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GLASGOW UNIVERSITY RADIOCARBON MEASUREMENTS II

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A third radiocarbon counting system has been established in the Chemistry Department, University of Glasgow, since April, 1968. Operating conditions for the previous systems have remained essentially as described by Baxter *et al.* (1969).

The counting assembly was supplied by Johnston Laboratories, Inc., Baltimore and consists of 2.6L internal gas counter and a concentric multiple anode anticoincidence meson detector. The counters are encased in a 4-in.-thick shield manufactured from aged lead by J. Girdler and Co., London.

CO_2 is employed as the counting gas at a constant filling pressure of 760 mm. Hg at 15°C. Operational parameters are as follows: (1) anticoincidence plateau: greater than 800 v long with slope less than 0.5% per 100 v; (2) detector operating voltage: 3.48 $\pm$ 0.05 Kv. Adjustment is made within this range to ensure identical gas gain for all gases counted; (3) detector background count rate: 5.53 $\pm$ 0.12 ($\pm$ 2σ) counts/min. at 1013 mbar. A linear variation of background count rate with barometric pressure, amounts to -0.01 count/min./mbar; (4) net activity of NBS oxalic acid modern standard: 14.37 $\pm$ 0.08 ($\pm$ 2σ) counts/min., after correction for fractionation and decay.

CO_2 samples are normally stored for 14 days prior to counting to allow for radon decay. The presence of radon, however, is monitored via energy discrimination during each counting sequence. When necessary, a correction is applied to the total count rate to allow for the contribution of radon and its beta active daughter products.

Samples are counted at least twice and several days apart to give a minimum total of 60,000 counts. Modern standard and background activities are monitored weekly to check counter performance.

Mass spectrometric analysis for fractionation correction have been performed at The National Physical Laboratory, Teddington.

Calculations are based on the Lamont VIII formulae (Radiocarbon 1961, v. 3, p. 176-204) and errors arising from uncertainties in C^{14} measurement are quoted to one standard deviation (1σ).

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SAMPLE DESCRIPTIONS

I. INTERCALIBRATION SAMPLES

Prior to routine measurement of C^{14} activities with the new system intercalibration was performed in conjunction with the established radiocarbon counting facilities at Glasgow (Baxter *et al.*, 1969).

1922 ± 60

GU-67. Kilphedir hut circles, Sutherland, Scotland **A.D. 28**

Charcoal. *Comment*: sample previously described and reported under GU-10, 1908 ± 60, GU-11, 2064 ± 55 and L-1061, 2100 ± 80.

Snowdon, Wales 1968

Atmospheric CO_2 samples, counted as CO_2 and then converted to CH_4 for measurement on alternative counting systems. Coll. by Central Electricity Generating Board at Cwm Dyli, Mt. Snowdon, Wales, alt 300 ft (53° 03′ N Lat, 04° 00′ W Long).

	δC^{14}‰	δC^{13}‰	Δ‰
GU-83.	60.0 ± 0.9	−21.3	58.9 ± 0.9
CO_2 coll. April 1968. Counted as CO_2 on new system.			
GU-68.	59.8 ± 0.7	−21.3	58.7 ± 0.8
CO_2 coll. April 1968. Counted as CH_4 on system 1.			
GU-69.	60.5 ± 1.1	−21.3	59.4 ± 1.2
CO_2 coll. April 1968. Counted as CH_4 on system 2.			
GU-70.	61.6 ± 0.9	−20.5	60.2 ± 0.9
CO_2 coll. June 1968. Counted as CO_2 on new system.			
GU-71.	60.0 ± 0.7	−20.5	58.7 ± 0.8
CO_2 coll. June 1968. Counted as CH_4 on system 1.			

Agreement between systems is satisfactory; no further designation of counting system is deemed necessary.

II. ATMOSPHERIC CO_2 SAMPLES

A. Ground level

Data reported here are derived from atmospheric CO_2 samples coll. at various sites in the U.K. and throughout the world. Measurements were made as part of 2 continuing research programs, viz., (a) C^{14} concentrations in humans in relationship to those of their immediate environment (Harkness and Walton, 1969) and (b) transport of C^{14} within the "dynamic" carbon reservoir (Walton *et al.*, 1969).

