

STOCKHOLM NATURAL RADIOCARBON MEASUREMENTS III

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INTRODUCTION

This paper is a direct continuation of the second date list released from this laboratory (Östlund, 1959), and the technique of preparation and the characteristics of our two 3-atmospheres carbon dioxide counters are substantially unchanged (Östlund 1957a, b). As in previous lists, our standard is oak wood, grown A.D. 1845-1855 in Stockholm, corrected for radioactive decay to 1960. As usual, the counting rates have been corrected according to the mass-spectrometrically measured C^{13}/C^{12} ratio in each sample of purified carbon dioxide. In this scale the U. S. National Bureau of Standards Natural Radiocarbon Standard (NBS standard) gives a counting rate which is $104.5 \pm 0.4\%$ of our age-corrected oak standard. Taking into account that our oak has a C^{13}/C^{12} ratio of 25 per mil lower than the Chicago PDB- C^{13} standard, our age figures can, by subtracting 55 years, be converted to the new, international radiocarbon age scale proposed by Broecker and Olson (1959).

In each error are included the statistical uncertainties of the measurements of the sample and related standard and background figures, together with the small error in the half-life of radiocarbon, the latter assumed to be 5568 ± 30 years. The variation of the C^{14} activity of the biosphere during past times, as reported by de Vries (1958), has not been taken into account.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES—SWEDEN

A. Interglacial and Interstadial Samples

St-492. Porsi >40,000

Sample of ooze below 9 m till at Porsi, Jokkmokk, Lappland ($66^{\circ} 28' N$ Lat, $20^{\circ} 43' E$ Long), Sweden. Coll. by I. Hector, Porsi; subm. by G. Lundqvist, Geological Survey of Sweden (to be published). *Comment* (G.L.): the ooze is interglacial, which was expected.

Ingebäck series

Samples of marine clay, low in organic matter, and very low in carbonate, cut from a core taken at Ingebäck in the valley of the river Göta Älv, 11 km N of Göteborg ($57^{\circ} 48' N$ Lat, $12^{\circ} 00' E$ Long), Sweden. Core revealed an unexpectedly thick layer of sediments, namely, 90 m to the rock. Coll. and

subm. by F. Brotzen, Geological Survey of Sweden. Samples of about 0.5 kg were burned without pretreatment.

St-450. Ingebäck 4	10,710 ± 150
Beccari zone, postglacial. Depth 4.0 to 4.3 m.	
St-449. Ingebäck 12	16,040 ± 200
Beccari zone, postglacial. Depth 12.5 to 12.8 m.	
St-431. Ingebäck 14	15,740 ± 290
Lowest Beccari level, postglacial. Depth 14.8 to 15.1 m.	
St-447. Ingebäck 33	15,200 ± 250
Lowest part of the upper Late-Glacial. Depth 33.1 to 34.1 m.	
St-430. Ingebäck 55	15,350 ± 220
Lowest part of conglomerate of the lower Late-Glacial. Depth 55.6 to 56.1 m.	
St-448. Ingebäck 59	26,700 + 1300 - 1000
Upper part of interstadial sandy clay. Depth 59.1 to 60.0 m.	
St-429. Ingebäck 64	29,000 + 1300 - 1000
Lowest part of interstadial sandy clay, resting on gravel. Depth 64.0 to 65.0 m.	

Comment (F.B., G.Ö.): work with this series is being continued, but it is already clear that the two lowest samples indicate a late interstadial.

B. Postglacial Strandlines and Peat Bogs

St-439. Hällby **3970 ± 80**
Wood found at 6 m depth, covered by sand and clay in the esker Strömsholmsåsen, ca. 800 m SW of Hällby, 5 km W of Eskilstuna, Södermanland (59° 23' N Lat, 16° 25' E Long), Sweden. Measured in the program of the study of the process of crustal uplift. Subm. and described by G. Lundqvist (1959b), Geological Survey of Sweden.

