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# GLASGOW UNIVERSITY RADIOCARBON MEASUREMENTS V

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## INTRODUCTION

Operation of counting systems and preparation of results remain as described previously by Baxter *et al.* (1969), and Ergin *et al.* (1970).

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## SAMPLE DESCRIPTIONS

### I. ATMOSPHERIC $CO_2$ SAMPLES

#### *A. Global distribution*

Data relate to research program of transport of $C^{14}$ within the "dynamic" carbon reservoir (Walton *et al.*, 1970). $CO_2$ coll. by exposure of carbonate-free 8M KOH solution to atmosphere at ground level for each calendar month.

**Lerwick, Scotland series**

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

**Lerwick series, 1969**

| Sample no. | Coll. date | $\delta C^{14}$‰ | $\delta C^{13}$‰ | $\Delta$‰ |
|---|---|---|---|---|
| GU-334 | Jan. | 54.6 ± 2.1 | −20.6 | 53.2 ± 2.2 |
| GU-335 | May | 55.8 ± 2.0 | −22.7 | 55.1 ± 2.0 |
| GU-336 | July | 56.9 ± 2.2 | −18.5 | 54.9 ± 2.0 |
| GU-337 | Oct. | 53.1 ± 2.0 | −19.6 | 51.4 ± 2.0 |

**Gibraltar series**

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

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**Gibraltar series, 1969**

| Sample no. | Coll. date | $\delta C^{14}\%$ | $\delta C^{13}‰$ | $\Delta\%$ |
|---|---|---|---|---|
| GU-338 | Jan. | 52.9 ± 2.2 | −19.2 | 51.1 ± 2.2 |
| GU-339 | April | 55.5 ± 2.2 | −21.4 | 54.4 ± 2.3 |
| GU-340 | July | 54.8 ± 2.1 | −22.2 | 53.9 ± 2.1 |
| GU-341 | Oct. | 52.6 ± 1.5 | −21.8 | 51.6 ± 1.5 |

**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, 1969**

| Sample no. | Coll. date | $\delta C^{14}\%$ | $\delta C^{13}‰$ | $\Delta\%$ |
|---|---|---|---|---|
| GU-342 | Jan. | 79.6 ± 2.5 | −20.2 | 77.8 ± 2.5 |
| GU-343 | April | 48.8 ± 2.2 | −24.2 | 48.6 ± 2.2 |
| GU-344 | July | 46.8 ± 2.0 | −23.4 | 46.3 ± 2.0 |
| GU-345 | Oct. | 53.8 ± 2.3 | −21.0 | 52.6 ± 2.4 |

**Pretoria series**

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

**Pretoria series, 1969**

| Sample no. | Coll. date | $\delta C^{14}\%$ | $\delta C^{13}‰$ | $\Delta\%$ |
|---|---|---|---|---|
| GU-346 | Jan. | 52.2 ± 2.2 | −23.7 | 51.8 ± 2.2 |
| GU-347 | April | 48.8 ± 2.1 | −24.5 | 48.7 ± 2.1 |
| GU-348 | July | 49.9 ± 2.2 | −22.0 | 49.0 ± 2.2 |
| GU-349 | Oct. | 49.3 ± 2.2 | −23.2 | 48.8 ± 2.2 |

**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, 1969**

| Sample no. | Coll. date | $\delta C^{14}$‰ | $\delta C^{13}$‰ | $\Delta$‰ |
|---|---|---|---|---|
| GU-350 | Jan. | 51.1 ± 2.2 | −24.7 | 51.0 ± 2.2 |
| GU-351 | April | 49.7 ± 2.5 | −24.9 | 49.7 ± 2.5 |
| GU-352 | July | 50.2 ± 1.5 | −23.5 | 49.7 ± 1.5 |
| GU-353 | Oct. | 46.6 ± 2.0 | −24.5 | 46.5 ± 2.0 |

*B. Urban variations*

The reported $C^{14}$ activities were measured during a study of combustion product $CO_2$ levels in urban air viz., local Suess effect (Walker, 1969).

Samples were coll. during Jan. 1969 through exposure of 8 M KOH at selected sites within a 30-mi. radius of Glasgow, Scotland (55° 50′ N Lat, 04° 16′ W Long).

**Urban $CO_2$, Glasgow area**

| Sample no. | Coll. site no. | District | $\delta C^{14}$‰ | $\delta C^{13}$‰ | $\Delta$‰ |
|---|---|---|---|---|---|
| GU-354 | 1 | Beith | 50.9 ± 1.1 | −23.2 | 50.3 ± 1.2 |
| GU-355 | 2 | Mauchline | 49.7 ± 1.0 | −23.0 | 49.1 ± 1.1 |
| GU-356 | 3 | Mauchline | 46.3 ± 0.5 | −24.4 | 46.2 ± 0.6 |
| GU-357 | 4 | Newton Mearns | 47.9 ± 1.0 | −23.9 | 47.6 ± 1.1 |
| GU-358 | 5 | Newton Mearns | 47.1 ± 0.9 | −24.5 | 46.9 ± 1.0 |
| GU-359 | 6 | Newton Mearns | 41.6 ± 0.8 | −23.7 | 41.2 ± 0.9 |
| GU-360 | 7 | Central Glasgow | 41.4 ± 0.9 | −23.2 | 40.9 ± 1.0 |
| GU-361 | 8 | Central Glasgow | 40.4 ± 0.9 | −23.3 | 39.9 ± 1.0 |
| GU-362 | 9 | Central Glasgow | 39.4 ± 1.1 | −23.0 | 38.9 ± 1.2 |
| GU-363 | 10 | Riddrie | 38.6 ± 1.1 | −21.7 | 37.7 ± 1.2 |
| GU-364 | 11 | Riddrie | 23.1 ± 0.9 | −23.5 | 22.7 ± 1.0 |
| GU-365 | 12 | Wishaw | 27.5 ± 0.9 | −23.4 | 27.1 ± 1.0 |

