SETTLEMENT PATTERNS IN THE SOUTHERN LEVANT DESERTS DURING THE 6TH–3RD MILLENNIA BC: A REVISION BASED ON ^{14}C DATING

Uzi Avner[1] • Israel Carmi[2]

ABSTRACT. Archaeological surveys conducted in the Negev and Sinai during the 20th century were commonly interpreted as representing short settlement periods interrupted by long gaps. The time factor was usually based on archaeological estimates rather than comprehensive physical dating. For example, the perceived age and time duration of "hole-mouth" pottery sherds and tabular flint scrapers became a source of circular reasoning to "date" sites and their "duration." Thus, desert sites became to be perceived as temporary, seasonal, short-lived, while the cultures of desert populations were somehow undervalued. However, radiocarbon dating of desert sites from the Late Neolithic to the Early Bronze Age IV presents a very different scenario. The deserts of the Southern Levant exhibit a full sequence of settlement, a longer life span of individual sites, and a higher level of activity and creativity of the desert people. This paper describes the controversy and presents the ^{14}C data that form the basis for the revised view.

INTRODUCTION

The southern Levant deserts discussed in this paper include the areas of southern Jordan, the Negev, and Sinai. The climate of the region is arid or hyper-arid, characterized by summer temperatures that often rise above 40 °C in the hottest parts. Annual average precipitation is below 100 mm, while the potential evaporation may reach 4000 mm per year. The mountains of southern Jordan, southern Sinai, and the Negev Highlands enjoy better conditions, but are still very dry. The climate during the periods under discussion, the 6th to 3rd millennia BC, was somewhat moister than at present, but the environment clearly remained a desert.

In view of the negative water balance of the region most scholars described the occupational history of the Southern Levant deserts as a series of short settlement periods separated by long intervals of abandonment. During historical periods settlement in the desert was attributed to the initiative of strong political entities from the neighboring fertile regions. The dearth of archaeological remains during the intervening periods was related to nomads, who did not leave traces. The commonly accepted occupation scenario of the deserts in the southern Levant includes: 1) several pre-pottery Neolithic B sites (PPNB), 2) hardly any human presence during the 6th–4th millennia BC (Late Neolithic, Chalcolithic, and Early Bronze I), 3) a sudden and extensive settlement throughout the desert in the Early Bronze II (EBII, about 3000–2650 BC), 4) another period of emptiness during EBIII, and 5) extensive human presence in the EBIV period (about 2300–2000 BC).

This picture of "ups and downs" is well represented by the publications of the Negev Highland surveys. So far, nine survey maps have been published, covering altogether 900 km^2 encompassing about 65% of the Negev Highlands. Figure 1 presents a compilation of site numbers in each period.

Settlement Patterns Based on Radiocarbon Dating

In 1994 we published a detailed description and discussion of the settlement pattern in the deserts of the southern Levant during the 6th–3rd millennia BC with emphasis on the southern Negev (Avner et al. 1994). Based on archaeological surveys, excavations, artifacts, and 84 radiocarbon dates, we asserted a full sequence of settlement in the desert from the PPNB until the EBIV. Since then, more information accumulated on desert settlements and this concise paper provides an update.

