

UPPSALA NATURAL RADIOCARBON MEASUREMENTS XI

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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 C¹⁴ laboratory since the last list (R., 1969, v. 11, p. 515-544); samples utilized for determining the increase of the C¹⁴/C¹² ratio due to explosion of nuclear devices are omitted.

The technique used is mainly the same as previously described by Olsson (1958) and the pretreatment is also similar. In autumn 1970, we changed from bottles filled with saturated CrO₃ in conc. H₂SO₄ to more CrO₃ (a mixture of 60 g CrO₃, 60 ml H₂O and 100 ml conc. H₂SO₄ dissolved in the same amount of water as the mixture), as suggested by A. Heikkinen, Finland. Peat, gyttja, other organic sediments, charcoal, wood, roots, leaves, and other plant remains are heated to ca. 100°C for some hours with HCl, 1 to 2%, left at least over night, washed with distilled water, transferred to NaOH, 1 to 2%, at +80°C over night, washed with distilled water and finally acidified to pH < 3 before being dried. Combustion shortly follows pretreatment. Foraminifera and mollusk shells are leached with HCl. Fractions used for shell samples are given in per cent as a mean value. Since shell fragments usually are different in size, the fraction of shell samples does not give the fraction of individual shells.

Bone samples were treated differently to test methods (Olsson *et al.*, ms. in preparation). Each method is indicated with the sample. Tree-ring samples were also treated differently as indicated in each description. Any other deviation from normal treatment is indicated in the description.

The reference sample is 95% of the C¹⁴/C¹² ratio of the NBS oxalic-acid standard. Any corrections for apparent water ages are thus not included here, but are discussed in papers dealing with the samples. Corrections for deviations from the normal C¹³/C¹² ratio (-25.0‰ in the PDB scale) are applied for unknown samples. Our 6 oxalic-acid samples did not show any significant difference in their C³¹/C¹² ratio according to measurements made in Stockholm. W. G. Mook in Groningen, The Netherlands, has kindly measured our 4 remaining standard samples. Oxalic acid 1, 4, 5, and 6 were measured as -19.12, -19.27, -19.24 and -19.62‰, respectively. Our secondary C¹³ standard, oxalic-acid I, was measured by Craig (1961) and it had a δC¹³ value of -18.97‰ which should be corrected by ca. 1‰, giving a value of ca. -19.2‰, consistent with recent measurements made by Mook for us. Since the value given by Craig in 1961 for our oxalic acid standard agrees with

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the international oxalic acid standard, we have not applied corrections, based on the C^{13} content, to our standard.

The value 5570 yr has been used for the half-life of C^{14} , except for some samples of geochemical interest, when 5730 yr was used as stated in the table. These Δ values will not be changed if results are calculated with the half-life 5570 yr.

Results in this list are given B.P. (before 1950) or as an excess, Δ , over the reference sample:

$$\Delta = \delta C^{14} - (2 \delta C^{13} + 50) \left(1 + \frac{\delta C^{14}}{1000} \right)$$

where δC^{14} is the age-corrected C^{14} deviation from the reference sample in per mil in A.D. 1950, and δC^{13} is the deviation from PDB standard in per mil. Errors include standard deviation (σ) of counted particles and errors in corrections due to the C^{13}/C^{12} ratio, filling pressure, temperature, working voltage, barometric pressure, etc., as described by Olsson (1965, 1966). When measured activity is lower than zero, 2σ has been used for calculation of minimum age. When it is between zero and 2σ , net activity is increased by 2σ for calculation of minimum age. Since results are physical measurements, no terms are included for the error in the half-life or previous C^{14}/C^{12} variations. These errors are discussed elsewhere.

Several samples had to be diluted with CO_2 from an old source to bring them to normal working pressure of the counters. This has been about 2600 mm Hg for samples with numbers U-704 or lower, proportional counter 1; ca. 1000 mm Hg for samples with numbers from U-705 to U-757, proportional counter 1; and ca. 1600 mm Hg for samples with numbers from U-2000, proportional counter 4.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Deep-sea cores

Indian Ocean Series 1

Foraminifera tests from deep-sea core 156 (07° 14' N Lat, 52° 49'

E Long), Somali Basin, Indian Ocean, depth 5107 m. Coll. 1948 by Swedish *Albatross* Expedition (Pettersson); subm. by Eric Olausson, Marinegeol. Lab., Univ. Göteborg, Sweden. Core is rich in coccoliths except in a few horizons (Olausson *et al.*, 1971). One horizon dated previously U-677: $39,500 \begin{smallmatrix} +5400 \\ -3300 \end{smallmatrix}$ and U-678: $> 33,500$ (R., 1969, v. 11, p. 516-517). *Comment*: sample ultrasonically washed in acidified, boiled, distilled water, sieved, pH ca. 4, and dried before subm. to Uppsala.

U-2143. Core 156, w **15,000 ± 1000**
13,100 B.C.
 $\delta C^{13} = -1.3\%$

Core 156, depth 170.5 to 178.5 cm, Pt. I, $> 65\mu$, whole fraction.
Comment: diluted.

+3700
5300
-2500
3300 B.C.
 $\delta C^{13} = -0.5\%$

U-2144. Core 156, b

Core 156, depth 170.5 to 178.5 cm, Pt. II, $> 65\mu$, innermost 30%.
Comment: diluted.

+2200
13,300
-1900
11,300 B.C.
 $\delta C^{13} = -0.3\%$

U-2145. Core 156, a

Core 156, depth 170.5 to 178.5 cm, Pt. II, $> 65\mu$, outermost 65%.
Comment: diluted.

Indian Ocean Series 2

Foraminifera tests from deep-sea Core V16-66 (42° 39' S Lat, 45° 40' E Long), Indian Ocean, depth 3072 m. Samples date appearance of *Globorotalia truncatulinoides*. Coll. 1966 by Lamont *Vema* Expedition; subm. by Olausson. All samples give an activity 0.022 ± 0.036 (weighed mean-value) corresponding to an age $> 34,300$. *Comment*: samples ultrasonically washed in acidified, boiled distilled water, sieved, pH ca. 4, and dried before subm. to Uppsala. All samples diluted.

U-2139. Vema 16-66, b **>13,400**
 $\delta C^{13} = -4.1\%$

Core V16-66, depth 182 cm, $> 65\mu$. Innermost 30% was used.

U-2140. Vema 16-66, a **>20,500**
 $\delta C^{13} = -0.1\%$

Same as U-2139; outermost 70% was used.