CO_2 coll. by exposure of carbonate free 8N KOH solution to atmosphere for each calendar month.

Snowdon series

CO_2 coll. by the Central Electricity Generating Board in a ventilated cabinet at Cwm Dyli Power Sta. on E slope of Mt. Snowdon (53° 03′ N Lat, 04° 00′ W Long).

Snowdon series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-72	May	64.4 ± 0.8	−19.9	62.7 ± 0.8
GU-73	June	54.0 ± 0.9	−18.1	51.8 ± 1.0
GU-74	July	64.8 ± 1.5	−17.4	62.2 ± 1.6
GU-75	Aug.	60.0 ± 0.6	−22.8	59.3 ± 0.7
GU-76	Sept.	62.1 ± 0.8	−17.8	59.8 ± 0.8
GU-77	Oct.	59.8 ± 0.6	−18.0	57.6 ± 0.7
GU-78	Nov.	59.1 ± 0.8	−20.2	57.6 ± 0.8
GU-79	Dec.	54.3 ± 1.4	−18.3	52.2 ± 1.5

Snowdon series, 1968

GU-80	Jan.	58.5 ± 1.4	−21.4	57.3 ± 1.5
GU-81	Feb.	52.9 ± 1.3	−21.6	51.9 ± 1.4
GU-82	March	57.1 ± 1.4	−20.7	55.8 ± 1.5
GU-83	April	60.0 ± 0.9	−21.3	58.9 ± 0.9
GU-84	May	60.3 ± 0.8	−20.5	58.8 ± 0.9
GU-85	June	61.6 ± 0.8	−20.5	60.2 ± 1.0
GU-86	July	61.9 ± 0.9	−20.6	60.5 ± 1.0
GU-87	Aug.	56.0 ± 1.0	−20.0	54.4 ± 1.1
GU-88	Sept.	59.3 ± 1.0	−20.4	57.8 ± 1.1
GU-89	Oct.	55.8 ± 1.4	−19.9	54.9 ± 1.4
GU-90	Nov.	54.9 ± 1.2	−21.5	54.0 ± 1.3
GU-91	Dec.	50.7 ± 0.9	−22.9	50.0 ± 1.0

Snowdon series, 1969

GU-92	Jan.	57.5 ± 1.3	−21.6	56.5 ± 1.4
GU-93	Feb.	55.1 ± 0.8	−24.5	55.0 ± 0.9
GU-95	April	57.4 ± 0.7	−21.2	56.2 ± 0.8
GU-96	May	57.9 ± 0.8	−20.3	56.4 ± 0.9
GU-97	June	52.4 ± 0.8	−19.2	50.7 ± 0.9
GU-98	July	56.8 ± 0.8	−21.4	55.7 ± 0.8
GU-99	Aug.	54.9 ± 0.8	−19.5	53.2 ± 0.9

Comment: sampling station is remote from any source of fossil fuel CO_2 or possible contamination by $C^{14}O_2$ from nuclear establishments. A seasonal variation in the tropospheric C^{14} concentration is evident, and is in agreement with present theories of stratospheric/tropospheric mixing patterns.

Chilton, England series

CO_2 coll. by the United Kingdom Atomic Energy Comm. at a site adjacent to A.E.R.E. Harwell (51° 31′ N Lat, 01° 20′ W Long).

Chilton series, 1967

Sample no.	Coll. date	δC^{14}‰	δC^{13}‰	Δ‰
GU-100	May	78.2 ± 0.9	−24.0	77.2 ± 1.0
GU-101	June	70.8 ± 0.8	−22.1	69.8 ± 0.9
GU-102	July	67.3 ± 0.4	−20.3	65.8 ± 0.6
GU-103	Aug.	60.3 ± 1.6	−24.7	59.3 ± 1.7
GU-104	Sept.	68.0 ± 0.8	−21.1	66.8 ± 0.8
GU-105	Oct.	61.0 ± 0.8	−25.3	61.1 ± 1.0
GU-106	Nov.	58.2 ± 1.0	−22.9	57.5 ± 1.2
GU-107	Dec.	62.8 ± 1.2	−22.5	61.8 ± 1.2

