UPPSALA NATURAL RADIOCARBON MEASUREMENTS VII

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The following list covers some old measurements not included in previous lists and most of the samples measured at the Uppsala C^{14} laboratory since the last list (Uppsala V) except for all of the samples utilized for determining the increase of the C^{14}/C^{12} ratio due to explosion of nuclear devices, and except for more than twenty samples measured for testing, storing, and pretreatment of Foraminifera.

The technique used is mainly the same as previously described by Olsson (1958) and the pretreatment is mainly that which has been used earlier (Uppsala IV). In spring 1966 a washing bottle with chromic acid (saturated CrO_3 in conc. H_2SO_4) was included in the combustion line. Due to the high C^{14} activity of the troposphere during the summer 1965 in part of Sweden extra precautions are taken to avoid contamination. The pH of the samples is less than 3 when they are put in the oven to be dried. The combustion is done shortly after the pretreatment is completed. The fraction used for shell samples is given in percent as a mean value. Since the shell fragments usually are different in size the fraction used of individual shells might vary within one sample.

The reference sample is 95% of the activity of the NBS oxalic-acid standard. Any corrections for apparent water ages are thus not included here, but will be discussed in the later papers dealing with the samples. Corrections for deviations from the normal C^{13}/C^{12} ratio (-25.0% in the PDB scale) are applied for the unknown samples. Our five oxalicacid samples have not shown any significant difference in their C^{13} content. The value for oxalic-acid 1, -18.97%, agrees with the value to which the activity of oxalic-acid should be standardized.

The value 5570 yr has been used for the half-life of C¹⁴. Results are expressed before 1950 (B.P.). Errors include the standard deviation (σ) of the counted particles and errors in the corrections due to the C¹³ content, filling pressure, temperature, working voltage, barometric pressure etc. as described by Olsson (1965, 1966). When the measured activity is lower than zero, 2σ has been used for calculation of the minimum age. When it is between zero and 2σ , the net activity + 2σ has been used for calculation of the minimum age.

Several samples had to be diluted with CO_2 from an old source to bring them to normal working pressure of the counters. This pressure has been about 3 atm for samples with numbers lower than U-1000, and about 2 atm for samples with numbers from U-2000. Two counters have

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been used for these samples. A third counter has been used at varying pressure and the corresponding measurements have numbers between U-1000 and U-1400.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. South hemisphere

Sealevel changes, S hemisphere series

Sapropelitic mud from Core 122 (07° 30' S Lat, 113° 38' E Long), Java Sea, depth in sea 68 m. Sample dating last transgression from salt to brackish water. Coll. 1948 by Swedish *Albatross* Expedition (Pettersson); subm. by Eric Olausson, Oceanografiska Inst., Göteborg, Sweden.

U-556. Core 122, 694 to 700 cm Core 122, 694 to 700 cm. Comment: diluted. δC ¹³	$\begin{array}{l} {\bf 12,900} \pm {\bf 300} \\ {\bf 10,900} \ {\bf B.c.} \\ = -9.6\% . \end{array}$
	$13,550 \pm 330$
U-557. Core 122, 701.5 to 710 cm	11,600 в.с.
Core 122, depth 701.5 to 710 cm. Comment: diluted.	$\delta C^{13} = -11.1\%$

B. Mediterranean and Red Sea Area

8980 ± 360 7030 в.с.

U-256. Core 21003, 107 to 117 cm, $>44\mu$

Core 21003 (37° 26' N Lat, 01° 05' E Long), depth 107 to 117 cm, depth in sea 2782 m. Previous samples in Western Mediterranean Sea series are given in Uppsala I, II, III, IV, and V and discussed in Eriksson (1965) and Eriksson and Olsson (1963). Comment: treated with dist. water, fraction >44 μ used. Diluted. $\delta C^{13} = -5.5 //c_{e}$.

Red Sea series

Foraminifera tests from deep-sea cores. Coll. 1948 by Swedish Albatross Expedition (Pettersson); subm. by Eric Olausson.

U-555. Core 162, 641.5 to 649.5 cm, $>65\mu$ 6010 B.C.

Core 162 (11° 57' N Lat, 44° 18' E Long), depth 641.5 to 649.5 cm, depth in sea 883 m. Sample dates time when outflow from Red Sea had been constant. *Comment:* sample ultrasonically washed in boiled dist. water, sieved and washed (immediately before being decomposed) in ca. 80 cm³ dil. HCl, pH about 2.5. Fraction >65 μ was used. $\delta C^{13} = -3.4\%c$.

9310 ± 100

 7960 ± 130

U-554. Core 162, 881.5 to 889.5 cm, $>65\mu$ 7360 B.C.

Core 162 (11° 57' N Lat, 44° 18' E Long), depth 881.5 to 889.5 cm, depth in sea 883 m. Sample dates time when outflowing, subsurface Red Sea water began influencing oxidation processes in Gulf of Aden. *Comment:* sample ultrasonically washed in boiled dist. water, sieved and washed (immediately before being decomposed) in ca. 80 cm³ dil. HCl, pH about 3. Fraction >65 μ was used. $\delta C^{13} = -3.3\%c$.