St-462. Kärna mosse **7720 ± 120**
Wood in peat under the *Ancylus* limit, 1 km ESE of the church of Kärna, W of Linköping, Östergötland (58° 05' N Lat, 16° 03' E Long), Sweden. Coll. 1909 by the late H. Munthe; subm. by G. Lundqvist, Geological Survey of Sweden, from the museum of the Survey. *Comment* (G.L.): according to earlier knowledge this locality was supposed to date the *Ancylus* limit, but the obtained C¹⁴ age shows this shoreline to be younger than that.

Lidamossen series

Samples of peat from cores taken from the raised bog Lidamossen, 10 km ESE of Eskilstuna, Södermanland (59° 20' N Lat, 17° 42' E Long), Sweden. These measurements were made in order to study the development of the bog, especially its recurrence surface (R.S.), and the isolation level (indicating the time of its isolation from the sea). Coll. by C. Larsson; subm. and described by G. Lundqvist (1959b), Geological Survey of Sweden. Core no. 4 was in a

central part of the bog, and cores no. 2 and 7 were more peripherally located. The stratigraphically identical R.S. was dated by samples above and below the R.S. in each of the three cores.

St-463. Lida 9	700 ± 85
Core 4. Above the R.S., 120 cm below the surface.	
St-464. Lida 10	1020 ± 90
Core 4. Below the R.S., 130 to 135 cm below the surface.	
St-467. Lida 13	540 ± 85
Core 7. Above the R.S., 70 to 80 cm below the surface.	
St-469. Lida 14	850 ± 85
Core 7. Below the R.S., 80 to 85 cm below the surface.	
St-470. Lida 15	245 ± 80
Core 2. Above the R.S., 40 to 50 cm below the surface.	
St-471. Lida 16	670 ± 105
Core 2. Below the R.S., 60 to 70 cm below the surface.	
St-465. Lida 11	2100 ± 100
Core 4. 175 cm below the surface.	
St-466. Lida 12	5990 ± 110
Core 4. The isolation level, 440 to 450 cm below the surface.	

Comment (G.L.): from the first six of these listed samples it is seen that the R.S. in this bog is not synchronous over the entire bog but becomes younger toward the periphery; this was unexpected. In addition, the whole R.S. is younger than had previously supposed.

Stormossen series

Samples of peat collected in profiles of the bog Stormossen, 10 km SW of Eskilstuna, Södermanland (59° 20' N Lat, 16° 20' E Long), Sweden. This investigation was made in order to study both the development of a bog and the process of crustal uplift. Thus, special interest is given to the ages of the recurrence surface and the isolation level. Coll., subm., and described by G. Lundqvist (1959b), Geological Survey of Sweden.

St-494. Stormossen 1	1580 ± 90
Core 3. 240 cm below the surface. Indicates the age of the quagmire.	
St-495. Stormossen 2	240 ± 80
Core 5. 20 cm below the surface.	
St-496. Stormossen 3	4380 ± 110
Core 8. The level of isolation, 400 cm below the surface.	
St-497. Stormossen 4	2820 ± 140
Core 8. 265 cm below the surface. First occurrence of <i>Picea</i> pollen curve.	
St-498. Stormossen 5	2570 ± 100
Core 8. 200 cm below the surface. Beginning of continuous <i>Picea</i> pollen curve.	
St-499. Stormossen 6	2070 ± 90
Core 8. An earlier recurrence surface (R.S.), 150 cm below the surface.	

St-500. Stormossen 7 **1220 ± 100**

Core 8. Below the well-developed R.S., 100 cm below the surface. This R.S. corresponds stratigraphically to the level of St-495.

St-501. Stormossen 8 **1180 ± 130**

Immediately above the well-developed R.S., 85 cm below the surface.

*C. Various Geologic Samples***St-441. Peskehaure** **6760 ± 160**

Subfossil stump of pine, found above the present tree limit S of lake Peskehaure, Lappland (66° 55' N Lat, 16° 33' E Long), Sweden. Coll. by the late Fr. Svenonius; subm. by G. Lundqvist, Geological Survey of Sweden from its museum.