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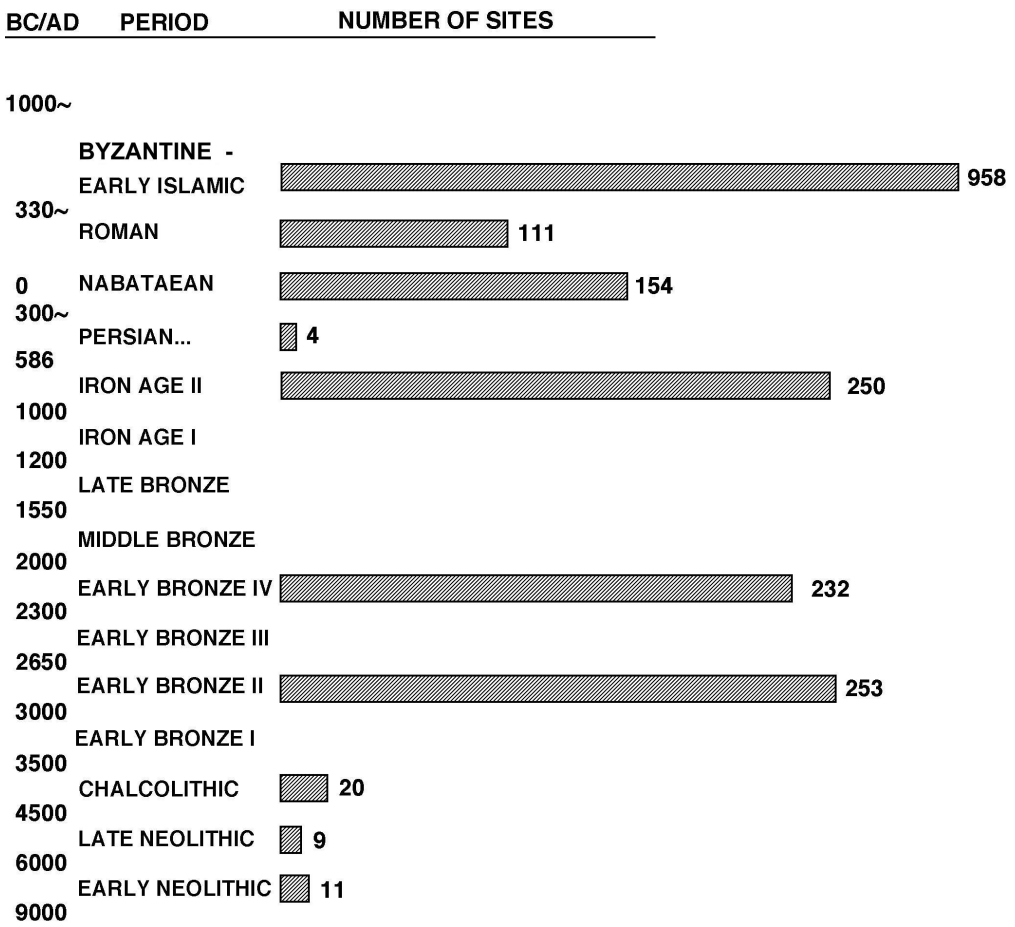

Figure 1 The traditional view of settlement patterns in the Negev Highlands based on archaeological age assessment. Compilation of site numbers in each period is derived from the Negev Highland surveys published by the Israel Antiquities Authority (Avni 1992; Cohen 1981, 1985, 1999; Haiman 1986, 1991, 1993, 1999; Lender 1990; Rosen 1994).

The new ^{14}C list from the area includes 175 dates from 73 sites in the time period of about 6000–2000 BC (see also Figures 2 and 3). This list provides a higher resolution of the settlement sequence and better illuminates the "dark ages" in the desert: the Late Neolithic, Chalcolithic, EB-I, and EB-III. In fact, these periods proved not to be "dark" at all. An arbitrary division of these dates by cultural periods gives a general idea of the settlement patterns as shown in Table 1.

The sequence of settlements by numbers of dates per century in each period is demonstrated in Figure 2. It shows that only one part of the sequence remains with a low number of dates: the period 4000–3500 BC, or the Late Chalcolithic in cultural terms. This is partly related to the fact that some sites previously dated as Chalcolithic were later proven to be EB-I (Adams and Genz 1995; Genz 1997; Khalil and Eichmann 1999). Nevertheless, no settlement gaps are apparent and additional excavations will most probably provide further information on the Late Chalcolithic.