Chilton series, 1968

GU-108	Jan.	54.8 ± 1.4	−25.1	54.9 ± 1.4
GU-109	Feb.	49.6 ± 0.5	−24.9	48.7 ± 0.6
GU-110	March	57.3 ± 1.0	−22.0	56.3 ± 1.0
GU-111	April	62.5 ± 0.9	−25.5	62.6 ± 1.0
GU-112	May	63.0 ± 0.9	−21.3	61.8 ± 1.0
GU-113	June	63.5 ± 0.9	−21.0	62.2 ± 1.0
GU-114	July	61.0 ± 1.3	−24.6	60.9 ± 1.4
GU-115	Aug.	60.3 ± 1.3	−23.4	59.7 ± 1.4
GU-116	Sept.	63.4 ± 1.1	−24.1	63.1 ± 1.2
GU-117	Oct.	79.9 ± 1.4	−25.6	80.1 ± 1.5
GU-118	Nov.	52.3 ± 1.2	−26.4	52.8 ± 1.3
GU-119	Dec.	49.2 ± 1.1	−22.4	48.5 ± 1.2

Chilton series, 1969

GU-120	Jan.	65.7 ± 0.8	−25.6	65.9 ± 0.9
GU-121	Feb.	55.1 ± 0.8	−29.4	56.5 ± 0.9
GU-122	March	55.1 ± 0.9	−25.5	55.3 ± 1.0
GU-123	April	64.8 ± 0.8	−24.7	64.7 ± 0.8
GU-124	May	56.9 ± 0.7	−24.5	56.8 ± 0.7
GU-125	June	73.6 ± 0.8	−22.8	72.6 ± 0.9
GU-126	July	59.2 ± 0.8	−22.9	58.5 ± 0.9
GU-127	Aug.	71.0 ± 0.8	−23.6	70.6 ± 0.9

Comment: occasional high C^{14} concentrations would appear to indicate localized atmospheric contamination from adjacent nuclear establishment (ca. 2 km away). A study of the above data relative to prevailing wind direction at sampling site is being made to clarify this possibility.

Lerwick, Scotland series

Samples coll. by Meteorologic Office in their ventilated East hut, Lerwick (60° 08′ N Lat, 01° 11′ W Long).

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Lerwick series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-128	Nov.	65.0 ± 1.1	−22.6	64.2 ± 1.2
Lerwick series, 1968				
GU-129	Jan.	62.4 ± 1.2	−21.2	61.1 ± 1.2
GU-130	April	68.1 ± 1.2	−22.7	67.3 ± 1.3
GU-131	July	64.0 ± 0.9	−18.4	61.8 ± 1.0
GU-132	Oct.	58.8 ± 1.0	−19.9	57.2 ± 1.0

Victoria, B.C. series

Samples coll. by Defence Research Establishment Pacific, Canada, in covered box with gauze sides to allow free circulation of air (48° 25′ N Lat, 123° 19′ W Long).

Victoria series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-133	Jan.	60.4 ± 0.8	−18.4	58.3 ± 0.9
GU-134	April	63.9 ± 0.9	−17.6	61.5 ± 0.9
GU-135	July	65.1 ± 0.9	−18.3	62.9 ± 1.0
GU-136	Oct.	59.4 ± 0.8	−18.0	57.1 ± 0.9
Victoria series, 1968				
GU-137	Jan.	58.4 ± 0.9	−20.7	57.0 ± 1.0
GU-138	April	68.4 ± 1.0	−21.9	67.4 ± 1.1
GU-139	May	66.0 ± 1.0	−20.2	64.4 ± 1.1
GU-140	Sept.	53.5 ± 0.9	−21.8	52.6 ± 1.0
GU-141	Dec.	53.0 ± 1.0	−21.5	51.9 ± 1.0

Gibraltar series

Samples coll. by Meteorologic Office, R.A.F. Gilbraltar, in well-ventilated room, adjacent to open window (36° 09′ N Lat, 05° 21′ W Long).