8690 ± 130

U-562. Core 166, 52.5 to 58.5 cm, $>65\mu$, b 6740 B.C.

Core 166 (17° 56' N Lat, 39° 57' E Long), depth 52.5 to 58.5 cm, length of core 1091 cm, depth in sea 1283 m. Sample dates decrease of carbon content in Postglacial stage of core. Descr. by Olausson (1960). *Comment:* sample was washed ultrasonically in boiled dist. acidified water and sieved, pH about 3. Inner 72% was used. $\delta C^{13} = +3.8\% c$.

 $\mathbf{7800} \pm \mathbf{340}$

 9270 ± 130

U-2020. Core 166, 52.5 to 58.5 cm, >65 μ , a 5850 B.C. The same sample as U-562, but outer 28% was used. $\delta C^{13} = -0.6\%$.

C. Spitsbergen

Vestspitsbergen series

Shells and bones measured as continuation of Vestspitsbergen series (Uppsala II, III, IV, and V; Feyling-Hanssen and Olsson, 1959-1960) to determine shoreline displacements. All altitudes are above mean sealevel. *Comment:* a treatment of bones suggested by de Waard (priv. commun., 1962) was used. 200 g bone is treated several times at 50° C with EDTA dissolved in dist. water and NaOH, repeatedly washed with water at 50° C, treated with 0.1-N HCl at 70° C, dried, dissolved in water and centrifuged. The liquid is dried and used for age determinations (**R**). The undissolved material was, for test purposes, also used for age determinations (W).

U-573. Kapp Linné 6006 b 7320 B.C.

Shell fragments of different species from Kapp Linné (78° 04' N

Lat, 13° 38' E Long), Isfjorden, Spitsbergen, alt 7 to 8 m. Coll. 1960 by Feyling-Hanssen and Olsson. Fragments were frozen to surface in patterned ground area of a terrace. They may thus originate from layers lower and older than terrace surface. Sample coll. in attempt to search for possible systematic errors in areas with permafrost. Sample is older than shells from this altitude normally are. *Comment:* inner 39°_{0} was used. $\delta C^{13} = -0.1\%$.

9640 ± 200 7690 в.с.

Shell layer surrounding the part used for U-573. Comment: layer corresponds to 27% of the shells; $34^{\circ}_{\prime o}$ was removed by washing. $\delta C^{13} = +0.0\%$.

U-506. Gipshuken 6013 b R (5) 1130 B.C.

U-572. Kapp Linné 6006 a

Collagen fraction of whalebone from Gipshuken (78° 27' N Lat, 16° 24' E Long), Isfjorden, Spitsbergen, alt ca. 5.5 m (Feyling-Hanssen and Jørstad, 1950, p. 55-58). $\frac{2}{3}$ of sample buried. Coll. 1960 by Feyling-Hanssen and Olsson. δC^{13} assumed -20.2%.

U-506. Gipshuken 6013 b W (2) 1800 = 330 A.D. 150

Wrong fraction of same whalebone as used for sample U-506 but from another portion of the crushed bone. *Comment:* diluted. $\delta C^{13} = -22.5\%_0$.

$\begin{array}{l} 9090 \ \pm \ 190 \\ 7140 \ \text{ B.c.} \end{array}$

 3080 ± 90

U-570. Ekholmvika 6022 b R (3)

Collagen fraction of whalebone from Ekholmvika (78° 35' N Lat, 16° 38' E Long), Billefjorden, Spitsbergen; alt ca. 50 m. Deeply buried in fine gravel. Location mapped by Balchin (1941). Coll. 1960 by D. H. Maling. *Comment:* diluted. $\delta C^{13} = -20.2\%$.

U-569. Ekholmvika 6022 b W (2)

8120 ± 190 6170 в.с.

Wrong fraction of same whalebone as used for U-570 but from another portion of crushed bone. $\delta C^{13} = -20.1\%$

D. Iceland

Iceland series

Shell, peat, wood and charcoal from Iceland. C¹⁴ determinations on Iceland are often used to date lava-flows, tephra layers and shore-lines. Pollen diagrams are usually dated by tephra layers. Earlier C¹⁴ datings of Quaternary deposits in Iceland are listed by Kjartansson *et al.* (1964). Present samples subm. by Gudmundur Kjartansson, Náttúrugripasafnid (Mus. of Nat. History) Reykjavik, Iceland.

U-2019. Ekruhorn

11.450 ± 330 9500 в.с.

One valve of Mya truncata from Ekruhorn in Saurbaer (65° 24' N Lat, 21° 56' W Long), Dalasýsla, Iceland. Sample, found together with *Yoldia arctica* close to the sea, from upper half of thick marine clay layer, upper boundary at 15 m alt, overlain by gravel. Coll. 1964 by Kjartansson. Comment: inner 65% was used. Diluted. $\delta C^{13} = -1.7\%$.

U-519. Gardsendi 1 p (2)

5310 ± 170 3360 в.с.

