

REHOVOT RADIOCARBON MEASUREMENTS II

A. KAUFMAN, I. CARMI, and R. SCHLESINGER

The Weizmann Institute of Science, Rehovot, Israel

This list contains results obtained since July 1970. They are mainly hydrologic and geologic samples prepared and counted as described in our previous date list, (Carmi *et al.*, 1971). The coordinate system used to describe sampling locations is the local one.

SAMPLE DESCRIPTIONS

I. HYDROLOGIC SAMPLES

Samples from the Galilee were subm. by E. Wackshall, Hebrew Univ.; those from Samaria by E. Rosenthal, Geol. Inst., and G. Dror, Hydrol. Service; those from the Judean Desert by U. Baida, Water Planning Comm. for Israel, Ltd.; those from Chamat Gader and Sample RT-307E by E. Mazor, Weizmann Inst., and Sample RT-322 by A. Issar, Geol. Inst. This last sample is much less active than the shallow Sample RT-140 in our previous date list. δC^{13} values, relative to PDB, were measured to permit apparent age estimation according to Ingerson and Pearson (1964). These ages are not given due to the uncertain validity of their assumptions.

Sample	Name	Well (W) or spring (S)	Local grid coordinates	Sampling date	$\delta C^{13}\%$	C^{14} (% Modern)
A. Galilee						
RT-305A	Einan 2	W	20386 /27637	8/70	-13.7	41.4 ± 1.1
RT-305B	Chindaj 2	W	20150 /27167	8/70	-13.7	59.3 ± 0.8
RT-305C	Chazon 2	W	18563 /25467	8/70	-12.6	77.8 ± 1.2
RT-305D	Bir Ubalh	W	19530 /27570	8/70	-11.5	15.8 ± 0.4
RT-305E	Chittin 4	W	19188 /24648	9/70	-15.0	63.1 ± 0.9
RT-306	Chittin 3	W	19318 /24760	9/70	-14.5	50.5 ± 0.8
RT-344A	Einan 5	W	20390 /27650	8/70	-11.6	42.9 ± 0.9
RT-344B	Chulah 3	W	20150 /29550	8/70	- 8.7	22.3 ± 0.5
RT-344C	Ein Zahav	S	20360 /29130	8/70	-11.4	59.1 ± 1.2
RT-345D	Ga'aton 2	W	16679 /26874	10/70	-14.2	60.5 ± 1.2

Sample	Name	Well (W) or spring (S)	Local grid coordinates	Sampling date	$\delta C^{13}\%$	C^{14} (% Modern)
B. Samaria						
RT-324A	Ma'ayan Charod	S	1837 /2172	2/71		42.9 ± 0.6
RT-324B	Ein Amal	S	19210 /21245	2/71	-11.9	35.0 ± 0.4
RT-324D	Tel Yosef 'T'	W	18905 /21426	2/71	-12.0	45.9 ± 0.6
RT-324E	Argaman	W	20116 /17687	2/71	- 9.0	15.3 ± 0.7
RT-325	Chaman el Malich	S	1950 /1927	2/71	-13.3	10.4 ± 0.6
RT-335A	Revaya 1	W	1926 /2067	5/71	-11.3	22.0 ± 0.6
RT-335B	Ein Soda	S	2013 /21355	5/71	-11.3	77.8 ± 1.3
C. Judean Desert						
RT-349A	Ein Fawar	S	1366 /1832	6/71	-11.5	61.9 ± 1.8
RT-349B	Ein Duyuk	S	1447 /1900	6/71	-12.7	82.5 ± 1.6
RT-349E	Ein Sultan	S	1418 /1923	6/71	-12.4	86.0 ± 2.1
D. Chamat Gader						
RT-307A	Spring A	S	2327 /2130	10/10	-14.1	18.6 ± 0.5
RT-307B	Spring B	S	2321 /2128	10/70	-12.4	13.2 ± 0.2
RT-307C	Spring C	S	2322 /2125	10/70	-11.4	13.4 ± 0.5
RT-307D	Spring D	S	2320 /2127	10/70	- 9.5	9.2 ± 0.3
RT-333	Spring B	S	2321 /2128	5/71	-12.2	14.4 ± 0.4
E. Lake Tiberias area						
RT-307E	Ein Noon	S	2497 /1982	10/70	-13.7	60.0 ± 0.9
F. Central lowlands						
RT-308	Lod 19	W	154 /141	10/70	—	37.1 ± 0.6
G. Sinai						
RT-322	Nahel (Deep)	W	9260 /0290	2/71	- 7.4	2.9 ± 0.3