U-2141. Vema 16-66, b **>31,700**
 $\delta C^{13} = -1.2\%$

Core V16-66, depth 182 cm, 44 to 65μ . Innermost 85% was used.

U-2142. Vema 16-66, a **>18,500**
 $\delta C^{13} = -3.4\%$

Same as U-2141; outermost 15% was used.

U-2135. Vema 16-66, b **>26,500**
 $\delta C^{13} = -1.8\%$

Core V16-66, depth 202 cm, > 65 μ . Innermost 55% was used.

U-2136. Vema 16-66, a **>22,800**
 $\delta C^{13} = -2.1\%$

Same as U-2135; outermost 45% was used.

U-2137. Vema 16-66, b **>29,000**
 $\delta C^{13} = -2.9\%$

Core V16-66, depth 202 cm, 44 to 65 μ . Innermost 90% was used.

U-2138. Vema 16-66, a **>12,800**
 $\delta C^{13} = -3.5\%$

Same as U-2137; outermost 10% was used.

Pacific Ocean core series

Foraminifera from Core MSN 138 G (00° 15' S Lat, 147° 34' W Long). Coll. 1961 by the *Monsoon* Expedition. Samples were separated into fractions by sieving by acidified boiled distilled water (pH 4) and leached in HCl to give different fractions for studies of contamination such as was seen in cores from Mediterranean (Eriksson and Olsson, 1963; Olsson and Eriksson, 1965; Olsson *et al.*, 1968). Upper samples in core dated previously (R., 1969, v. 11, p. 517-518). Results presented in Paris, 1969 (Olsson and Eriksson, 1971). Pretreated and subm. by K. Gösta Eriksson, Inst. Geol., CTH and Univ. Gothenburg, Sweden.

U-2148. MSN 138 G, b **+1800**
16,600
-1500
14,700 B.C.
 $\delta C^{13} = +1.3\%$

Core MSN 138 G, depth 30 to 40 cm, > 63 μ . *Comment:* innermost 20% was used. Diluted.

U-2149. MSN 138 G, a **+620**
18,030
-580
16,080 B.C.
 $\delta C^{13} = +1.0\%$

Shell layer surrounding U-2148. *Comment:* corresponds to outermost 80% of tests. Diluted.

	+500
	20,670
	-470
U-2150. MSN 138 G, b	18,720 B.C.
	$\delta C^{13} = -0.7\%$
Core MSN 138 G, depth 30 to 40 cm, 4 to 45 μ . <i>Comment:</i> innermost 35% was used.	
	+840
	18,250
	-760
U-2151. MSN 138 G, a	16,300 B.C.
	$\delta C^{13} = -0.4\%$
Shell layer surrounding U-2150. <i>Comment:</i> corresponds to outermost 15% of tests. Diluted.	
	18,500 \pm 500
U-2152. MSN 138 G, b	16,550 B.C.
	$\delta C^{13} = +0.2\%$
Core MSN 138 G, depth 40 to 50 cm, > 63 μ . <i>Comment:</i> innermost 45% was used. Diluted.	
	+480
	19,930
	-450
U-2153. MSN 138 G, a	17,980 B.C.
	$\delta C^{13} = +0.4\%$
Shell layer surrounding U-2152. <i>Comment:</i> corresponds to outermost 55% of tests.	
	+560
	20,430
	-520
U-2155. MSN 138 G, c	18,480 B.C.
	$\delta C^{13} = +3.0\%$
Core MSN 138 G, depth 40 to 50 cm, 4 to 45 μ . <i>Comment:</i> innermost 50% was used.	
	+530
	20,180
	-500
U-2156. MSN 138 G, b	18,230 B.C.
	$\delta C^{13} = +3.6\%$
Shell layer surrounding U-2155. <i>Comment:</i> corresponds to 30% of tests.	

	+540
	19,100
	-510
U-2157. MSN 138 G, a	17,150 B.C.
	$\delta C^{13} = -1.7\%$
Shell layer surrounding U-2156. <i>Comment:</i> corresponds to outermost 20% of tests.	
	+1170
	24,200
	-1020
U-2158. MSN 138 G, b	22,250 B.C.
	$\delta C^{13} = +1.0\%$
Core MSN 138 G, depth 50 to 60 cm, > 63 μ . <i>Comment:</i> innermost 40% was used. Diluted.	
	+1000
	24,000
	- 900
U-2159. MSN 138 G, a	22,100 B.C.
	$\delta C^{13} = +0.6\%$
Shell layer surrounding U-2158. <i>Comment:</i> corresponds to outermost 60% of tests. Diluted.	
	+880
	24,890
	-800
U-2160. MSN 138 G, c	22,940 B.C.
	$\delta C^{13} = -0.4\%$
Core MSN 138 G, depth 50 to 60 cm, 4 to 45 μ . <i>Comment:</i> innermost 35% was used.	
	+760
	23,860
	-690
U-2161. MSN 138 G, b	21,910 B.C.
	$\delta C^{13} = -1.3\%$
Shell layer surrounding U-2160. <i>Comment:</i> corresponds to 45% of tests.	
	+800
	23,100
	-700
U-2162. MSN 138 G, a	21,100 B.C.
	$\delta C^{13} = +10.0\%$
Shell layer surrounding U-2161. <i>Comment:</i> corresponds to outermost 20% of tests.	

	+1200
	31,700
	-1100
U-2163. MSN 138 G, w	29,800 B.C.
	$\delta C^{13} = +0.5\%$
Core MSN 138 G, depth 80 to 88 cm, > 63 μ . <i>Comment</i> : whole tests were used.	
	+4400
	37,400
	-2800
U-2164. MSN 138 G, c	35,500 B.C.
	$\delta C^{13} = -0.7\%$
Core MSN 138 G, depth 80 to 88 cm, 4 to 45 μ . <i>Comment</i> : inner-most 30% was used.	
	+1400
	31,600
	-1200
U-2165. MSN 138 G, b	29,600 B.C.
	$\delta C^{13} = +1.7\%$
Shell layer surrounding U-2164. <i>Comment</i> : corresponds to 35% of tests.	
	+1700
	26,700
	-1500
U-2166. MSN 138 G, a	24,700 B.C.
	$\delta C^{13} = -1.3\%$
Shell layer surrounding U-2165. <i>Comment</i> : corresponds to outer-most 35% of tests.	