Peat from Gardsendi (63° 25' N Lat, 20° 17' W Long), Heimaey, Vestmannaeyjar, Iceland, overlain by thick volcanic formations that bear no signs of glaciation. Below sample, ca. 0.1 m thick, is layer of aeolian soil on lava of Stórhöfdi. Coll. 1964 by Kjartansson. $\delta C^{13} =$ -25.8%

		5760 ± 120
U-539.	Gardsendi 1 p (3)	3810 в.с.

Same peat as U-519 but new pre-treatment. $\delta C^{13} = -26.1\%$.

4120 ± 90 2170 в.с.

Same peat as U-519 but bad pre-treatment; sample was not stirred when made acid before drying. *Comment:* result should not be used for an age discussion. $\delta C^{13} = -29.7\%$.

U-521. Gardsendi 1 w

U-517. Gardsendi 1 p(1)

5110 ± 200 3160 в.с.

Small pieces of *Salix* wood picked from peat used for U-519. Diluted. $\delta C^{13} = -27.0\%$

8190 ± 190 6240 в.с.

U-525. Thjórsárbrú p 0 to 2

Peat from Thjórsárbrú (63° 56' N Lat, 20° 39' W Long), Árnessýsla, Iceland, from 2 lowest cm of peat layer 30 cm thick, resting on river gravel and overlain by 3 m lava. Dated to determine final regression of sea from lowlands. This lava, called Thjórsárhraun, is largest known postglacial lava flow on Earth. Coll. 1959 by Kjartansson. Descr. by Kjartansson (1958) and Kjartansson *et al.* (1964). Comment: top layer of same peat has been dated previously: W-482 and W-913, 8065 \pm 400 and 8170 \pm 300 B.P. (USGS IV and VI). $\delta C^{13} = -24.4\%$.

8210 ± 310

U-524. Thjórsárbrú p 2 to 3

6260 в.с.

Peat from same layer as U-525 but selected 2 to 3 cm from bottom. *Comment:* diluted. $\delta C^{13} = -28.0\%$.

U-523. Hlídardalsskóli

4530 ± 100 2580 в.с.

Charcoal from Hlídardalsskóli (63° 56' N Lat, 21° 24' W Long), Arnessýsla, Iceland. From top layer of aeolian soil where plant remains have been carbonized by heat of overlying lava. Coll. 1956 by Sigurdur Thorarinsson. *Comment:* peat underlying Ellidaárhraun lava, which might be identical with Hlídardalsskóli lava, was dated previously: C-749, 5300 \pm 340 (Libby, 1955). $\delta C^{13} = -22.1\%$.

E. Arctic Ocean

Arctic Ocean series

Globigerina pachyderma from flank of Alpha Rise (82° 56.2' N Lat, 155° 54' W Long), Arctic Ocean, depth in sea 3548 m. Coll. 1963 by K. Hunkins; subm. by W. Donn and T. Saito, Lamont Geol. Observatory, Palisades, New York. Piston corer penetrated only 24 cm. Samples from several cores close to each other. Similar cores are descr. by Ericson *et al.* (1964). *Comment:* before being submitted, samples washed with tap water. In two cases a leaching procedure to eliminate outer contamination was tried. Large discrepancy between fractions indicates contamination. All samples diluted.

	A	
		8070 ± 180
U-548.	T3-63-1/S 1 to 2 cm, b	6120 в.с.

Core T3-63-1/S, depth 1 to 2 cm. Comment: inner 85% was used. $\delta C^{13} = +2.5\%$.

		6200 ± 500
U-547.	T3-63-1/S 1 to 2 cm, a	4300 в.с.

Shell layer surrounding the part used for U-548. Comment: outer 15% was used. $\delta C^{13} = -14.7\%$.

		10,400 - 400
U-550.	T3-63- $1/S$ 3 to 4 cm, b	11,400 в.с.

Core T3-63-1/S depth 3 to 4 cm. Comment: inner $55^{o_7}_{/o}$ was used. $\delta C^{13} = -5.8\%$

		$10,200 \pm 300$
U-549.	T3-63- $1/S$ 3 to 4 cm, a	8300 в.с.

Shell layer surrounding the part used for U-550. Comment: outer 45% was used. $\delta C^{13} = -3.4\%$.

		12,000 + 1200 - 1000
U-551.	T3-63-1/S 5.5 to 6.5 cm	10,100 в.с.

Core T3-63-1/S, depth 5.5 to 6.5 cm. *Comment:* whole sample was used. $\delta C^{13} = +3.7\%$.

F. Poland

U-542. Korne near Kościerzyna (1)

Peat from Korne (54° 08' N Lat, 17° 52' E Long), Poland. From upper part, 1.3 to 1.4 m below surface, of 0.8-m-thick peat layer overlain by sand of alluvial cone. Below peat is fluvioglacial sand and

280 ± 90

а.д. 1670

1 1000

 $13\,400 + 400$

gravel. Coll. 1964 and subm. by Jan Szupryczyński, Instytut Geografii Polska Akademia Nauk Toruń, Poland. $\delta C^{13} = -29.3\%$.