Table 1 Number of ^{14}C dates according to cultural period

Cultural Period	Number of ^{14}C dates
Late Neolithic	53
Chalcolithic	38
Early Bronze I	21
Early Bronze II	25
Early Bronze III	23
Early Bronze IV	11

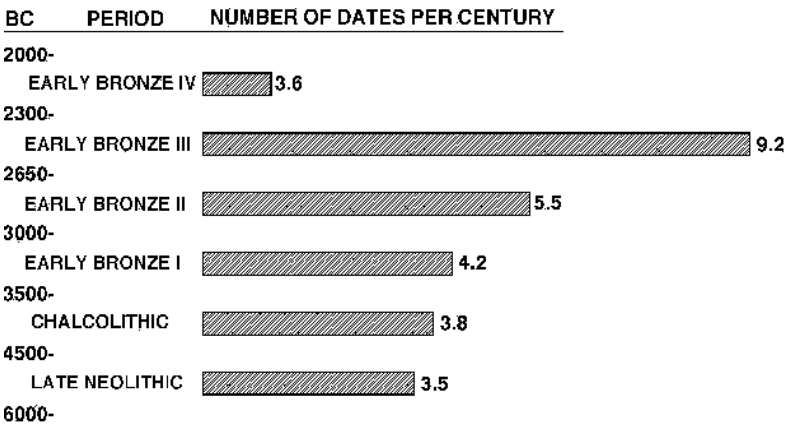

Figure 2 A different picture of settlement patterns in the Southern Levant deserts during the 6th–3rd Millennia BC is clearly emerging from ^{14}C dating

Settlement Duration of Desert Sites

Another point illuminated by the ^{14}C dating is the life span of individual sites. Usually, desert sites were described as "short lived and a passing phenomenon" or "seasonally used for only several years" (Haiman 1986:16, 1989:185) and having a "brief lifespan" (Beit-Arieh 1982:155, 1986:51). However, when a series of ^{14}C dates is retrieved from excavated sites, a long timeline is revealed spanning hundreds of years or even more (Figure 4, Sites 22, 25, 39, 50). The best example is the Nahal Issaron site (Figure 4, Site 29) in the Uvda Valley, where 35 dates cover 4500 years from early PPNB to late Chalcolithic (Figure 5). It is not asserted here that these sites were inhabited every day or even every year, but still, their long duration contradicts common notions about desert settlement and suggests a great demographic and cultural significance.

What is the reason for the time difference between settlement patterns obtained through archaeological surveys and through ^{14}C dating? The main answer, in our opinion, lies in the archaeological age estimate attributed to ceramics and flint tools. The two major types of artifacts collected from the surface in the Negev and Sinai surveys—the "hole-mouth" pottery sherds and tabular flint scrapers—were considered to identify only EB-II. However, a closer examination shows that a much longer time range is obtained when these artifacts are found with other datable finds and with ^{14}C dates (Avner et al. 1994:280–81). As a result of the limited dating, the EB-II period was overemphasized, at the expense of the Late Neolithic, the Chalcolithic, the EB-I, and EB-III. It still seems that