Gulf of Bothnia series

Three samples of clay containing a small amount of organic matter, taken as an integral part of an investigation of the geochronology of northern Sweden as reflected in the bottom sediments of the Gulf of Bothnia. The samples were ooze-varved clay situated directly above the underlying gray clay, the latter considered to be glacial. Expected age was 6500 to 7000 B.C. Coll. and subm. by A. Jerbo, Geological Survey of Sweden.

St-432. Bothnia A **6050 ± 110**

(61° 22' N Lat, 17° 27' E Long.) Water depth 82 m (echo-sounding). Depth in postglacial sediment 10.5 m.

St-433. Bothnia B **5980 ± 140**

(63° 07' N Lat, 19° 27.5' E Long.) Water depth 169 m (echo-sounding). Postglacial sediment depth 7.5 m.

St-434. Bothnia C **5920 ± 130**

(65° 23' N Lat, 22° 55' E Long.) Water depth 92 m (echo-sounding). Postglacial sediment depth 8 m.

II. ARCHAEOLOGIC SAMPLES—SWEDEN

*A. Lappland and Neighboring Provinces***St-403. Borgasjön** **470 ± 80**

Sample of birch trunks used in the construction of a dwelling place at Lake Borgasjön, Dorotea parish, Lappland (64° 51' N Lat, 14° 58.5' E Long), Sweden. In a hearth under the ruptured roof were found a scraper and several other pieces of quartz. Coll. 1950 and subm. by H. Hvarfner, Royal Office of Antiquities, Stockholm. *Comment* (H.H. and G.Ö.): charcoal from the hearth was also dated. One large piece, St-402A, gave a date of 3450 ± 250 yr. From the remaining material (smaller pieces of charred wood and other plant remnants), a new portion was measured. This preparation, St-402B, gave 850 ± 100 yr. The reason for the difference between the C¹⁴ ages of St-402 and St-403 is evidently that the burned material consisted in part of a dry fir which had grown 3000 yr before its use. Such dry firs have been found to be very old (Östlund, 1959, p. 37-38; Lundqvist, 1959a), and it is a known fact that even nowadays the Lapps prefer dry fir for camp firing, owing to its very superior qualities for this purpose.

Hornavan series

Charcoal from sites at Döudden, at Lake Hornavan, Arjeplog parish, Lappland (66° 04' N Lat, 18° 09' E Long), Sweden. The place is a small peninsula formed by drifting sand, bound by vegetation, containing several culture levels. The finds in the lower levels comprise stone artifacts only, but the upper levels contain some ceramics in addition. Coll. 1958 by Birgitta Hallgren and Göte Östlund; subm. by H. Hvarfner, Royal Office of Antiquities, Stockholm.

St-454. Döudden 2 **1920 ± 80**

Thin, extensive layer of charcoal, covered by sand up to base of present-day vegetation, but situated above the uppermost reliable cultural layer.

St-455. Döudden 5 **1710 ± 70**

Stratigraphically the same layer as St-454 but 5 m from that point.

St-457. Döudden 13 **1810 ± 75**

Stratigraphically the same layer at a third point.

St-453. Döudden 1 **Average: 6160 ± 100**

Charcoal among the stones of a hearth at the lower surface of the lowermost cultural layer. Three preparations were made:

St-453A. Gross sample **6260 ± 225**

St-453F. Sifted sample, fine fraction **6140 ± 140**

St-453C. Sifted sample, coarse fraction **6125 ± 140**

St-456. Döudden 11 **6170 ± 100**

Charcoal among the stones of another hearth at the same stratigraphic position as St-453. At least one stone scraper was found definitely related to the hearth.

Comment (H.H. and G.Ö.): the great age of the lowest samples is confusing, especially since the investigation St-453A,F, and C makes very unlikely any error similar to that mentioned in St-403 above. The work is being continued, and the intermediate layers will also be investigated.

Stensele series

Charcoal from hearths at site no. 690 at the bay Sörviken, Lake Storuman, Stensele parish, Lappland (65° 08' N Lat, 17° 03' E Long), Sweden. In this series is also included one sample from site no. 694 at the bay Stenselet, 5 km SSE of the above locality. The archaeological findings are artifacts originating from several cultures ranging from the arctic stone age to the 18th century. Coll. 1954 and 1955 and subm. by H. Hvarfner, Royal Office of Antiquities, Stockholm.