B. Iceland

Surtsey series

Cyprina islandica from Surtur II crater (63° 18' N Lat, 20° 37' W Long), Surtsey, Iceland. Alexandersson (1970) discussed marine sediments lithified on the sea floor. Coll. 1968 and subm. by Torbjörn Alexandersson, Dept. Hist. Geol. and Paleontol., Univ. Uppsala, Sweden. *Comment*: sample, ca. 10 g, consisted of 3 fragments of varying sizes (12% very thin, 23% rather thin and 65% appreciably thicker) but due to small amount, fragments were used as 1 sample. Ca. 0.6 g removed from each shell by leaching with dilute HCl before they were joined to 1 sample. "Outer" fraction consists, largely, of CO₂ from smallest fragments, whereas "inner" fraction consists, mainly, of CO₂ from the largest shell. Comparison between U-2146 and U-2147 proves, that the sample consisted of fragments of varying ages. Ages given are mean for shells, which may vary within at least 4000 yr range but probably much longer.

U-2146. Surtsey 200668, b

6010 ± 190
4060 B.C.
 $\delta C^{13} = +0.7\%$

“Innermost” 50% was used. *Comment:* diluted.

+390
10,570
 -370

U-2147. Surtsey 200668, a

8620 B.C.
 $\delta C^{13} = -1.6\%$

Shell layer surrounding U-2146 and smallest shell. *Comment:* corresponds to 35% of shells; 15% removed by washing. Diluted.

Shoreline series

Shells and peat from Iceland to determine chronology of late- and Post-glacial shorelines. Subm. by Thorleifur Einarsson, Sci. Inst., Univ. Iceland.

U-2225. Röndin, Kópasker, 1-70, b

12,830 ± 170
10,880 B.C.
 $\delta C^{13} = +2.7\%$

Mya truncata from cliff Röndin at Kópasker (66° 17.5' N Lat, 18° 27' W Long), Iceland, from silt layer with boulders and shells above pillow lava. Sample underlying 2 m moraine overlain by 1 m loose sand. Innermost 35% was used. *Comment:* difference between U-2225 and U-2226 indicates contamination. Coll. 1969 by Einarsson.

U-2226. Röndin, Kópasker, 1-70, a

11,710 ± 210
9760 B.C.
 $\delta C^{13} = +2.7\%$

Shell layer surrounding U-2225. *Comment:* corresponds to 35% of shells; 30% removed by washing.

U-724. Arnes, Víðidalur, 2-70, b

9730 ± 160
7780 B.C.
 $\delta C^{13} = -2.2\%$

Fragments of *Mytilus edulis*, *Mya truncata*, and *Saxicava arctica* from Arnes, Víðidalur (65° 27' N Lat, 20° 36' W Long), Iceland, from E bank of R. Víðidalsa, 15 m alt, in silt layer, 4 m thick, overlain by 1 m soil. Innermost 95% was used. Coll. 1969 by Einarsson.

U-725. Arnes, Víðidalur, 2-70, a

+2600
9800
 -2000
7850 B.C.
 $\delta C^{13} = +1.2\%$

Shell layer surrounding U-724. *Comment:* corresponds to 5% of shells. Whole sample only 8 g. Diluted.

U-2227. Kaldárbrú, 3-70, b **11,630 ± 160**
9680 B.C.
 $\delta C^{13} = -2.8\text{‰}$

Fragments of *Saxicava arctica* and *Mya truncata* from Kaldárbrú (64° 47' N Lat, 22° 17' W Long), Kolbeinsstadahreppur, Iceland, from 5 m silt below 2 m layer with gravel, on N bank of R. Kaldá, near bridge. Innermost 80% was used.

+540

11,330
-510

U-726. Kaldárbrú, 3-70, a **9380 B.C.**
 $\delta C^{13} = +1.5\text{‰}$

Shell layer surrounding U-2227. *Comment:* corresponds to 15% of shells; 5% removed by washing. Whole sample only ca. 14 g. Diluted.

U-2224. Faxaflói-bay, 2-69, INS **9460 ± 100**
7510 B.C.
 $\delta C^{13} = -29.4\text{‰}$

Peat from floor of Faxaflói-bay (64° 13.5' N Lat, 22° 19' W Long), Melakriki, Iceland, underlying 3 m shelly sand. Depth 40 m. No *Betula* pollen in sample; probably redeposited. Coll. 1968 by Ludvik Jonsson on *M/s Sandey* and subm. by Einarsson.

U-750. Faxaflói-bay, 2-69, SOL **9120 ± 180**
7170 B.C.
 $\delta C^{13} = -29.6\text{‰}$

Humus products extracted from U-2224.

U-2167. Tjarnargata 4, 1-69 **1190 ± 90**
A.D. 760
 $\delta C^{13} = -27.2\text{‰}$

Wood (*Betula nana*) from Tjarnargata 4, Reykjavik (64° 09' N Lat, 21° 57' W Long), Iceland in peat below ground water level, with wood fragments of *Larix decidua* dated as U-2082: 1140 ± 70 (R., 1969, v. 11, p. 520-521) and bones. Coll. 1944 by Finnur Gudmundsson, Mus. Nat. Hist., Reykjavik, Iceland and subm. by Einarsson. Species determined by E. Åberg, Uppsala.

C. Svalbard

Vestspitsbergen series

Shells and whale bones from Vestspitsbergen coll. for determination of land uplift but also used for testing different methods for pretreatment of bones. Alt. given above mean sea level. Previous determinations in this series in R.: 1960, v. 2, p. 115-116; 1961, v. 3, p. 82-83; 1964, v. 6, p. 296-298; 1965, v. 7, p. 317-318; 1967, v. 9, p. 456-457; 1969, v. 11, p. 521-524. Quaternary geology and land uplift is discussed by Birkenmajer (1960), Feyling-Hanssen (1955), Feyling-Hanssen and Olsson (1959-1960), and Birkenmajer and Olsson (1970). Samples from Hornsund coll. 1966 and subm. by Krzysztof Birkenmajer, Polish Acad. Sci., Krakow,

Poland and those from Isfjorden coll. 1960 by D. H. Maling, Rolf Feyling-Hanssen, Dept. Geol., Aarhus Univ., Denmark, and I. U. Olsson. *Comment*: bone treatment with EDTA described in R., 1967, v. 9, p. 456.

910 ± 110

U-2229. Rettkvalbogen E, 1st, Q5a, W **A.D. 1040**
 $\delta C^{13} = -20.7\%$

Wrong fraction from EDTA-treatment of U-2048.