U-575. Korne near Kościerzyna (3) A.D. 1740 210 ± 60

Another portion of sample used for U-542. New pretreatment. $\delta C^{13} = -28.5\% c$.

G. Shetland

Shetland series

Lake sediments and peat from Shetland to study sealevel changes and glacial and vegetational history. Coll. 1964 by Gunnar Hoppe and Anders Häggblom (Naturgeografiska Institutionen, Stockholms Univ., Stockholm, Sweden) together with Magnus Fries (Skogshögskolan, Stockholm, Sweden). Descr. by Hoppe (1965). *Comment:* samples contain old coal as determined chemically by A. M. Asklund and H. Berger, Stockholm. Several samples were dated previously (Stockholm VII). Some gave higher ages than expected. Since Uppsala lab. was engaged in this project only one dating completed. Different separation methods are being tried. As a first step humus was dated, since pretreatment with NaOH, to extract humus, would not dissolve the old coal, which most probably caused some of Stockholm dates to be too high.

U-2007. Lower Loch of Brouster,	Lower Loch of Brouster,	7700 ± 600
	core 20, 343 to 348, h, 1	5800 в.с.
		7600 ± 600
U-576.		5700 в.с.

Two measurements of humus extracted from gyttja from tidal lake Lower Loch of Brouster (60° 15' N Lat, 01° 36' W Long), Shetland. Sample 343 to 348 cm below top of sediment. Sample supposed to be of same age as one sample collected nearby, dated 15,080 ± 850 (St-1757). *Comment:* diluted. $\delta C^{13} = -20.5\%c$.

H. Sweden

Shell banks series

Shells from Lindalsskogen, Väjern ($58^{\circ} 22'$ N Lat, $06^{\circ} 47'$ E Long), alt 25 m and Hult, Svarteborg ($58^{\circ} 36'$ N Lat, $06^{\circ} 26'$ E Long), alt 103 m, Bohuslän, Sweden. Collected in shell banks. *Balanus* shells were broken. An attempt to date the shells was done in order to study time interval for deposit. At Väjern all samples were coll. within 100 m from each other. Shell bank at Svarteborg is descr. by Hessland (1943). Coll. 1966 and subm. by K. Gösta Eriksson, Göteborgs Univ., Göteborg, Sweden.

U-584. Väjern 3275 b

10,200 ± 120 8250 в.с.

Balanus shells from Väjern, coll. 2 to 3 m below surface of bank,

1 to 2 m below erosion surface. Comment: inner 20% was used. $\delta C^{13} = -2.1\%$

U-583. Väjern 3275 a

Shell layer surrounding the part used for U-584. Comment: layer corresponds to 15% of the shells; 65% was removed by washing. Diluted. $\delta C^{13} = +3.0\%$

U-590. Väjern 3276 b

Balanus shells from Väjern, coll. in a layer with much Mytilus edulis, 0.8 to 1 m below erosion surface. Comment: inner 40% was used. Diluted. $\delta C^{13} = +3.0\% \epsilon$.

U-2017. Väjern 3276 a

Shell layer surrounding the part used for U-590. Comment: layer corresponds to 25% of shells; 35% was removed by washing. $\delta C^{13} =$ -1.1%

U-586. Väjern 3248 b₁

Balanus shells from Väjern, coll. 0 to 1 m below erosion surface. Comment: inner 42% was used. $\delta C^{13} = +0.2\%$.

U-585. Väjern 3248 a_1

Shell layer surrounding the part used for U-586. Comment: layer corresponds to 35% of the shells; 23% was removed by washing. δC^{13} = -0.4%

U-588. Väjern 3248 b₂

Balanus shells from same sample as U-586. Comment: new treatment due to difference between U-585 and U-586. Inner 40% was used. δC^{13} assumed -1.0%.

U-587. Väjern 3248 a.,

Shell layer surrounding the part used for U-588. Comment: layer corresponds to ca. 50% of the shells; 10% was removed by washing. $\delta C^{13} = -0.8\%$

U-2016. Väjern 3273 b

Balanus shells from Väjern, coll. 0 to 0.5 m above erosion surface. Comment: inner 20% was used. Diluted. $\delta C^{13} = -0.7\%$.

U-568. Väjern 3273 a

= -2.4%

Shell layer surrounding the part used for U-2016. Comment: layer corresponds to 45% of the shells; 35% was removed by washing. δC^{13}

 $10,260 \pm 140$

 9680 ± 150 7730 в.с.

 9520 ± 120

 9540 ± 230

 9650 ± 130

7700 в.с.

7590 в.с.

7570 в.с.

8310 в.с.

 9990 ± 130 8040 в.с.

 $10,430 \pm 200$

8480 в.с.

 10.330 ± 160

8380 в.с.

 $10,930 \pm 150$

8980 в.с.

U-566. Väjern 3247 b

U-565. Väjern 3247 a

Shell layer surrounding the part used for U-566. Comment: layer corresponds to 22% of the shell; 50% was removed by washing. δC^{13} $= -0.2\%_{o}$.