St-407. Sörviken, hearth 2 **1150 ± 80**

Connected finds are a stone arrow point, a stone scraper, and ceramics.

St-408. Sörviken, hearth 3 **1775 ± 100**

Connected find is a silver loaf of very late design, (medieval or later).

St-409. Sörviken, hearth 4 **1100 ± 85**

Connected finds are a whetstone, and a quartz arrow point.

- St-410. Sörviken, hearth 5** **970 ± 70**
 Connected finds are iron artifacts and asbestos-tempered ceramics.
- St-411. Sörviken, hearth 6** **945 ± 100**
 No finds.
- St-412. Sörviken, hearth 8** **310 ± 120**
 Connected finds are quartz scrapers.
- St-413. Sörviken, section K5** **1460 ± 100**
 Connected finds are fragments of bronze kettles, dated as about 11th century A.D., and ceramics.
- St-418. Stenselet, hearth 5B** **1010 ± 100**
 Connected finds are fragments of bronze kettles, possibly dating from about the 11th century A.D., and ceramics.
Comment (H.H. and G.Ö.): with the exception of St-408 and St-413, the age figures obtained are reasonable. Those two dates might be too old owing to the same cause as described in the comment in St-403, above.
- St-435. Vejenäs** **1240 ± 70**
 Charcoal from the bottom of a pit trap, also used for cooking, found in a gravel ridge at Vejenäs, Arjeplog parish, Lappland (66° 15' N Lat, 16° 48' E Long), Sweden. Subm. by E. Manker, Nordiska Museet, Stockholm.
- St-436. Alfta** **300 ± 60**
 Stem of an ackja (hollowed-out trunk sledge, snow boat) found 1952 in near-shore deposits of Lake Börnasen, Alfta parish, Helsingland (60° 17' N Lat, 15° 49' E Long), Sweden. Subm. by E. Manker, Nordiska Museet, Stockholm.
- St-437. Adak** **980 ± 70**
 Sled runner, found in the soil by the stream Skeppträskån, Adak, Malå parish, Lappland (65° 20' N Lat, 17° 33' E Long), Sweden. Subm. by E. Manker, Nordiska Museet, Stockholm.
- St-452. Järvträsk** **1390 ± 75**
 Wooden spade found 1950 in soil at Järvträsk, Arvidsjaur parish, Lappland (65° 13' N Lat, 16° 39' E Long), Sweden. Subm. by E. Manker, Nordiska Museet, Stockholm.

B. Southern Sweden

Fiskeby, Horn, Bankälla, and Rogsta Hage series

Resin caulking from grave fields, measured as part of the work on the chronology of late Bronze Age-Early Iron Age in Sweden. An earlier part of the Fiskeby series has been measured previously (Östlund 1959, p. 41). The present samples were taken from Fiskeby and three other grave fields in southern central Sweden, containing archaeologically comparable material. Coll. 1951-1952 and subm. by P. Lundström, Museum of National Antiquities, Stockholm. Descriptions have been made by Sahlström and Gejvall (1948, 1954) and by the submitter (Lundström, 1952a, b).

Fiskeby

Location: Fiskeby, Ö. Eneby parish, Östergötland (58° 36' N Lat, 16° 06' E Long), Sweden.

St-405.	Fiskeby 6.	Grave No. 7	2140 ± 140
St-482.	Fiskeby 13.	Grave No. 290	2120 ± 110
St-481.	Fiskeby 14.	Grave No. 316	2100 ± 80
St-483.	Fiskeby 15.	Grave No. 198	2050 ± 80
St-484.	Fiskeby 16.	Grave No. 414	2335 ± 85
St-505.	Fiskeby 17.	Grave No. 614	1970 ± 80
St-506.	Fiskeby 18.	Grave No. 133	2110 ± 80
St-507.	Fiskeby 19.	Grave No. 283	1930 ± 80
St-508.	Fiskeby 20.	Grave No. 644	1990 ± 75
St-509.	Fiskeby 21.	Grave No. 542	2070 ± 70
St-510.	Fiskeby 22.	Grave No. 681	1940 ± 60

Horn

Location: Kyrkbacken, Horn parish, Västergötland (58° 31' N Lat, 13° 54' E Long), Sweden.