9480 ± 180

U-2228. Isbjørnhamna, 2a₂, Q3a, *Balanus*, b **7530 B.C.**
 δC^{13} assumed +2.8‰

Fragments (*Balanus*) from Isbjørnhamna (77° 00' N Lat, 15° 33' 30" E Long), Wilczekodden, Hornsund, Spitsbergen, alt 7.5 m. Sample overlay sand and gravel but underlay sand, Horizon "d" of 2a₂ Terrace, *Saxicava-Mya* Terrace. *Comment*: fragments (*Mya truncata*, *Saxicava arctica*) from same batch dated previously (R., 1969, v. 11, p. 522). Innermost 55% was used.

+210
9470
-200

U-727. Isbjørnhamna, 2a₂, Q3a, *Balanus*, a **7520 B.C.**
 $\delta C^{13} = +2.8\%$

Shell layer surrounding U-2228. *Comment*: corresponds to 25% of shells; 20% removed by washing.

280 ± 100

U-2270. Kapp Linné 6005, A1, R **A.D. 1670**
 $\delta C^{13} = -14.6\%$

Vertebra of whale from Kapp Linné (78° 04' N Lat, 13° 40' E Long), Isfjorden, Spitsbergen, alt ca. 1 m. Coll. 1960 by Feyling-Hanssen and Olsson. *Comment*: sample treated with acetone before EDTA extraction. Diluted.

+800
4690
-750

U-2271. Kapp Linné 6005, A1, A **2740 B.C.**
 $\delta C^{13} = -25.4\%$

Acetone extract from U-2270. *Comment*: probably contaminated with oil from radio sta. Diluted.

680 ± 80

U-2272. Kapp Linné 6005, B1, R **A.D. 1270**
 $\delta C^{13} = -14.7\%$

Sample from same vertebra as U-2270. *Comment*: not treated with acetone before EDTA extraction.

+210
7550
-200

U-2273. Ekholmrika 6022 b, HCl, <250 μ , r **5600 B.C.**
 $\delta C^{13} = -21.4\%$

Insoluble remains after HCl treatment of whalebone from Ekholmrika (78° 35' N Lat, 16° 38' E Long), Billefjorden, Spitsbergen; alt ca. 50 m. Deeply buried in fine gravel. Coll. 1960 by D. H. Maling. *Comment*: grains < 250 μ used. HCl added until pH of liquid remained at 1 to 1.5 for 4 days. 1-N HCl used.

U-2274. Ekholmrika 6022 b, HCl, <250 μ , l **8960 \pm 130**
7010 B.C.
 $\delta C^{13} = -18.1\%$

In HCl soluble fraction of bone received at treatment giving U-2273.

U-2275. Ekholmrika 6022 b, HCl, 250-500 μ , r **9660 \pm 180**
7710 B.C.
 $\delta C^{13} = -16.6\%$

Insoluble remains after HCl treatment of whalebone also used for U-2273. *Comment*: grains 250 to 500 μ used; pH 1 to 1.5 for 7 days. 1-N HCl used.

+540
7700
-510

U-751. Ekholmrika 6022 b, HCl, 250-500 μ , l **5750 B.C.**
 $\delta C^{13} = -17.5\%$

In HCl soluble fraction of bone received at treatment giving U-2275. *Comment*: diluted.

U-169. Gipshuken 6016 a, inorganic $\Delta = 3121 \pm 30\%$
 δC^{13} assumed -20.0%

Inorganic fraction of bone of U-467, CO₂ liberated at HCl-treatment, with assumed false result. *Comment*: sample was pulverized before treatment. Ca. 25% HCl used. Sample stored in room with high C¹⁴ content before treatment. Diluted.

D. Sweden

Sörmon series

Charcoal from Sörmon (59° 23' N Lat, 13° 22' E Long), Värmland, Sweden. Blomquist (1969) has described Sörmon formation. Coll. 1968 and subm. by Thorsten Blomquist, Inst., Quaternary Geol., Univ. Uppsala, Sweden.

U-2133. Sörmon 8C **7060 \pm 180**
5110 B.C.
 $\delta C^{13} = -27.1\%$

Charcoal from Quarry VII, ca. 0.5 m below surface.

U-2132. Sörmon 10C **2900 ± 100**
950 B.C.
 $\delta C^{13} = -18.5\%$

Charcoal from Quarry VII, ca. 0.6 m below surface.

Kyrkviken series

Post-glacial sediments from Kyrkviken (62° 55' N Lat, 17° 47' E Long), 1 km S Kramfors, Ångermanland, Sweden. Samples from sharp transition from black clay rich in sulphur to light-gray clay with somewhat disturbed micro-varves with organic substance. Salinity analyses by Birgitta Ericsson, diatom analyses by Maj-Britt Florin, both of Inst. Quaternary Geol., Univ. Uppsala, Sweden. Brackish-water sediments. Carbon content ca. 1.4% according to Ericsson. Contamination with graphite not excluded. Kyrkviken sediments described by Ericsson (1970). Coll. 1969 and subm. by Ericsson. *Comment:* due to risk of contamination with allochthonous material, sediments are not suitable for dating; different fractions must be studied. NaOH-soluble fraction dated at lower age than insoluble fraction, as seen previously in similar samples (R., 1964, v. 6, p. 303; 1969, v. 11, p. 532). Insoluble fraction difficult to combust, in comparison with peat, gyttja, or soluble fraction. Total yield in radiocarbon lab. corresponds to < 1% carbon. A detailed description will be given by Olsson, 1971.

U-713. Kyrkviken 1, INS **12,660 ± 260**
10,710 B.C.
 $\delta C^{13} = -28.3\%$

Insoluble part, 0 to 5 cm above transition.

+1200
8000
-1000

U-714. Kyrkviken 1, SOL **6100 B.C.**
 $\delta C^{13} = -27.5\%$

In warm dilute NaOH soluble part from U-713. *Comment:* diluted.

+350
12,100
-340

U-715. Kyrkviken 2, INS **10,150 B.C.**
 $\delta C^{13} = -27.2\%$

Insoluble fraction, 0 to 5 cm above transition. *Comment:* diluted.

U-716. Kyrkviken 2, INS + SOL, 1st **8760 ± 270**
6810 B.C.
 $\delta C^{13} = -27.5\%$

In warm dilute NaOH soluble part mixed with insoluble part from U-715. Fraction corresponds to gas received at 1st step of combustion, when sample is heated very little. *Comment:* diluted.

+5000
16,200
-3100

U-717. Kyrkviken 2, INS + SOL, 2nd **14,200 B.C.**
 $\delta C^{13} = -27.9\%$

Fraction corresponds to gas received at 2nd step of combustion of U-716. Sample is heated more and stronger stream of oxygen is used.
Comment: diluted.