U-582. Väjern 3274 b₁

Balanus shells from Väjern, coll. from upper Postglacial layer 0 to 1 m below surface of bank, 0.5 to 1.5 m above erosion surface. Comment: inner half was used. $\delta C^{13} = +0.3\% c$.

U-589. Väjern $3274 b_2$

Shells from same layer as U-582. Comment: inner 60% was used. $\delta C^{13} = -1.4\%$

U-2013. Hult 3271 b

Balanus hameri from Hult, coll. in clay 0.5 to 1 m below surface of bank. Sample is Late Glacial. *Comment:* inner quarter was used. Diluted. $\delta C^{13} = -1.4\%$

U-567. Hult 3271 a

Shell layer surrounding the part used for U-2013. Comment: layer corresponds to a quarter of the shells; outer half of the shells was removed by washing. $\delta C^{13} = -1.2\%$.

Östra Landborgen series

Peat and gyttja sequences to date the Ancylus transgression. Pollen analyses by Lars-König Königsson, Kvartärgeologiska Inst., Uppsala Univ., Uppsala, Sweden. Coll. 1963 and subm. by Königsson. Comment: the first samples in this series were published in Uppsala V.

U-485. Mellösa 483 (1)

Peat from Mellösa (56° 53' N Lat, 16° 50' E Long), Bredsättra parish, öland, Sweden. From upper part of peat layer, dating period between Ancylus and Littorina transgressions. Comment: lower part of same layer was used for U-489 and U-1016. $\delta C^{13} = -26.6\%$.

U-571. Mellösa 483 (2)

-27.5%

4460 в.с. Peat of same sample as U-485, but new pretreatment. $\delta C^{13} =$

 $11,320 \pm 180$ 9370 в.с.

> 6570 ± 180 4620 в.с.

> 6410 ± 110

10,840 + 420 - 3908890 в.с.

 9750 ± 240

7800 в.с.

5880 в.с.

 7830 ± 120

 7810 ± 120 5860 в.с.

 9750 ± 140 7800 в.с.

6510 ± 110 4560 в.с.

6910 ± 120 4960 в.с.

U-495. Övra Sandby 497 (1)

Peat from Övra Sandby (56° 52' N Lat, 16° 49' E Long), Bredsättra Darish, Öland, Sweden. From peat below shore deposit. $\delta C^{13} = -27.7\%$.

U-514. Övra Sandby 497 (2)

Peat of same sample as U-495, but new pretreatment. $\delta C^{13} = -27.8\%$

U-494. Bettorp 557

9670 ± 140 7720 в.с.

Gyttja from Bettorp (56° 40' N Lat, 16° 42' E Long), Norra Möckleby parish, Öland, Sweden. From gyttja layer below shore deposits estimated to be of Ancylus age. $\delta C^{13} = -29.4\%$.

Late Pleistocene Vegetational series, Eastern Central Sweden

Sediments from Lillsjön (59° 14' N Lat, 14° 43' E Long), Kilsbergen, Närke, Sweden, alt 171 m. Coll. 1964 by Maj-Britt Florin and assistants, Kvartärgeologiska Inst., Uppsala Univ., Uppsala, Sweden; subm. by M.-B. Florin. Diatom (1944) and pollen analyses by M.-B. Florin.

		9160 ± 520
U-468.	Lillsjön I, 70 to 74	7210 в.с.

Silt with some gyttja, 70 to 74 cm below sediment surface. Pollen analyses imply late Pre-Boreal Pollen-Zone IV b and early Pollen-Zone V (Jessen). *Comment:* diluted. $\delta C^{13} = -30.4\%$.

,		9200	± 200
U-470.	Lillsjön III, 82 to 86	7250	B.C.

Silt with some organic material, 82 to 86 cm below sediment surface. Pollen analyses imply Pre-Boreal Pollen-Zone IV b (Jessen). Comment: diluted. $\delta C^{13} = -18.1\%$.

U-469. Lillsjön II, 98 to 102

Silt and sand with some organic material, 98 to 102 cm below sediment surface. Pollen analyses imply early Pre-Boreal Pollen-Zone IV b (Jessen). Comment: diluted. $\delta C^{13} = -19.5\%$.

Land Uplift series, Central Sweden

U-513. Elgsjömossen I, II and IV, p

Sediments from Central Sweden, coll. from ancient lakes developed by isolation from the sea (S. Florin 1944; 1948; 1963). Subm. by S. Florin, Kvartärgeologiska Inst., Uppsala Univ., Uppsala, Sweden. Pollen analyses by M.-B. Florin and Gunnel Linnman.

$\begin{array}{l} 4550 \, \pm \, 140 \\ \textbf{2600 B.C.} \end{array}$

 $\begin{array}{l} \mathbf{9420} \ \pm \ \mathbf{210} \\ \mathbf{7470} \ \mathbf{B.C.} \end{array}$

Partly humified Sphagnum peat with Eriophorum vaginatum from Elgsjömossen (59° 13' N Lat, 14° 26.5' E Long), Nysund parish, Närke, Sweden, 98.8 m alt. Sample 375 to 385 cm below surface. Coll. 1959 by S. Florin. *Comment:* diluted. $\delta C^{13} = -13.7\%$.