Gibraltar series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-142	Sept.	64.9 ± 1.1	−19.0	62.9 ± 1.2
GU-143	Nov.	69.1 ± 1.6	−21.6	68.0 ± 1.7
Gibraltar series, 1968				
GU-144	Jan.	67.8 ± 0.8	−20.1	66.2 ± 0.9
GU-145	April	57.4 ± 1.1	−20.4	56.0 ± 1.2
GU-146	July	52.6 ± 0.9	−23.2	52.0 ± 1.0
GU-147	Oct.	67.0 ± 1.1	−22.3	66.1 ± 1.2
GU-148	Nov.	54.0 ± 1.2	−21.2	52.9 ± 1.3

Hong Kong series

Samples coll. by Meteorologic Office at Tates Cairn radar sta. in Stevenson screen which shelters samples from both rain and dry deposition (22° 18′ N Lat, 14° 10′ E Long).

Hong Kong series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-149	Jan.	60.4 ± 0.9	−26.3	60.8 ± 1.0
GU-150	April	61.2 ± 0.9	−25.5	61.3 ± 0.9
GU-151	July	55.2 ± 0.8	−26.2	55.6 ± 0.9
GU-152	Nov.	51.1 ± 1.0	−27.0	51.7 ± 1.1

Hong Kong series, 1968

GU-153	Jan.	54.0 ± 1.1	−28.1	55.0 ± 1.2
GU-154	April	56.6 ± 1.0	−26.2	56.9 ± 1.1
GU-155	July	52.6 ± 1.1	−21.4	51.5 ± 1.2
GU-156	Nov.	54.7 ± 1.0	−24.4	54.5 ± 1.0

Singapore series

Samples coll. by Meteorologic Office, R.A.F. Changi, Singapore, at airport (01° 22′ N Lat, 103° 59′ E Long).

Singapore series, 1968

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-157	Jan.	59.0 ± 0.8	−22.0	58.1 ± 0.9
GU-158	April	57.4 ± 0.8	−23.8	57.0 ± 1.0
GU-159	July	53.2 ± 1.1	−25.5	53.4 ± 1.2
GU-160	Oct.	51.1 ± 1.1	−23.6	50.7 ± 1.2

Suva, Fiji Island series

Samples coll. by Meteorologic Office in instrument hut (18° 09′ S Lat, 178° 27′ E Long).

Fiji Island series, 1967

Sample no.	Coll. date	$\delta C^{14}\%$	$\delta C^{13}‰$	$\Delta\%$
GU-161	Jan.	61.8 ± 0.8	−18.5	59.7 ± 0.9
GU-162	April	58.1 ± 0.8	−18.9	56.2 ± 0.9
GU-163	July	58.5 ± 0.9	−18.1	56.3 ± 1.0
GU-164	Oct.	64.5 ± 1.2	−18.0	62.2 ± 1.3

Fiji Island series, 1968

GU-165	Jan.	54.9 ± 1.1	−20.8	53.6 ± 1.2
GU-166	April	55.4 ± 0.9	−21.2	54.3 ± 1.0
GU-167	July	56.1 ± 0.9	−21.9	55.2 ± 1.0
GU-168	Oct.	54.6 ± 1.0	−21.7	53.5 ± 1.0

Pretoria series

Samples coll. by Atomic Energy Board, Pelindaba, Pretoria, in Stephenson screen housing a variety of meteorologic instruments (25° 45′ S Lat, 28° 16′ E Long).

Pretoria series, 1968

Sample no.	Coll. date	$\delta C^{14}‰$	$\delta C^{13}‰$	$\Delta‰$
GU-169	Jan.	59.0 ± 1.1	−23.3	58.4 ± 1.1
GU-170	April	54.2 ± 0.9	−24.8	54.2 ± 1.0
GU-171	July	51.9 ± 1.2	−21.6	50.9 ± 1.3
GU-172	Oct.	63.2 ± 1.0	−24.3	63.0 ± 1.1
GU-173	Dec.	52.5 ± 0.8	−23.6	52.1 ± 0.9

Melbourne series

Samples coll. by Meteorologic Office, in thermometer screen fitted with perspex hood for protection against dry deposition (37° 49′ S Lat, 144° 58′ E Long).