8970 ± 250
7020 B.C.
 $\delta C^{13} = -28.8\%$

U-718. Kyrkviken 3, INS

Insoluble part, 0 to 5 cm below transition. *Comment:* diluted.

+1700
6300
-1400

U-719. Kyrkviken 3, SOL **4300 B.C.**
 $\delta C^{13} = -27.4\%$

In warm dilute NaOH soluble part from U-718. *Comment:* diluted.

+5000
32,100
-3100

U-2276. Graphite 200169, C **30,100 B.C.**
 $\delta C^{13} = -20.9\%$

Graphite from chemicals dealer, Kebo. *Comment:* gas obtained at normal combustion. High temperature, strong stream of oxygen, bad yield. Diluted.

Fjällsjö series

Sediments from Sil, Fjällsjö (63° 46' 13" N Lat, 16° 27' 43" E Long), Ångermanland, Sweden, alt 225 m. Coll. 1969 and subm. by Erling Lindström, Inst. Nat. Geog., Univ. Uppsala, Sweden.

2650 ± 150
700 B.C.
 $\delta C^{13} = -33.0\%$

U-707. Sil, Fjällsjö, I, INS

Peat, 63 to 65 cm below surface.

2540 ± 80
590 B.C.
 $\delta C^{13} = -27.4\%$

U-2205. Sil, Fjällsjö, I, SOL

Humus products extracted from U-707.

2660 ± 80
710 B.C.
 $\delta C^{13} = -28.1\%$

U-2206. Sil, Fjällsjö, II, INS

Silt-gyttja, 65 to 67 cm below surface.

U-2207. Sil, Fjällsjö, II, SOL **2620 ± 80**
670 B.C.
 $\delta C^{13} = -26.8\%$

Humus products extracted from U-2206.

+350
10,920
-340

U-708. Sil, Fjällsjö, III, INS **8970 B.C.**
 $\delta C^{13} = -27.2\%$

Silt with low content of organic material, 118 to 120 cm below surface.

+1500
10,300
-1300

U-709. Sil, Fjällsjö, III, INS + SOL **8300 B.C.**
 $\delta C^{13} = -29.1\%$

Mixture of soluble and insoluble fractions from same level as U-708.
Comment: ca. 2/3 insoluble fraction removed. Sample corresponds to ca. 1/3 insoluble and all soluble fraction. Diluted.

+1000
8600
- 900

U-710. Sil, Fjällsjö, III, SOL **6650 B.C.**
 $\delta C^{13} = -28.6\%$

Humus products extracted from U-708. *Comment:* diluted.

Bjurselet series

Gyttja from Bjurselet (65° 10' N Lat, 21° 10' E Long), Byske parish, Västerbotten, Sweden, to date vegetational development recognized in pollen diagrams related to archaeological studies (see Archaeologic Samples, this series, below) in same area. Pollen analyses by Lars-König Königsson and Thorolf Candolin, Inst. Quaternary Geol., Univ. Uppsala, Sweden. Geol. description by Königsson (1970) including Königsson's interpretation of C^{14} dates. Geol. samples dated previously (R., 1967, v. 7, p. 454-470). Coll. 1964 and subm. by Königsson. *Comment:* all samples highly humified and roots removed by sieving before subm. to radiocarbon lab.; earlier described as carr peat, information when samples were subm., based on preliminary field studies.

U-500. Bjurselet 14 G, INS **2600 ± 600**
700 B.C.
 $\delta C^{13} = -22.1\%$

Sandy silt with gyttja substance, 56 to 53.5 cm below surface, below big decrease of *Salix*. *Comment:* diluted. Very small remainder used to certify that 14 G younger than 11 G. Complete new pretreatment.

U-612. Bjurselet 11 G, INS **3970 ± 70**
2020 B.C.
 $\delta C^{13} = -29.1\%$

Silty gyttja, 48.5 to 46 cm below surface. CO₂ from new combustion, after treatment with HCl, of sample pretreated for U-579. Below 1st appearance of cerealia and *Hordeum*.

U-600. Bjurselet 6 G, INS **3610 ± 60**
1660 B.C.
 $\delta C^{13} = -28.6\%$

Silty gyttja with wood fragments, 38 to 36 cm below surface. Before beginning of *Picea*.

U-2056. Bjurselet 6 G, INS **3450 ± 90**
1500 B.C.
 $\delta C^{13} = -28.6\%$

Same CO₂ as for U-600, but measured in another counter.

U-602. Bjurselet 4 G, INS **2630 ± 80**
680 B.C.
 $\delta C^{13} = -29.7\%$

Peaty gyttja with wood fragments, 34 to 32 cm below surface. Dates maximum of *Pinus* and minimum of *Alnus*.

U-601. Bjurselet 3 G, INS **2420 ± 80**
470 B.C.
 $\delta C^{13} = -28.8\%$

Peaty gyttja with wood fragments, 32 to 29 cm below surface. Dates minimum of *Pinus* and *Picea*, although both show increasing tendency in pollen curves. Also dates maximum of *Alnus* in curve showing decreasing tendency and decrease of *Betula*, *Gramineae* and *Sphagnum* sp. increase strongly.

II. ARCHAEOLOGIC SAMPLES

A. Africa

Ivory coast series

Shells and charcoal from shell mounds adjacent to lagoons, Ivory Coast. Samples dated to prove that shell accumulations are artificial. Mounds generally lense-shaped; formerly regarded as natural deposits, but Dorthe (1964) and Madon (1967, 1969) reported bone and pottery finds. Raymond Mauny, Fac. Lettres et Sci. Humaines, Univ. Paris, France, described sites archaeologically (1971). Present radiocarbon dates discussed by Mauny and Olsson (mss. in preparation). Some dates on different fractions of 1 sample given previously, U-264: 970 ± 110, U-265: 990 ± 70 and U-266: 950 ± 70 (R., 1964, v. 6, p. 294-295), from +15 m, not 48 m as Tricart stated. *Comment: Pachymelania byronensis* lives in slightly brackish water, *Egeria paradoxa* in fresh water, and *Aloidis trigona* in brackish water. Only one possibility given to determine apparent age of water by cross-dating with charcoal from same site. Dif-

ference between weighed mean value of shells (U-2194 and U-2195, *Aloidis*) and charcoal (U-753) is 385 ± 120 .

U-2184. Songon Kassemblé, c **1200 ± 90**
A.D. 750
 $\delta C^{13} = -6.1\%$

Aloidis trigona from Songon Kassemblé (05° 18' N Lat, 04° 17' W Long), Daval, 22 km W Abidjan, from 1 m depth in mound, +0.2 to 1.65 m. Coll. 1969 and subm. by Mauny. *Comment*: innermost 40% was used.