U-606.	Elgsjömossen I, II and IV, h	5610 ± 100 3660 в.с.
Humus f	from sample used for U-513. $\delta C^{13} = -29.1\%$.	

U-2021. Elgsjömossen III and V, p 3800 ± 600 1900 B.C.

Partly humified Sphagnum peat with Eriophorum vaginatum from Elgsjömossen (59° 13' N Lat, 14° 26.5' E Long), Nysund parish, Närke, Sweden, 98.8 m alt. Sample 400 to 407 cm below surface. This sample and U-513 are from Littorina Time L II and date an early local Picea occurrence which has been seen at other localities in Central Sweden. Coll. 1959 by S. Florin. Comment: diluted. $\delta C^{13} = -25.1\%e$.

U-2012.	Elgsjömossen III and V, h	5680 ± 130 3730 в.с.
Humus fro	om sample used for U-2021. $\delta C^{13} = -21.1\%$.	

U-522. Nedre Mogetorp I, p 5790 ± 820 3840 в.с.

Clay with gyttja from Nedre Mogetorp (59° 00' N Lat, 16° 09' E Long), Södermanland, Sweden, alt 44 to 45 m. Sample 370 to 375 cm below surface, Littorina Time, before L II maximum. Layer corresponds to 400 cm level below surface in diagram given by Florin (1948). Coll. 1959 by S. Florin. $\delta C^{13} = -22.1\%$

U-2022. Nedre	Mogetory I, h	7370 ± 140 5420 в.с.
Humus from the	sample used for	U-522. $\delta C^{13} = -24.5\%$

Fluvial processes series

Peat from Bjurholm (63° 53' N Lat, 19° 15' E Long), Västerbotten, Sweden. Samples sedimented in rather thin layers separated by heavy sand layers in river bed of Öre älv. Samples are first in series to try to date the processes. Coll. 1965 and subm. by Sten Martvall and Gunnar Nilsson, Geografiska Inst., Uppsala Univ., Uppsala, Sweden.

U-552. Bjurholm 1:1 + 1:2 900 ± 400 A.D. 1100

Peat coll. 72 and 67.5 to 66 cm above sand bottom used as reference level. $\delta C^{13} = -26.8\%_0$.

U-553. Bjurholm 1:3 + 1:4 1290 ± 190 A.D. 660

Peat coll. in same core as U-552, 38 to 36.5 and 29 to 27.5 cm above sand bottom used as reference level. $\delta C^{13} = -22.8\%$.

E-jurselet series

Carr peat from Bjurselet (65° 10' N Lat, 21° 10' E Long), Byske parish, Västerbotten, Sweden. Samples were taken to date vegetational development as seen in pollen diagrams made in connection with a chaeologic investigation (see p. 467) in same area. Pollen analyses by Königsson and Candolin. Coll. 1964 and subm. by Königsson. *Ceneral Comment:* all samples were highly humified and roots were removed by sieving. These samples are first in one extensive series.

U-515. Bjurselet 5 G	3180 ± 80 1230 в.с.
Peat, 34 to 36 cm below surface. Dates beginning $SC^{13} = -\frac{97}{8}$	of the Picea.
$00^{-1}27.0/c_0$.	4120 ± 90
U-579. Bjurselet 11 G	2170 в.с.
Peat, 46 to 48.5 cm below surface. $\delta C^{13} = -28.9\%$	
	3470 ± 80
U-499. Bjurselet 12 G	1520 в.с.
Peat, 48.5 to 51 cm below surface. $\delta C^{13} = -30.5\%$	
	3630 ± 140
U-498. Biurselet 12 G. h	1680 в.с.
Humus extracted from sample used for U-499. 8C	$^{13} = -26.2\%$
	3320 ± 400
U-497. Bjurselet 14 G	1370 в.с.
Peat, 53.5 to 56 cm below surface. Comment: dil	uted. $\delta C^{13} =$
26.7%.	
·	3710 + 90

				0110 = 70
U-496.	Bjurselet 14 G	, h		1760 в.с.
	1 6		1.6 11.405 0.012	00 50

Humus extracted from sample used for U-497. $\delta C^{13} = -28.5\% c$.

II. ARCHAEOLOGIC SAMPLES

A. Sweden

Gårdlösa series

Charcoal from Gårdlösa No. 3 (55° 34' N Lat, 14° 08' E Long), Smedstorp parish, Skåne, Sweden. Coll. 1964 and subm. by Berta Stjernquist, Lunds Historiska Mus., Lund, Sweden. Investigation of prehistoric cult places in province of Skåne (Scania) is treated by Stjernquist (1964). Several samples in this series have been dated previously (Uppsala V). Gårdlösa springs are situated on a slight incline and are surrounded by several hearths. Potsherds, sherds of glass, some metal artifacts and some bones are found indicating Migration or Vendel periods.