Melbourne series, 1967

Sample no.	Coll. date	$\delta C^{14}‰$	$\delta C^{13}‰$	$\Delta‰$
GU-174	Jan.	55.6 ± 0.9	−25.0	55.6 ± 1.0
GU-175	April	56.3 ± 0.8	−26.7	56.9 ± 0.9
GU-176	July	51.2 ± 1.0	−20.1	49.8 ± 1.0
GU-177	Oct.	52.3 ± 0.9	−21.4	51.2 ± 0.9

Melbourne series, 1968

GU-178	Jan.	52.9 ± 0.8	−19.1	51.1 ± 0.9
GU-179	April/May	50.4 ± 1.1	−20.6	49.0 ± 1.2
GU-180	July	47.2 ± 1.1	−21.7	46.3 ± 1.2
GU-181	Oct.	49.6 ± 1.1	−22.1	48.7 ± 1.2

Comment: C^{14} activities in Melbourne samples are generally low. The reason for this may be a "local" Suess effect, because there are some smoke-producing stacks within 1 mi of sampling site and the harbour is ca. 3 mi away.

Stanley, Falkland Islands series

Samples coll. outdoors by Meteorologic Office, Stanley, Falkland Is., in meteorologic thermometer screen (51° 42′ S Lat, 57° 52′ W Long).

Stanley series, 1968

Sample no.	Coll. date	δC^{14}‰	δC^{13}‰	Δ‰
GU-182	Jan.	55.1 ± 1.0	−21.9	54.2 ± 1.0
GU-183	April	56.3 ± 0.8	−24.2	56.1 ± 0.8
GU-184	July	52.4 ± 0.8	−24.8	52.3 ± 0.9
GU-185	Oct.	49.0 ± 1.0	−24.7	49.0 ± 1.0

Argentine Islands series

Samples coll. by British Antarctic Survey in magnetic observatory (65° 15′ S Lat, 64° 16′ W Long).

Argentine Islands series, 1967

Sample no.	Coll. date	δC^{14}‰	δC^{13}‰	Δ‰
GU-186	April	55.4 ± 0.9	−20.4	54.0 ± 1.0
GU-187	July	53.9 ± 0.8	−20.9	52.6 ± 0.9
GU-188	Oct.	54.7 ± 0.9	−21.4	53.6 ± 0.9

Argentine Islands series, 1968

GU-189	April	53.2 ± 0.9	(−20.9)	52.0 ± 1.0*
GU-190	Oct.	52.8 ± 0.9	(−20.9)	51.5 ± 0.9*

Comment: * indicates that no mass spectrometric measurement was available for sample; a value of −20.9 ± 1‰ was assumed.

Halley Bay series

Samples coll. by British Antarctic Survey in magnetic hut during summer and in ozone hut during winter (75° 31′ S Lat, 26° 45′ W Long).

Halley Bay series, 1967

Sample no.	Coll. date	δC^{14}‰	δC^{13}‰	Δ‰
GU-191	Dec.	55.8 ± 0.9	−20.0	54.2 ± 0.9

Halley Bay series, 1968

GU-192	May	55.3 ± 0.9	−28.3	56.4 ± 1.0
GU-193	July	55.1 ± 1.0	−22.0	54.2 ± 1.1
GU-194	Oct.	52.2 ± 1.0	−22.9	51.6 ± 1.1

B. Upper atmospheric samples

The following C^{14} activities were measured for CO_2 coll. from the upper troposphere and lower stratosphere during the period June 1967 to December 1968.

Sampling was confined to flight paths within the region 50° to 60° N Lat, and 1° E to 8° W Long.

Atmospheric CO_2 was adsorbed on 1/8 in. pellets of molecular sieve, Linde Type 4A, using the techniques described by Godwin and Willis (Radiocarbon, 1964, v. 6, p. 134). Sampling time was 20 min. and this proved sufficient for the collection of ca. 4.0L – atm. CO_2, using 2 kg sieve per sample. Adsorbed CO_2 was recovered from the sieve material with steam displacement and coll. as $BaCO_3$ by absorption in $Ba(OH)_2$/KOH solution (Harkness, 1970).