U-2185. Songon Kassemblé, b **1430 ± 130**
A.D. 520
 $\delta C^{13} = -5.1\%$

Shell layer surrounding U-2184. *Comment*: corresponds to 15% of shells.

U-2186. Songon Kassemblé, a **+410**
1130
-390
A.D. 820
 $\delta C^{13} = -8.2\%$

Shell layer surrounding U-2185. *Comment*: corresponds to 25% of shells; 20% removed by washing.

U-2187. Songon Dagbé, 1b **2630 ± 120**
680 B.C.
 $\delta C^{13} = -11.9\%$

Aloidis trigona from Songon Dagbé (05° 18' N Lat, 04° 18' W Long), 23 km W Abidjan, 1 m depth in mound, + 0 to 8 m, containing copper bracelets, axes, pottery and iron harpoon. Coll. 1969 and subm. by Mauny *Comment*: innermost 30% was used.

U-2188. Songon Dagbé, 1a **2640 ± 130**
690 B.C.
 $\delta C^{13} = -11.5\%$

Shell layer surrounding U-2187. *Comment*: corresponds to 35% of shells; 35% removed by washing.

U-2189. Songon Dagbé, 2c **2840 ± 150**
890 B.C.
 $\delta C^{13} = -10.8\%$

Aloidis trigona from same colln. as U-2187. *Comment*: innermost 30% was used.

U-2190. Songon Dagbé, 2b **2730 ± 100**
780 B.C.
 $\delta C^{13} = -7.7\%$

Shell layer surrounding U-2189. *Comment*: corresponds to 40% of shells.

U-2191. Songon Dagbé, 2a
2460 ± 200
510 B.C.
 $\delta C^{13} = -10.2\%$

Shell layer surrounding U-2190. *Comment:* corresponds to 30% of shells; 0% removed by washing.

U-2192. Dabou-Tchotchoraf, -2, b
2920 ± 100
970 B.C.
 $\delta C^{13} = -11.4\%$

Aloidis trigona from Dabou-Tchotchoraf (05° 18' 51" N Lat, 04° 21' 56" W Long), 2 km ESE Dabou, from 2 m depth in mound, + 1 to 5.15 m, containing pottery. Coll. 1969 and subm. by Mauny. *Comment:* innermost 40% was used.

U-2193. Dabou-Tchotchoraf, -2, a
2920 ± 140
970 B.C.
 $\delta C^{13} = -11.8\%$

Shell layer surrounding U-2192. *Comment:* corresponds to 15% of shells; 45% removed by washing.

U-2194. Dabou-Tchotchoraf, -1.1, b
2920 ± 80
970 B.C.
 $\delta C^{13} = -10.1\%$

Aloidis trigona from same mound as U-2192, from 1.1 m depth in mound. *Comment:* innermost 25% was used.

U-2195. Dabou-Tchotchoraf, -1.1, a
3010 ± 140
1060 B.C.
 $\delta C^{13} = -10.4\%$

Shell layer surrounding U-2194. *Comment:* corresponds to 40% of shells; 35% removed by washing.

U-2196. Tiebissou, b
3630 ± 100
1680 B.C.
 $\delta C^{13} = -8.5\%$

Egeria paradoxa from Tiebissou (05° 20' N Lat, 04° 51' W Long), 100 km W Abidjan, on the 2 banks of river at Bandama, 23 km from coast. Sample from several sites 4 to 8 m above level of river. Coll. 1967 by H. Madon, Sodemi, Abidjan and subm. by Mauny. *Comment:* innermost 35% was used.

U-2197. Tiebissou, a
3750 ± 150
1800 B.C.
 $\delta C^{13} = -11.8\%$

Shell layer surrounding U-2196. *Comment:* layer corresponds to 35% of shells; 30% removed by washing.

U-2198. Ehoussou, -1.7, b
3010 ± 100
1060 B.C.
 $\delta C^{13} = -12.1\%$

Pachymelania byronensis from Ehoussou, near lagoon Aby (05° 14' 21" N Lat, 03° 16' 20" W Long), 82 km E Abidjan, from 1.7 m depth

in mound, + 0.1 to 0.9 m, containing bones. Coll. 1967 by Melseaux, Abidjan and subm. by Madon. *Comment*: innermost 25% was used. Sample probably contaminated by CO₂ dissolved in water penetrating into bottom layers of mound.

U-2199. Ehoussou, -1.7, a
2680 ± 140
730 B.C.
 $\delta C^{13} = -12.8\%$

Shell layer surrounding U-2198. *Comment*: corresponds to 35% of shells; 40% removed by washing.

U-2200. Ehoussou, -1.0, b
3310 ± 80
1360 B.C.
 $\delta C^{13} = -13.2\%$

Pachymelania byronensis from same mound as U-2198, from 1.7 m depth. *Comment*: innermost 25% was used.

U-2201. Ehoussou, -1.0, a
3210 ± 150
1260 B.C.
 $\delta C^{13} = -12.4\%$

Shell layer surrounding U-2200. *Comment*: corresponds to 35% of shells; 40% removed by washing.

U2202. Ehoussou, -0.3, b
3340 ± 100
1390 B.C.
 $\delta C^{13} = -11.6\%$

Pachymelania byronensis from same mound as U-2198 and U-2200, from 0.3 m depth. *Comment*: innermost 25% was used.

U-2203. Ehoussou, -0.3, a
3120 ± 140
1170 B.C.
 $\delta C^{13} = -12.1\%$

Shell layer surrounding U-2202. *Comment*: corresponds to 35% of shells; 40% removed by washing.

U-753. Dabou-Tchotchoraf, -1.1, k
2560 ± 90
610 B.C.
 $\delta C^{13} = -25.9\%$

Charcoal from soil separated from shells, part of U-2194. *Comment*: diluted.

B. Sweden

Gårdlösa series

Charcoal from Iron age settlement Gårdlösa No. 2 (grave-field) and No. 3 (house foundations) (55° 34' N Lat, 14° 08' E Long), Smedstorp parish, Skåne, Sweden. Coll. and subm. by Berta Stjernquist, Hist. Mus., Univ. Lund, Sweden. Several samples were dated previously (R., 1965, v. 7, p. 326-327; 1967; v. 9, p. 465-467; 1969, v. 11, p. 536.)

U-746. Gårdlösa 2, Stone-settings 1967, 1550 ± 80
No. 67:8 A.D. 400
 $\delta C^{13} = -26.5\%$

Charcoal from 0.55 to 0.65 m below surface, with melted bronze, fragment of iron, bead, and fragment of a comb. Coll. 1967.

