66:1 (55° 28' N, 13° 59' E). *Comment*: pretreated with HCl and NaOH. Sample undersized; diluted; 89% sample.

Lu-2456. Öja 1:1, A 7 **1980 ± 50**
 $\delta^{13}C = -25.3\text{‰}$

Charcoal (Pomoideae, *Rhamnus cathartica*, *Alnus* sp, & *Ulmus* sp) from hearth at Öja 1:1, Öja parish, S Scania (55° 28' N, 13° 51' E). Coll 1982 and subm by S Tesch. *Comment*: mild pretreatment with NaOH and HCl. Sample undersized; diluted; 86% sample.

Nymölla series (III)

Charcoal from coastal settlement area (Middle Neolithic—Pitted Ware culture) at Nymölla 12³⁸, Gualöv parish, NE Scania (56° 02' N, 14° 28' E). Coll 1982 and subm by B Wyszomirska, Inst Archaeol, Univ Lund. For other dates from Nymölla, see R, 1982, v 24, p 210; 1984, v 26, p 407. Pretreated with HCl and NaOH.

Lu-2493. Nymölla 12³⁸, Sq L9 **4450 ± 60**
 $\delta^{13}C = -25.0\text{‰}$

Charcoal from occupation layer, Sq L9. Assoc with flint tools and Pitted Ware pottery indicating Middle Neolithic Age.

Lu-2494. Nymölla 12³⁸, Sq m9/1 **3610 ± 70**
 $\delta^{13}C = -26.0\text{‰}$

Charcoal from occupation layer, Sq m9, +7.38m. Assoc with same artifact assemblage as Lu-2493, above. *Comment*: sample undersized; diluted; 70% sample.

Lu-2495. Nymölla 12³⁸, Sq m9/2 **4360 ± 60**
 $\delta^{13}C = -25.2\text{‰}$

Charcoal from hearth, Sq m9, +7.46m. Assoc with same artifact assemblage as Lu-2493, above.

Denmark

Hareskovene series

Charcoal from sites in Store and Lille Hareskov, NW of Copenhagen. Coll 1979 (Lu-2469) and 1984 and subm by E Laumann Jørgensen, Værløse Mus, Værløse. Dating is part of study of stones with incisions of sacral character (Laumann Jørgensen, 1980). For previous date from Store Hareskov, see R, 1982, v 24, p 211. All samples pretreated with HCl and NaOH. No $\delta^{13}\text{C}$ measurements available for this series. Standard deviation for dates increased accordingly.

Lu-2467. Kærmysse-mosen, Sample I **600 ± 50**

Charcoal from uppermost part of presumed cremation grave at Bøndernes Hegn Afd 199A, Kærmysse-mosen, Store Hareskov, 5km NNW of Gladsaxe village (55° 46.5' N, 12° 26' E). Sample from flint accumulation ca 20cm below surface.

Lu-2468. Kærmysse-mosen, Sample II **540 ± 50**

Charcoal from basal part of presumed cremation grave. Sample from same flint accumulation as Lu-2467, above, but ca 40cm below surface.

Lu-2469. Hörgen—Fægdyden **100 ± 50**

Charcoal from stone slab in front of stone with sacral incisions at Hörgen—Fægdyden, Afd 117 øst, Lille Hareskov, 6km NW of Gladsaxe village (55° 46.2' N, 12° 23' E).

General Comment: dates much younger than expected.

Bulgaria

Lu-2409. Varna **2470 ± 60**
 $\delta^{13}\text{C} = -24.2\text{‰}$

Small charcoal particles separated from soot and mineral soil from archaeol excavation in center of town of Varna, W coast of Black Sea, E Bulgaria (43° 10' N, 27° 57' E). Coll Sept 1983 and subm by M Filipova, Natural Mus, Varna. Sample contained a few subfossil seeds of cereal. Assoc with animal bones and pottery indicating Archaic period (6th to 5th century BC). *Comment:* mild pretreatment with NaOH and HCl. Sample undersized; diluted; 78% sample.

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