1760 ± 80 a.d. 190

U-534. Gårdlösa 3, Hearth 40

Charcoal from Gårdlösa 3, Hearth 40. Sample found in pit in a layer 0.7 to 0.8 m below surface well below cultivated layer. $\delta C^{13} = -26.1\%c$.

1940 ± 70

 1670 ± 70

A.D. 280

U-532. Gårdlösa 3, Layer under Hearth 40 A.D. 10

Charcoal from Gårdlösa 3, Hearth 40. Found in layer 0.9 to 1.0 m below surface. $\delta C^{13} = -24.1\%$.

U-536. Gårdlösa 3, Hearth 102

Charcoal from Gårdlösa 3 in small pit below limestone setting, 0.2 m below surface. Ground is cultivated down to stone setting. $\delta C^{13} = -26.5\%c$.

U-531. Gårdlösa 3, Hearth 106 A.p. 100

Charcoal from Gårdlösa 3. From a layer 0.40 to 0.45 m below surface, underlying cultivated ground. $\delta C^{13} = -25.6\%_{co}$.

U-535. Gårdlösa 3, L/M-P/Q, upper 1660 ± 90 A.D. 290

Charcoal from Gårdlösa 3, L/M-P/Q, the upper layer, 0.4 to 0.5 m below surface. Found together with potsherds. Layer with charcoal is separated from cultivated layer by a thin layer of soil. $\delta C^{13} = -25.8\%$.

U-580. Gårdlösa 3, L/M-P/Q, lower 1940 ± 60 A.D. 10

Charcoal from Gårdlösa 3, L/M-P/Q, the lower layer, 0.6 to 0.8 m below surface. Found together with potsherds. $\delta C^{13} = -27.5\%c$.

 1490 ± 80

U-533. Gårdlösa 3, Trench L, Setting 1 A.D. 460

Charcoal from Gårdlösa 3, Excavation Trench L, Stone-setting 1, 0.25 to 0.3 m below surface. Sample coll. on and between stones. $\delta C^{13} = -25.5\%_{0}$.

1380 ± 80 A.D. 570

U-528. Gårdlösa 3, House X A.

Charcoal from Gårdlösa 3, House X, found in a hearth, 0.75 to 0.8 m below surface. Found together with weaver's weights, potsherds, iron artifacts, slag, pearls and others items. $\delta C^{13} = -24.8\%$.

U-529. Gårdlösa 3, House XII A.D. 500

Charcoal from Gårdlösa 3, House XII, 0.75 to 0.8 m below surface, well below cultivated ground. Found together with pearls, iron items, iron pieces, potsherds, slag and other items. $\delta C^{13} = -24.1\%$

U-530. Gårdlösa 3, House XIX

Charcoal from Gårdlösa 3, House XIX, found in a hearth, 0.6 m below surface, together with a pearl, potsherds, iron pieces and slag. The cultivated ground is 0.25 m deep. $\delta C^{13} = -26.1\%$.

U-527. Gudahagen test pit: 60

Charcoal from Gudahagen (56° 10' N Lat, 14° 29' E Long), Näsum parish, Skåne, Sweden. From charcoal horizon in bog at depth of 0.6 m in a test pit. Another sample from Gudahagen has been dated previously (Uppsala V). Coll. 1962 and subm. by Stjernquist. Comment: diluted. $\delta C^{13} = -22.5\%$

U-526. Gudahagen test pit: 180

Charcoal from Gudahagen (56° 10' N Lat, 14° 29' E Long), Näsum parish, Skåne, Sweden. From charcoal horizon in bog at depth of 1.8 m in a test pit. Coll. 1962 and subm. by Stjernquist. Comment: diluted. $\delta C^{13} = -26.7\%$

U-541. Eketorp ring-fort, House 1, sample 1 **А.D.** 460

Charcoal from Eketorp (56° 02' N Lat, 16° 03' E Long), Gräsgård parish, Öland, Sweden. From hearth in lower layer. Coll. 1964 and subm. by Mårten Stenberger, Inst. för Nordisk och Jämförande Fornkunskap, Uppsala Univ., Uppsala, Sweden. There are 16 known ancient forts on Öland and a few uncertain. The forts are descr. by Stenberger (1966a). The Eketorp ringfortress is descr. by Stenberger (1966b and c). It has inner diam of 80 m, an almost circular wall, originally 5 m thick and probably ca. 4 m high, now destroyed and nowhere higher than 2 m; it is surrounded by another lower wall which probably was used as foundation for a palisade. An upper habitation level from ruined settlement within fort consists mainly of large stones, probably from houses, and numerous artifacts indicate Late Viking Period and Early Medieval time. A lower level has system of trapezoidal building foundations stretching their walls from ring wall 11.5 m towards center of fort. Each house, 5 m wide at ring wall and with radial walls common with nearest houses, had probably two rooms. Several artifacts in lower level indicate Late Migration and Early Vendel Period. Excavation started 1964 and is not completed. Several samples are dated in Stockholm (Stockholm VII). $\delta C^{13} = -24.8\%$.