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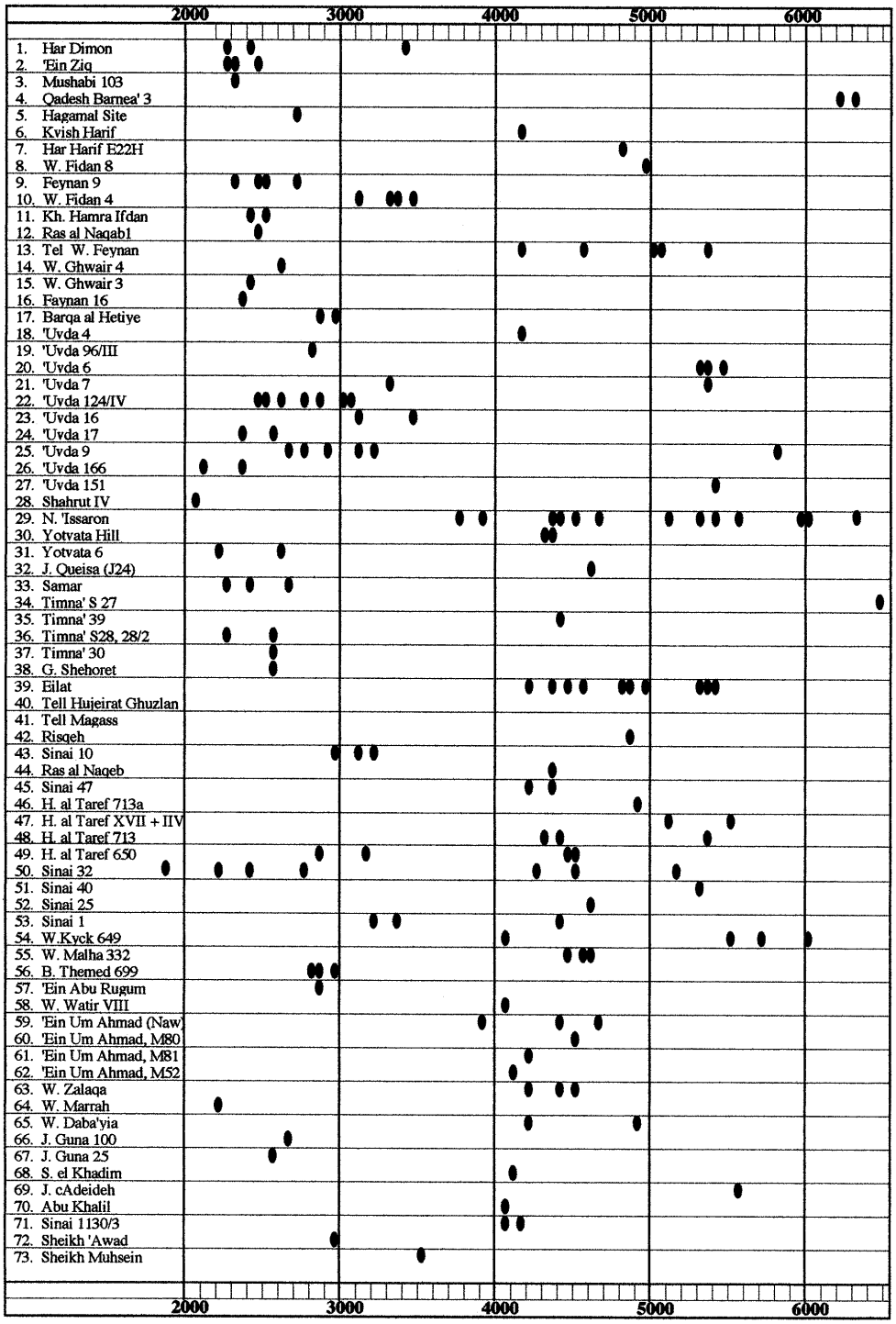

Figure 3 Histogram of calibrated BC dates: Late Neolithic to EBIV from southern Jordan, the Negev and Sinai from north to south. Each spot represents the mean value of one or more calibrated dates based on OxCal 3.4 (Ramsey 2000). For locations of the sites see Figure 4.