U-706. Gårdlösa 2, Stone-settings 1967, 1800 ± 80
No. 67:11 A.D. 150
 $\delta C^{13} = -25.9\%$

Charcoal from 0.45 to 0.60 m below surface, with melted bronze, fragment of an iron pin, and bead. Coll. 1967.

U-2222. Gårdlösa 2, Stone-settings 1967 1600 ± 80
No. 67:16 A.D. 350
 $\delta C^{13} = -24.5\%$

Charcoal from 0.55 to 0.65 m below surface, with melted bronze, fragments of bronze sheets, iron fragments, beads, and parts of 2 spindle whirles. Coll. 1967.

U-705. Gårdlösa 2, Stone-settings 1967 1300 ± 70
No. 67:27 A.D. 650
 $\delta C^{13} = -28.3\%$

Charcoal from 0.45 to 0.55 m below surface, with part of the bronze spring of a fibula, iron fragments, beads, and melted glass. Coll. 1967.

U-2219. Gårdlösa 2, Stone-settings 1967, 1430 ± 70
No. 67:32 A.D. 520
 $\delta C^{13} = -25.4\%$

Charcoal from 0.58 to 0.63 m below surface with bones of a dog. Coll. 1967. *Comment:* part of sample dated previously, U-672: 1340 ± 70.

U-2220. Gårdlösa 2, Stone-settings 1967, 1505 ± 75
No. 67:33 A.D. 445
 $\delta C^{13} = -25.5\%$

Charcoal from 0.55 to 0.70 m below surface, with a bead. Coll. 1967.

U-2221. Gårdlösa 2, Stone-settings 1967, 1360 ± 80
No. 67:39 A.D. 590
 $\delta C^{13} = -24.9\%$

Charcoal from 0.50 to 0.65 m below surface, with bronze fragment with ornament, and bead. Coll. 1967.

U-747. Gårdlösa 3, House LI 1310 ± 100
A.D. 640
 $\delta C^{13} = -24.0\%$

Charcoal from layer, underlying 20-cm-thick layer with cultivated soil from 0.65 to 1.05 m below surface, with potsherds and a bead. Coll. 1966.

U-2261. Gårdlösa 3, House XLVII **1550 ± 80**
A.D. 400
 $\delta C^{13} = -24.3\%$

Charcoal from layer, underlying 20-cm-thick layer with cultivated soil, from 0.70 to 0.95 m below surface, with fibula of bronze, iron and bronze pin, fragments of knives, bead, and potsherds. Coll. 1965.

U-752. Ödehoburga 1²¹ **2290 ± 130**
340 B.C.
 $\delta C^{13} = -24.3\%$

Charcoal from Ödehoburga (57° 54' N Lat, 19° 6' E Long), Fårö, Gotland, Sweden, from big piece of charcoal in hearth with potsherds. Coll. 1970 and subm. by Anna-Lena Gerdin, Gotland's Hist. Mus., Visby, Sweden.

Bjurselet series

Charcoal and bones from Bjurselet (65° 00' N Lat, 21° 04' E Long), Byrke parish, Västerbotten, Sweden. From Stone age dwelling-site, alt 53 m, with imported flint axes, scrapers, and potsherds. Upper layer consisted of cultivated soil, Layer I, underlain by sand, Layers II, III, and IV (Christiansson, 1965a, b, 1970). Samples dated previously (R., 1967, v. 9, p. 467-469; 1969, v. 11, p. 539). Pollen profile from same area discussed by Königsson (1970), with his interpretation of radiocarbon dates from Uppsala lab., partly pub. previously (R., 1969, v. 9, p. 465; this list, above). Subm. by Christiansson, Inst. Nordic Antiquities, Univ. Uppsala, Sweden.

U-2223. Bjurselet 116/266, Härdplatsen **480 ± 70**
A.D. 1470
 $\delta C^{13} = -25.0\%$

Charcoal from hearth. Coll. 1968 by Christiansson.

U-2204. Bjurselet 194/230, Åkern **+580**
1970
-550
20 B.C.
 δC^{13} assumed -19%

Burned seal bone (*Pusa hispida*) from field, Layer II and III. Coll. 1966 by Christiansson. *Comment:* sample EDTA-treated, but was so small that "right" and "wrong" fractions were combined and dated as one sample. Diluted.

III. TREE-RING SAMPLES

Northern Sweden series

Pinus from Hörnett at Hörnsjön (63° 17' N Lat, 18° 40½' E Long), Ångermanland, Sweden. Tree from hill S of lake, 100 m alt, felled 1969, age 56 yr, ca. 1.5 m above ground. Softwood. Subm. by A. Assarsson, Mo and Domsjö AB, Örnsköldsvik, Sweden, where part of wood was

chemically treated as described previously (R., 1969, v. 11, p. 539-540). Standardized treatment was applied on part of wood (Uppsala) as a check. *General Comment:* "atomic-bomb effect" seen in the extract from tree rings grown as early as A.D. 1950-1945 is assumed due to radial movement of nutrients in the parenchyma cells. Extraction with NaOH (1% b. w.) also gave an extract showing "atomic-bomb effect", although slightly smaller than that observed following more sophisticated treatment. Treatment of remaining wood at Uppsala gave higher activity than the holocellulose and wood extracted at Mo and Domsjö, implying that standard treatment with NaOH may be insufficient for precise work such as calibration of radiocarbon time scale. A similar result was observed for *Fitzroya* (see "Argentina series" below).

Age-corrected excess in activity of <i>Pinus</i> wood, A.D. 1945-1950					
Lab. no.	Substance	$\delta C^{13} \text{‰}$	$\Delta \text{‰}$	$T_{1/2} = 5730$	Prepared in
U-2168	Holocellulose	-22.8	-	35.6 ± 7.8	Örnsköldsvik
U-2169	Extracted wood	-23.1	-	42.0 ± 7.0	Örnsköldsvik
U-2170	Extract	-27.4	+	145.8 ± 10.2	Örnsköldsvik
U-2171	Extracted wood (INS)	-25.1	-	13.9 ± 6.7	Uppsala
U-2172	Extract (SOL)	-13.6	+	114.3 ± 22.2	Uppsala

Argentina series

Tree trunk (*Fitzroya cupressoides*) from Parque Nac. Los Alerces (43° S Lat, 71° W Long), Esquel, Chubut, Argentina. Park created 1937. Trunk donated by Intendencia, Parc Nac. Los Alerces via Åke Vinterbäck, Univ. Uppsala, Sweden. Tree rings counted by Horrying, High School of Forestry, Stockholm, Sweden. Tree probably was felled A.D. 1934. Cellulose and lignin prepared according to Olson and Broecker (1958), the 2 cellulose fractions, however, with slightly different procedures. One sample separated into fractions at Mo and Domsjö (see N Sweden series, above; R., 1969, v. 11, p. 539-540). Some results pub. previously (R., 1969, v. 11, p. 541). Results from same trees pub. by Lerman *et al.* (1970).