Bjurselet series

Charcoal from Bjurselet (65° 00' N Lat, 21° 04' E Long), Byske parish, Västerbotten, Sweden. From a Stone Age dwelling-site, alt 53 m, with imported flint axes, scrapers and potsherds. Subm. by Hans Christiansson, Inst. för Nordisk och Jämförande Fornkunskap, Uppsala

 1450 ± 80

 3070 ± 150 1120 в.с.

а.д. 500

3970 ± 150 2020 в.с.

 1490 ± 80

467

Ingrid U. Olsson, Allan Stenberg and Yeter Göksu

Univ., Uppsala, Sweden. An upper layer consisted of cultivated soil, Layer I, underlain by sand, Layer II and Layer III. Excavation started 1962, preliminary descr. by Christiansson (1965a, b). Flint artifacts are descr. by Becker (1952). A pollen profile from same area is dated p. 465. Comment: some samples are found in such a place that their origin is very uncertain.

580 ± 80 Bjurselet 115/265, Hearth 5 (1) **А.D.** 1370

Charcoal, 0.3 m below surface, from "the hearth area", (Härdplatsen). Coll. from boundary between cultivated ground and underlying sand. Coll. 1963 by Christiansson. $\delta C^{13} = -23.8\% c$.

U-544. Bjurselet 115/265, Hearth 5 (2) A.D. 1590 Charcoal from the same sample as U-545, but new pretreatment. $\delta C^{13} = -25.4\%$

U-560. Bjurselet 120/265

А.D. 1360 Charcoal, 0.3 m below surface, from hearth area (Härdplatsen). Coll. from boundary between cultivated ground and pure sand. Coll. 1964 by Christiansson. δC^{13} assumed -25.3%.

Bjurselet 194/227 Åkern A.D. 900 Charcoal, 0.3 m below surface, from the field. From boundary between cultivated ground and pure sand. Coll. 1964 by Christiansson. Comment: diluted. δC^{13} assumed -25.0%c.

U-561. Bjurselet 190/228 Åkern А.Д. 820

Charcoal, 0.3 m below surface, from "Åkern." From the sand below cultivated ground (Layer II). Coll. 1964 by Christiansson. $\delta C^{13} =$ -26.5%

U-546. Bjurselet 202/228 Åkern

Charcoal, 0.3 m below surface, from "Åkern." From boundary between cultivated ground and pure sand. Coll. 1964 by Christiansson. $\delta C^{13} = -26.1\%$

3020 ± 230 **U-2010**. Bjurselet 334/204 Staketet 1070 в.с.

Charcoal from Layer III possibly in connection with a hut. From layer with burned brittle stones below upper layer of sand. Coll. 1966 by Christiansson. Comment: diluted. $\delta C^{13} = -26.2\%$.

U-2003. Bjurselet 722/265 Udden A

Charcoal from hearth, Layer III, the ground probably never cultivated. Found together with flint artifacts and bones of seal and white-

 1130 ± 70

 310 ± 60

 3440 ± 450

1490 в.с.

А.D. 1640

1050 ± 130

 360 ± 80

 590 ± 90

468

U-545.

U-2005.

fish. Coll. 1964 by Christiansson. Comment: diluted. $\&C^{13}$ assumed -25.0%c.

U-559. Bjurselet 722/265 Udden B

3970 ± 340 2020 в.с.

Charcoal from same sample as U-2003 but somewhat different pretreatment. *Comment:* diluted. $\delta C^{13} = -27.4\%$.

1380 ± 70 A.D. 570

Charcoal, from "Skackerforsen," Kusmark I¹⁶ (64° 53' N Lat, 20° 43' E Long), Skellefteå parish, Västerbotten, Sweden. 0.2 m below the

43' E Long), Skellelteå parish, Västerbotten, Sweden. 0.2 m below the grass, in layer with soot at Stone Age dwelling site, probably connected with ca. 100 flint axes found 100 m from site with bones of seal. Ground is cultivated. Coll. 1965 by H. C. Vorting, Inst. för Nordisk och Jämförande Fornkunskap, Uppsala Univ., Uppsala, Sweden; subm. by Christiansson. $\delta C^{13} = -26.0\%$.

U-540. Hednäs, Hunting pit 4

U-558. Kusmark 219/120 K I

3980 ± 90 2030 в.с.

Charcoal from Hednäs (64° 15′ N Lat, 19° 30′ E Long), Degerfors parish, Västerbotten, Sweden. From bottom of hunting pit for reindeer, ca. 190 cm below mean level of surrounding ground. Charcoal probably from a forest fire. Some similar pits are dated at 1150 ± 65 B.P. (St-152), 450 ± 55 B.P. (St-170), 1110 ± 60 B.P. (St-110 and St-131) (all calculated with old Stockholm standard, Stockholm I); 1240 ± 70 (Manker, 1960, p. 88). Coll. 1964 and subm. by Göran Rosander, Inst. för Nordisk och Jämförande Fornkunskap, Uppsala Univ., Uppsala, Sweden. $\delta C^{13} =$ -19.4‰.

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