St-444.	Horn 9.	Grave No. 23273:109	2100 ± 70
St-445.	Horn 10.	Grave No. 23273:119	2240 ± 90
St-446.	Horn 11.	Grave No. 23435:211	2020 ± 80
St-480.	Bankälla		1965 ± 75

Location: Bankälla, Välla, parish, Västergötland (58° 32' N Lat, 13° 56' E Long), Sweden.

St-443.	Rogsta Hage		2470 ± 100
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Location: Rogsta Hage, Tystberga parish, Södermanland (58° 51' N Lat, 17° 13' E Long), Sweden.

St-475. Säter, Östergötland 1805 ± 70

Charcoal from a hearth in the upper part of the culture layer of the habitation site Säter III, Kvarsebo parish, Östergötland (58° 13' N Lat, 16° 35' E Long), Sweden. This site is a main station of the Middle Neolithic Pitted Ware Culture. Coll. 1959 and subm. by Mats P. Malmer, Museum of National Antiquities, Stockholm. *Comment* (M.P.M.): date shows that the hearth must be much later than the Stone Age settlement.

St-486. Simunde, Gotland 910 ± 70

Sample of charcoal, collected in a refuse pit on a Stone Age dwelling place at Simunde, Hörsne (formerly Bara) parish, Gotland, Sweden (56° 36' N Lat, 18° 38' E Long), excavated 1957-1958. Subm. by B. Schönback, Museum of National Antiquities, Stockholm. *Comment* (B.S.): the sample, presumed to belong to the Stone Age settlement, would have been of great importance for dating the later phase of the Gotlandic preceramic Stone Age culture. The difference of about 3500 yr between the archaeologic dating and the C¹⁴ age, however, indicates that remains from a late Iron Age fireplace have been buried in the same Stone Age pit.

Broby series, Uppland

The following samples were collected during the excavations 1955-1957 on a large prehistoric site at Broby, Börje parish, Uppland (59° 55' N Lat, 17° 32' E Long), Sweden. The monuments excavated include house- and hut foundations, workshop, graves, etc., all belonging to a late Bronze Age culture. The chronological limits of this east-Scandinavian phase of the Bronze Age, especially its end, are very difficult to establish; the supposition that it in fact extends up to the fully developed Iron Age (3rd period of the Iron Age) is strengthened by some of the samples below. Subm. by B. Schönback, Museum of National Antiquities, Stockholm, who has published preliminary excavation reports (Schönback, 1952, 1959).

St-487. Broby 1, No. 34 **1950 ± 200**

Charcoal from a refuse layer, outside grave no. 34, which was built as a "house of the dead".

St-488. Broby 2, No. 34 **2930 ± 100**

Lump of resin, collected in the same layer as the sample above, but about 10 cm lower.

St-489. Broby 3, No. 38 **2695 ± 100**

Lump of resin from fill of burial mound (placed on top of a former hut?).

St-490. Broby 4, No. 53B **2730 ± 90**

Charcoal from a bronze-founder's furnace pit, overlain by a Late Bronze Age burial.

St-491. Broby 5, No. 53C **2470 ± 90**

Sample like no. 4 from a similar pit, stratified in the same way.

St-493. Vildmossen **1090 ± 100**

Peat containing plaited plant fibers, found 1955 in the bog Vildmossen, Nässjö, Småland (57° 41' N Lat, 14° 39' E Long), Sweden, at a depth of 1.8 to 2 m below the surface. The find was located about 150 m from the shoreline of a former lake, now occupied by the bog. Subm. by A. Oldeberg, Museum of National Antiquities, Stockholm.

St-406. Linköping **300 ± 60**

Wood from a door frame in basement of a medieval house at the ancient Bishop Court, Linköping, Östergötland (58° 25' N Lat, 15° 37' E Long), Sweden. The question was to decide whether the material belonged to the Medieval Age or if the tree had been cut for a repair made in A.D. 1737. Coll. and subm. by E. Ridderstad, Linköping, *Comment* (G.Ö.): no absolutely certain conclusion can be drawn from the obtained C¹⁴ age, but the younger alternative is more probable.