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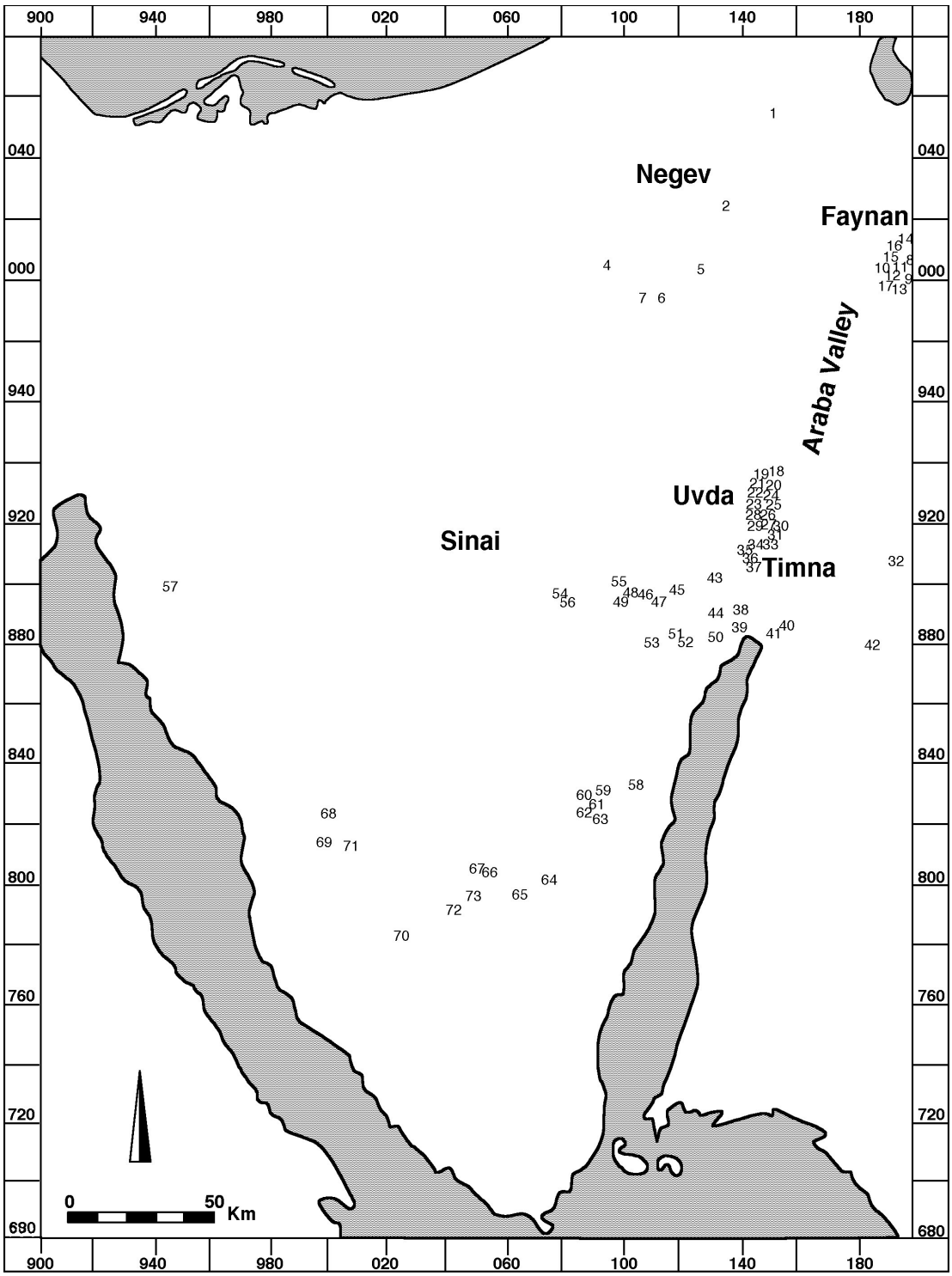

Figure 4 Location of archaeological sites dated by ^{14}C. The site numbers refer to Table 2.

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EB-II was indeed the climax of settlement in the southern Levant deserts, but the other periods should not at all be considered as "missing."

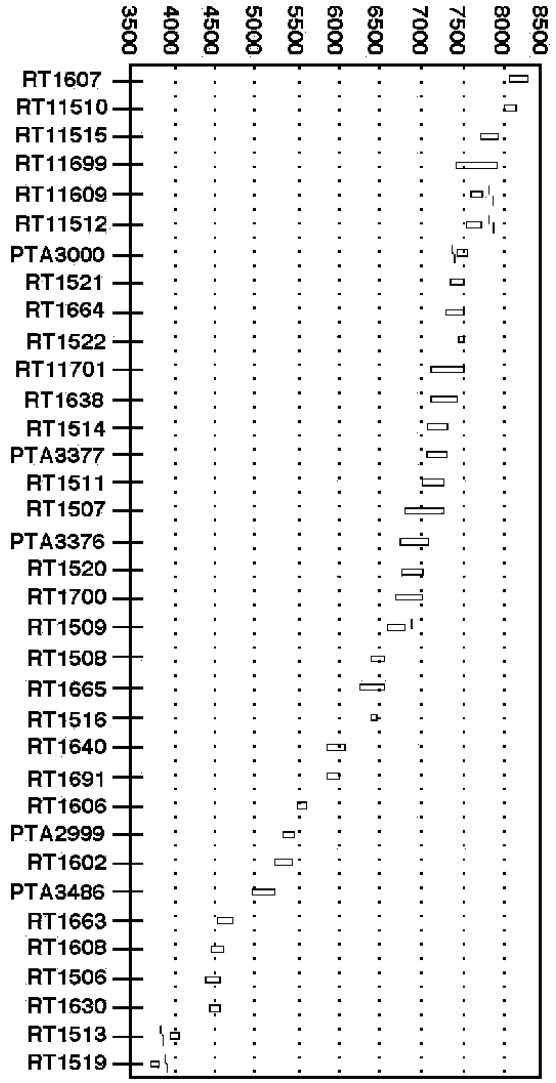

Figure 5 Distribution of ^{14}C dates at the Nahal Issaron site (Carmi et al. 1994).