II. GEOLOGIC SAMPLES

A. Lake Kinneret cores

Two cores were coll. from lake bottom sediments by M. Stiller. Core 'D' coll. Nov. 1969 in 42 m water at position ²⁴⁶⁷/2070, and Core 'F' Oct. 1970 in 25 m water at position ²⁵⁰⁸/2025. Typical sediment includes 50% carbonate and 2% organic matter; these 2 phases were run separately.

Core	Interval	Organic fraction			Inorganic fraction		
		Sample	$\delta C^{13}\text{‰}$	C^{14} (‰ Modern)	Sample	$\delta C^{13}\text{‰}$	C^{14} (‰ Modern)
D	0-8 cm	RT-225	—	63.8 ± 3.1	RT-224	—	74.2 ± 1.0
D	16.5-24.5 cm	RT-219	—	84.3 ± 3.6	RT-218	—	73.2 ± 1.0
D	32-42 cm	RT-223	—	75.3 ± 5.2	RT-222	—	35.3 ± 0.7
F	0-10 cm	RT-318D-ORG	-29.1	76.3 ± 2.0	RT-318D	-2.4	80.7 ± 1.2
F	10-20 cm	RT-318A-ORG	-30.7	63.9 ± 1.4	RT-318A	-2.2	69.2 ± 1.0
F	20-30 cm	RT-318B-ORG	-30.8	94.5 ± 3.7	RT-318B	-2.7	74.3 ± 1.1
F	30-40 cm	RT-318C-ORG	-30.2	89.1 ± 2.8	RT-318C	-1.0	78.2 ± 1.7
F	40-50 cm	RT-315-ORG	-30.7	85.9 ± 2.4	RT-315	-1.4	75.8 ± 1.2

B. Secondary calcites

Results on other samples from 1st 3 series mentioned here (Qsalon, Sha'ar Hagai, and Hermon) appear in Carmi *et al.* (1971). Samples coll. by M. Magaritz, March 1970 to Oct. 1970, except for N'tiv Halamed Hai series which was coll. June 1971. Ages are calculated assuming precipitations from bicarbonate solutions whose carbon is derived from soil CO₂ (‰C¹⁴ = 100, $\delta C^{13} = 25\text{‰}$) and country rock (‰C¹⁴ = 0, δC^{13} = as measured). In each case, δC^{13} of the country rock is given (see p. 182-3).

C. Dead Sea area carbonates

RT-321A. **10,700 ± 150**

Travertine from hillside above Ein Fescha (¹²⁴⁷/1925), coll. 1969 by F. Yaron.

RT-321B. **4200 ± 150**
 $\delta C^{13} = +1.3\text{‰}$

Travertine coll. 2 m from RT-321A.

RT-342B. **3800 ± 240**
 $\delta C^{13} = +0.4\text{‰}$

Precipitated carbonate crust from cliff overlooking Ras Fescha (¹²³¹/1927) at -392 m, coll. July 1971 by C. Klein.