C. Archaeologic Samples—Other Countries

Khirokitia series

Samples of charcoal in the pre-pottery levels from the Neolithic I settlement of Khirokitia, Cyprus (34° 47.5' N Lat, 33° 20.5' E Long). The layer was grayish soil containing flint and obsidian implements together with the charcoal, probably the result of burnt superstructures of mud and brushwood.

Archaeologic dating of the settlement was 3700-3400 B.C. (Dikaios, 1953, p. 314-315); it is considered to be the oldest so far discovered in Cyprus. Coll. and subm. by P. Dikaios, Cyprus Museum, Nicosia, Cyprus.

St-414. Khirokitia 1 **7570 ± 125**

Sample from the lowest layer in the north sector of the corridor surrounding Tholos I A (Dikaios, 1953, p. 1, and pl. VI).

St-415. Khirokitia 2 **7710 ± 160**

Check sample, same details as for St-414.

Average of St-414 and St-415 **7635 ± 100**

St-416. Khirokitia 3 **7500 ± 160**

Sample from the layers under the northwest stone of the foundation of Tholos XVII (Dikaios, 1953, fig. 50).

Comment (P.D.): There is an unexpected gap of almost two millenia between the Khirokitia pre-pottery culture and the Sotira combed ware culture (Dikaios, in press). The present dates are very important for Cypriot pre-history.

St-419. Kalavassos B **5140 ± 110**

Charcoal belonging to the Kalavassos B Culture at Kalavassos, Cyprus (34° 44.5' N Lat, 33° 19' E Long). The samples were collected from a layer under floor VI (the lowest) overlying bedrock in the half-sunk dwelling VIII (Dikaios, 1953, p. 314). The cultural stage to some extent corresponds to the Erimi culture. The main feature from the ceramic point of view is the presence of red on white pottery, but some combed pottery did occur, thus linking the Kalavassos B culture with the earlier Sotira culture belonging to the Neolithic II period. Samples from the Sotira culture were dated earlier at about 5150 and about 5460 B.P. (Östlund, 1959, St-350 and St-337). Coll. 1947 and subm. by P. Dikaios, Cyprus Museum, Nicosia, Cyprus. *Comment* (P.D.): age obtained checks well with the Sotira dates.

III. GEOPHYSICAL AND OTHER SAMPLES

Tree ring series

Samples of tree rings cut from an oak felled in 1953 at Djurgården, Stockholm (59° 20' N Lat, 18° 08' E Long), Sweden. The rings around A.D. 1850 have been used as our standard. Each sample includes the given number of rings before and after the year stated. The values are C¹³-corrected in the usual way, and also corrected for radioactive decay. Coll. by G. Östlund.

			δ C ¹³	Δ C ¹⁴
St-358.	Oak	1710 ± 5	(+9 ± 2‰)	+22 ± 5‰
St-359.	Oak	1810 ± 5	(+2 ± 2‰)	+ 1 ± 5‰
Standard	Oak	1850 ± 5	(0 ‰)	0 ± 4‰
St-360.	Oak	1910 ± 3	(+5 ± 2‰)	-18 ± 5‰
St-386.	Oak	1950 ± 1	(0 ± 2‰)	-23 ± 5‰

Comment (G.Ö.): the trend among the first three samples is similar to the

result obtained by de Vries (1958). The Suess effect appears to be $23 \pm 7\%$ in Stockholm. In order to convert to the accepted value of 0.95 times the NBS C^{14} scale, add $+7\%$ to the given C^{14} figures. In order to convert to the PDB- C^{13} scale, subtract 25 from the C^{13} figures.