Lab. no.	Age before		Substance	Age-corrected excess		
	A.D. 1934	Age B.P. (1950)		$\delta C^{13} \text{‰}$	$\delta C^{14} \text{‰}$	$\Delta \text{‰}$
U-2281	619-610	630.5	Lignin	-24.6	-17.3	-18 ± 9
U-2282	619-610	630.5	Cellulose w	-22.8	-19.7	-24 ± 9
U-2283	619-610	630.5	Cellulose y	-22.9	-22.6	-27 ± 9
U-2284	589-580	600.5	Holocellulose	-22.4	- 2.7	$- 8 \pm 5$
U-2285	589-580	600.5	Extracted wood	-24.6	- 6.3	$- 7 \pm 5$
U-743	589-580	600.5	Extract	-25.1	+20.4	$+21 \pm 8$

IV. GEOCHEMICAL SAMPLES

Tree leaves series

Tree leaves coll. to investigate influence of dissolved carbonate on C^{14}/C^{12} ratio in trees. Contemporaneous C^{14}/C^{12} ratio of atmosphere will be given later (Olsson, ms. in preparation). Present samples from Uppland, from area with soft ground-water and those from Öland, from area with hard ground-water (Olsson *et al.*, 1969).

U-689. *Salix*, Järlåsa 10 06 68, INS $\delta C^{14} = +587 \pm 11\%$
 $\Delta = +600 \pm 11\%$
 $\delta C^{13} = -29.0\%$

Leaves (*Salix*) at ditch with water at Rönningen (17° 13' N Lat, 59° 58½' E Long), Norra Hagunda; Uppland, Sweden. Coll. 1968 by Olsson.

U-690. *Betula*, Järlåsa 10 06 68, INS $\delta C^{14} = +593 \pm 11\%$
 $\Delta = +601 \pm 11\%$
 $\delta C^{13} = -27.5\%$

Leaves (*Betula*) at Hedbolund (17° 13' N Lat, 59° 56' E Long), Norra Hagunda, Uppland, Sweden. Coll. 1968 by Olsson.

U-691. *Salix*, MM 10 06 68, INS $\delta C^{14} = +611 \pm 9\%$
 $\Delta = +623 \pm 9\%$
 $\delta C^{13} = -28.5\%$

Leaves (*Salix*) at Möckelmosen (56° 32' N Lat, 16° 31' E Long), Öland, Sweden. Coll. approx. same day as Järlåsa samples, 1968 by Königsson.

U-692. *Salix*, MM 10 06 68, SOL $\delta C^{14} = +576 \pm 8\%$
 $\Delta = +588 \pm 8\%$
 $\delta C^{13} = -28.8\%$

In warm dilute NaOH soluble fraction of U-691.

U-693. *Betula*, MM 10 06 68, INS $\delta C^{14} = +578 \pm 9\%$
 $\Delta = +592 \pm 9\%$
 $\delta C^{13} = -29.5\%$

Leaves (*Betula*) at Möckelmosen (56° 32' N Lat, 16° 31' E Long), Öland, Sweden. Coll. approx. same day as Järlåsa samples, 1968 by Königsson.

U-694. *Betula*, MM 10 06 68, SOL $\delta C^{14} = +585 \pm 9\%$
 $\Delta = +595 \pm 9\%$
 $\delta C^{13} = -28.2\%$

In warm dilute NaOH soluble fraction of U-693.

Plant series

Tomato plants grown to investigate influence of dissolved carbonate on C^{14}/C^{12} ratio in plants. Contemporaneous C^{14}/C^{12} ratio of atmosphere will be given later (Olsson, ms., in preparation). Plants grown in plastic buckets on balcony outside C^{14} lab., 1968.

U-2278. Tomato 68, L, C12, INS $\delta C^{14} = +575 \pm 10$
 $\Delta = +576 \pm 10$
 $\delta C^{13} = -25.2\%$

Tomato leaves grown in peat to which C^{14} -free carbonate was added.

U-2279. Tomato 68, L, Cn, TW, INS $\delta C^{14} = +590 \pm 12$
 $\Delta = +590 \pm 12$
 $\delta C^{13} = -25.8\%$

Tomato leaves grown in peat. Watered by rain and tap water.

U-2280. Tomato 68, L, C14, INS $\delta C^{14} = +576 \pm 9$
 $\Delta = +565 \pm 9$
 $\delta C^{13} = -21.8\%$

Tomato leaves grown in peat to which 6 g $CaCO_3$ with $\Delta = 3940 \pm 80$ was added, δC^{13} assumed $-25. \%$.

U-757. Tomato 68, L, C14, SOL $\delta C^{14} = +569 \pm 17$
 $\Delta = +585 \pm 17$
 $\delta C^{13} = -30.1\%$

In warm dilute NaOH soluble fraction extracted from U-2280.

U-754. Tomato 68, R, C12, INS $\delta C^{14} = +550 \pm 12$
 $\Delta = +551 \pm 12$
 $\delta C^{13} = -25.2\%$

Roots of tomato plant used for U-2278. *Comment:* diluted.

U-755. Tomato 68, R, Cn, TW, INS $\delta C^{14} = +590 \pm 11$
 $\Delta = +593 \pm 11$
 $\delta C^{13} = -26.0\%$

Roots of tomato plants used for U-2279.

U-756. Tomato 68, R, C14, INS $\delta C^{14} = +577 \pm 12$
 $\Delta = +582 \pm 12$
 $\delta C^{13} = -26.7\%$

Roots of tomato plant used for U-2280 and U-757. *Comment:* diluted.

Corrections to earlier lists

R., 1967, v. 9, p. 457: U-506 should be U-482.

R., 1967, v. 9, p. 458: U-2019. Ekruhorn, $11,620 \pm 240$ (9670 B.C.)

R., 1967, v. 9, p. 463: U-468. Lillsjön I, 70 to 74, 9180 ± 380 (7230 B.C.).

R., 1969, v. 11, p. 523: U-2121 should be U-2120.

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