*Comment*: data correlate with geographic distribution of industry and prevailing wind pattern. The importance of careful site selection in global $C^{14}$ studies is emphasized by up to ca. 23% excess 'fossil' $CO_2$ in air at certain locations.

## II. SOIL CARBON

Data relate to profile coll. from non-calcareous, imperfectly drained Brown Forest soil belonging to the Lanfine Association. Samples coll. Jan. 1970 in vicinity of Doonbank Farm, Ayr, Scotland (55° 28′ N Lat, 04° 38′ W Long). Natl. Grid Ref. NS 327184.

Samples were sieved (1 mm mesh) and washed several times in 2 M HCl to remove organic debris (Gunning, 1970).

**Doonbank Farm series**

| Sample no. | Soil fraction | Coll. depth | $\delta C^{14}\%$ | $\delta C^{13}‰$ | $\Delta\%$ |
|---|---|---|---|---|---|
| GU-366 | Alkali sol. carbon | 0- 3 cm | −0.3 ± 0.5 | −31.4 | 1.0 ± 0.7 |
| GU-367 | Alkali insol. carbon | 0- 3 cm | −0.6 ± 0.6 | −30.5 | 0.5 ± 0.8 |
| GU-368 | Total carbon | 0- 3 cm | 7.6 ± 0.7 | −29.0 | 8.4 ± 0.8 |
| GU-369 | Total carbon | 8-10 cm | − 4.4 ± 0.6 | −30.5 | − 3.4 ± 0.8 |
| GU-370 | Total carbon | 13-15 cm | −12.8 ± 0.7 | −29.5 | −12.1 ± 0.9 |
| GU-371 | Total carbon | 23-25 cm | −24.3 ± 0.5 | −27.8 | −23.6 ± 0.8 |
| GU-372 | Total carbon | 40-45 cm | −32.9 ± 0.6 | −28.8 | −32.4 ± 0.8 |

*Comment*: presence of 'bomb' $C^{14}$ is evident in all surface samples, although enrichment is small. Temporal variations of such $C^{14}$ activities may afford a measure of the rates of mineralization and transport of organic carbon in soils.

III. GEOLOGIC SAMPLES

**8950 ± 90**

**GU-373. Dundonald Burn, Irvine** **7000 B.C.**

Organic mud exposed in bank of Dundonald Burn, (55° 36′ N Lat, 04° 38′ W Long), Natl. Grid Ref. NS 337372, 290 m N of Shewalton Bridge, near Irvine, Ayrshire, Scotland. Sample is top 5 cm of organic mud ca. 30 cm thick, overlain by sand, and underlain by gravelly till. Top of organic mud is at alt 6.2 m (Newlyn). Coll. 1966 and subm. by W. G. Jardine, Dept. Geol., Univ. Glasgow. *Comment* (W. G. J.): date is a more accurate maximum for beginning of main Flandrian marine transgression in central Ayrshire than date for wood from near middle or base of same bed of organic mud (Q-642: 9575 ± 150, Godwin and Willis, 1962).

**2027 ± 108**

**GU-374. Hollanbank Cottage** **77 B.C.**

Marine shells (*Cardium* sp.) from emerged shell ridge 50 m N of Hollanbank Cottage, Kirkcudbrightshire, Scotland, (54° 52′ N Lat, 04° 22′ W Long), Natl. Grid Ref. NX 482555. From alt. 5.24 m (Newlyn) 46 cm below top of shell ridge. Coll. 1966 and subm. by W. G. Jardine. *Comment* (W.G.J.): date indicates time of shell-ridge formation. It is close to age of shell layer within laminated fine sand at similar alt. at Crook of Baldon on W side of Wigtown Bay (I-5068: 2290 ± 95, in press).

**7812 ± 131**

**GU-375. Newbie Mains Borehole** **5862 B.C.**

Organic mud from undisturbed sample from borehole 500 m NNW of Newbie Mains Farm, Dumfriesshire, Scotland, (54° 58′ N Lat, 03° 17′ W Long), Natl. Grid Ref. NY 171651. Organic mud, 10 cm thick, occurs

within marine fine sand/sand sequence. Top of organic mud at alt. 4.57 m (Newlyn). Coll. 1967 and subm. by W. G. Jardine. *Comment* (W.G.J.): date is consistent with others for organic deposits assoc. with Carse deposits in E part of Solway Firth area (Q-637: 8135 ± 150, Godwin and Willis, 1962; GU-64: 7254 ± 101, Baxter *et al.,* 1969). Supports suggestion that penetration of kettles in this area by Flandrian transgressive sea was diachronous (Jardine, in press).

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