Sample	Area	Local grid coordinate	$\delta C^{13}\text{‰}$ in sample	$\delta C^{13}\text{‰}$ in country rock	Age (B.P.)	Comment
RT-237	Qsalon	1313 / 1532	-11.2	+1.0	Modern	Uppermost Na'ari of Qsalon series.
RT-301A	Sha'ar Hagai	1358 / 1524	-10.1	-1.0	>33,000	Fine-grained calcite from Cenomanian stratum.
RT-301B	"	"	-8.6	"	>32,000	Coarse-grained calcite from Cenomanian stratum.
RT-301D	Hermon	2960 / 2203	+2.0	-0.5	*	Calcite from ancient karst cavity.
RT-301E	"	"	-10.0	"	>31,000	Calcite near magmatic body.
RT-323A	Imwas	145 / 153	-10.2	-3.0	20,000 \pm 800	Na'ari within Senonian chalk
RT-331A	"	"	-10.4	"	12,800 \pm 300	"
RT-331B	"	"	-10.2	"	18,300 \pm 700	"
RT-302C	Ramallah	150 / 172	-11.7	-0.5	>33,000	Calcite from cave in Cenomanian dolomite.

* It is impossible to calculate an age by the method used here since RT-301D has more positive δC^{13} than does the country rock. The Hermon sample will be treated in a separate paper. This sample had δC^{13} (modern) ≤ 0.8 .

Sample	Area	Local grid coordinate	$\delta C^{13}/\text{‰}$ in sample	$\delta C^{13}/\text{‰}$ in country rock	Age (B.P.)	Comment
RT-320	Imwas	1385/1522	- 8.5	-1.0	500 \pm 160	Na'ari cementing pottery fragments; from top of Miocenc.
RT-323B	Gimzo	1425/1452	- 3.2	0.0	>21,200	Calcite from cave in Turoonian limestone.
RT-323C	Imwas	145/154	-10.5	-1.0	>27,000	Calcite vein assoc. with iron-rich mineralization in Turoonian limestone.
RT-338B	Nativ Halamed Hai	1992/1509	-11.2	+1.0	17,500 \pm 600	Na'ari 280 cm above Cenomanian limestone base.
RT-338C	"	"	- 9.7	+1.0	20,200 \pm 1,100	Na'ari 40 cm below 338B.
RT-339A	"	"	-10.8	"	13,100 \pm 800	Na'ari 120 cm below 338B.
RT-339D	"	"	-10.3	"	19,800 \pm 900	Na'ari 240 cm below 338B.
RT-339B	"	"	-	-	Modern	Tree root immediately adjacent to 339A.

D. Carbonates from other areas

RT-319.**1740 ± 120** $\delta C^{13} = -2.3\%$ Oolites from Ras Matarma lagoon, N Gulf of Suez, $\left(\frac{876}{930}\right)$, subm.

Dec. 1970 by A. Nissenbaum.

RT-348. $\cong 31,000$ $\delta C^{13} = -0.9\%$ Reef coral from erosion surface near Sharm-El-Sheik $\left(\frac{698}{081}\right)$

coll. July 1971 by R. Garson.

III. ATMOSPHERIC SAMPLES

Two atmospheric CO₂ samples were absorbed with a concentrated NaOH solution. *Comment* (A.K.): results show confirmation of 1969 decrease noted in Rehovot atmosphere (Carmi *et al.*, 1971) and a levelling off during 1970.

RT-352A. $\delta C^{14}\% = 50.3 \pm 3.0$

Exposed 26 Jan.-30 Jan. 1970.

RT-352B. $\delta C^{14}\% = 51.5 \pm 3.0$

Exposed 17 Jan.-24 Jan. 1971.

REFERENCES

- Carmi, I., Noter, Y., and Schlesinger, R., 1971, Rehovot radiocarbon measurements I: Radiocarbon, v. 13, p. 412-419.
 Ingerson, E. and Pearson, F. J., 1964, Estimation of ages and rate of motion of ground water, Recent researches in the field of hydrosphere, atmosphere and nuclear geochemistry: Tokyo, Maruzen Co., Ltd., p. 263-283.