Garpenberg series

Soil humus samples from a profile in a spruce forest, 95 years old, at Garpenberg, Dalarna ($60^\circ 33' N$ Lat, $16^\circ 13' E$ Long), Sweden. Altitude 200 m. Coll. 1958 and subm. by C.-O. Tamm, Forest Research Institute, Stockholm 51. The series is described in more detail and discussed by Tamm and Östlund (1960), and was made as an attack on the problem of the residence time of organic matter in the soil. The result below is given as per mil deviation from our Stockholm oak standard and is C^{13} -corrected as usual. In order to obtain the values in the NBS-standard scale, add $+7\%$.

St-472. Mor $-7 \pm 5\% C^{14}$

Raw humus, A_0 -horizon. Ash content 54.5% of dry weight.

St-473. Mineral soil $-20 \pm 5\% C^{14}$

Dark-colored mineral soil, A_1 -horizon. Ash content 84.1% of dry weight.

St-474. Accumulation horizon $-44 \pm 5\% C^{14}$

Accumulation, B-horizon. Dark brown to rust in color. Ash content 94.8% of dry weight.

Comment (C.O.T. and G.Ö.): the last result corresponds to a formal C^{14} age of 370 yr.

Adriatic Sea series

Black sapropelitic mud from a core, 2.5 m long, taken in the Adriatic Sea ($44^\circ 58' N$ Lat, $12^\circ 54' E$ Long), water depth 33 m. The top of the sediments may be missing owing to erosion. Samples were taken in order to obtain an indication of the rate of sedimentation, which in turn may be used to estimate the fallout of black, magnetic, so-called "cosmic spherules" included in the sediments. Subm. by K. Fredriksson, Geological Survey of Sweden.

St-426. Adriatic Sea A 9240 ± 180

102 to 103 cm below the present top surface.

St-427. Adriatic Sea B 8960 ± 170

106 to 109 cm below the present top surface.

REFERENCES

- Broecker, W. S., and Olson, E. A., 1959, Lamont radiocarbon measurements VI: AM. JOUR. SCI. RADIOC. SUPP., v. 1, p. 111-132.
- Dikaios, P., 1953, *Khirokitia*: Oxford, Oxford Univ. Press.
- in press, Swedish Cyprus Expedition IV, no. 1.
- Lundqvist, G., 1959a, C^{14} -dated pine stumps from the high mountains of western Sweden [in Swedish, summ. in English]: Sveriges geol. undersökning, ser. C, no. 565.
- 1959b, Beskrivning till geologiska kartbladet Eskilstuna [summ. in English]: Sveriges geol. undersökning, ser. Aa, no. 200.
- Lundström, P., 1952a, Gravfältundersökningar vid Fiskeby 1951: Fornvännen, v. 47, p. 120.
- 1952b, Gravfältundersökning vid Fiskeby 1952: Fornvännen, v. 47, p. 281.
- Östlund, H. G., 1957a, Stockholm natural radiocarbon measurements I: Science, v. 126, p. 493-497.
- 1957b, Carbon dioxide proportional counting for natural radiocarbon measurements: Arkiv f. Kemi, v. 12, no. 6, p. 69-78.

- 1959, Stockholm natural radiocarbon measurements II: *AM. JOUR. SCI. RADIOC. SUPP.*, v. 1, p. 35-44.
- Sahlström, K. E., and Gejvall, N.-G., 1948, Gravfältet på Kyrkbacken i Horns socken, Västergötland: *Kungl. Vitterhetsakad. Handl. no. 60:2*.
- 1954, Bankälla och stora Ro, Två västgötska brand-grops gravfält: *Kungl. Vitterhetsakad. Handl. no. 89*.
- Schönbäck, B., 1952, Bronsåldershus i Uppland: *Tor (Univ. Uppsala. Arch. Inst.)*, v. 1949-1951, p. 23-45.
- 1959, Bronsåldersbygd i Mälardalen: *Tor*, v. 1959, p. 52-107.
- Tamm, C. O., and Östlund, H. G., 1960, Radiocarbon dating of soil humus: *Nature*, v. 185, p. 706-707.
- Vries, Hessel de, 1958, Variation in the concentration of radiocarbon with time and location on Earth: *Koninkl. Nederlandse Akad. Wetensch. Proc., ser. B*, v. 61, no. 2, p. 1-9.