Upper atmospheric CO_2

Sample no.	Coll. date	Alt. (ft)	Tropo-pause ht. (ft)	δC^{14}‰	δC^{13}‰	Δ‰
GU-195	30 June 1967	41,000	39,000	87.7 ± 1.4	−20.2	85.9 ± 1.6
GU-196	20 Dec. 1967	41,000	39,000	87.0 ± 1.9	−19.6	85.0 ± 2.1
GU-197	15 Jan. 1968	43,000	41,000	79.9 ± 0.9	−18.3	77.5 ± 1.0
GU-198	15 Feb. 1968	39,000	35,000	74.5 ± 0.8	−17.8	72.0 ± 0.8
GU-199	15 Feb. 1968	31,000	35,000	58.3 ± 0.7	−17.1	55.8 ± 0.7
GU-200	15 Mar. 1968	43,000	41,000	62.8 ± 2.1	−20.5	61.4 ± 2.1
GU-201	19 Mar. 1968	31,000	28,000	62.8 ± 0.9	−19.8	61.1 ± 0.9
GU-202	19 Mar. 1968	25,000	28,000	64.6 ± 0.9	−20.3	63.0 ± 1.0
GU-203	26 Mar. 1968	41,000	38,000	72.3 ± 0.8	−20.2	70.6 ± 0.8
GU-204	26 Apr. 1968	41,000	39,000	73.6 ± 0.9	−16.9	70.7 ± 0.7
GU-205	30 Apr. 1968	39,000	29,000	63.7 ± 2.2	−22.4	62.8 ± 2.2
GU-206	30 Apr. 1968	27,000	29,000	62.1 ± 0.8	−19.7	60.4 ± 0.9
GU-207	21 May 1968	39,000	34,000	79.5 ± 1.6	−21.8	78.3 ± 1.6
GU-208	4 Nov. 1968	45,000	41,000	74.8 ± 0.8	−18.9	72.7 ± 0.9
GU-209	6 Dec. 1968	41,000	39,000	72.5 ± 0.6	−20.3	70.8 ± 0.7

III. BLOOD PROTEIN SAMPLES

Data reported here are derived from the protein fraction separated from human blood plasma collected in S Scotland. Each sample represents a composite prepared from the whole blood of 10 donors. Collection date quoted is accurate to within ± 5 days.

Blood protein, S Scotland

Sample no.	Sample date	δC^{14}‰	δC^{13}‰	Δ‰
GU-210	26 Oct. 1952	—3.6 ± 0.5	—28.4	—2.9 ± 0.6
GU-211	20 Sept. 1953	—8.1 ± 0.6	—26.4	—7.9 ± 0.6
GU-212	1 Apr. 1954	—5.4 ± 0.7	—26.2	—5.1 ± 0.8
GU-213	23 Mar. 1955	—1.6 ± 0.5	—26.2	—1.3 ± 0.5
GU-214	5 May 1956	—7.8 ± 0.6	—29.5	—7.0 ± 0.7
GU-215	26 Sept. 1957	—5.0 ± 0.7	—30.8	—3.9 ± 0.8
GU-216	11 Feb. 1960	9.1 ± 0.6	—26.5	9.4 ± 0.7
GU-217	23 May 1961	16.4 ± 0.9	—27.2	16.9 ± 1.0
GU-218	7 Apr. 1962	9.9 ± 0.9	—29.4	10.8 ± 0.9
GU-219	15 July 1963	32.0 ± 1.0	—32.3	33.9 ± 1.1
GU-220	9 Feb. 1964	44.4 ± 1.0	—29.4	45.6 ± 1.0
GU-221	5 Mar. 1965	60.1 ± 0.8	—29.5	61.5 ± 0.8
GU-222	17 Oct. 1966	65.4 ± 0.8	—27.2	66.2 ± 0.8
GU-223	15 Nov. 1966	64.0 ± 0.7	—30.0	65.6 ± 0.8
GU-224	30 Dec. 1966	64.5 ± 0.7	—27.9	65.4 ± 0.7
GU-225	8 Apr. 1967	64.2 ± 0.6	—28.4	65.3 ± 0.7
GU-226	27 Oct. 1967	62.7 ± 0.7	—33.2	65.3 ± 0.8
GU-227	10 July 1968	63.2 ± 1.0	—26.3	63.4 ± 1.0

Comment: C^{14} concentrations in blood protein indicate significant correlation with modifying influences on atmospheric C^{14} levels, viz. Suess effect and bomb effect. Blood protein C^{14} levels, however, did not reach peak concentrations attained in atmosphere, reflecting variations in source of carbon in diet and possibly tissue "turnover" time (Harkness and Walton, 1969).

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