CONCLUSION

Our knowledge of archaeological history in the deserts of the Southern Levant is still far from satisfactory. Much work is still needed before we can reconstruct the desert's past with some reliability. Most areas in these deserts have not been surveyed in detail. The typology and chronology of sites and artifacts is not clear enough as yet. And there is still much to be done in interpreting the known types of sites. However, as the speed of destruction of desert sites is very high, we cannot be sure how many sites will survive for investigation in the near future.

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Even with our limited knowledge, archaeological remains in the desert can no longer be attributed only to foreign initiatives during the late prehistory and early historic periods. Moreover, it can no longer be claimed that the desert population had no role in the cultures of the Near East. On the contrary, the desert peoples were innovative enough to develop a successful and sustainable form of agriculture under harsh conditions (Avner 1998). They were also involved in the development of copper mining and metallurgy (Rothenberg and Glass 1992) and they were especially creative in the realm of religion and philosophy. In these fields they had an important influence on the population of the fertile zones for many generations (Avner 1993, in press 1, 2, 3).

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APPENDIX

Table 2 Calibrated ^{14}C dates of Late Neolithic to Early Bronze-IV sites in the deserts of Southern Jordan, the Negev, and Sinai. The sites are arranged in geographical order from north to south. The references for the ^{14}C dates of each site are presented in the last column, next to the first date of the respective site[a]

Nr	Site name	Site type	Lab nr	M[b]	Years (BP)	Cal BC[c]	Mean	Reference
1	Har Dimon	Habitation	RT1556	C	4660 ± 55	3520–3360	3440	Segal and Carmi 1996
	Har Dimon		RT1557	C	3845 ± 50	2410–2200	2305	
	Har Dimon		RT1558	C	3915 ± 50	2470–2300	2385	
2	‘En Zik	Habitation	RT885A	C	3960 ± 90	2580–2300	2440	Cohen 1999
	‘En Zik		RT885B	C	3880 ± 50	2460–2200	2330	
	‘En Zik		RT885B1	C	3880 ± 50	2460–2290	2265	
	‘En Zik		RT2514	W	3700 ± 45	2200–1980	2090	
3	Mushabi 103	Habitation	RT447B	C	3800 ± 330	2700–1700	2200	Sharpensel et al. 1976
4	Qadesh Barne’a 3	Habitation	SMU662	C	7530 ± 80	6450–6250	6350	Bar Yosef 1987
	Qadesh Barne’a 3		Pta3662	C	7350 ± 80	6340–6070	6205	
5	Hagamal site	Habitation	Rt2043	C	4115 ± 50	2860–2580	2720	Segal and Carmi 1996
6	Kvish Harif	Habitation	Pta3374	C	5260 ± 60	4230–3980	4105	Rosen 1984
7	Har Harif E22H	Habitation	Tx1122	C	5960 ± 100	4960–4710	4835	Forenbaher 1997
8	W. Fidan	Habitation	HD17471	C	6082 ± 44	5050–4850	4950	Hauptmann 2000
9	Faynan 9	Copper smelt	HD10577	C	4140 ± 110	2880–2580	2730	
	Faynan 9		HD10993	C	3981 ± 50	2580–2400	2490	
	Faynan 9		HD10994	C	3973 ± 85	2620–2310	2465	
	Faynan 9		HD10584	C	3812 ± 77	2410–2130	2270	
10	W. Fidan 4	Habitation	HD13776	C	4654 ± 50	3520–3360	3340	
	W. Fidan 4		HD16378	C	4424 ± 51	3270–2920	3095	
	W. Fidan 4		HD16379	C	4576 ± 44	3500–3120	3310	

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No	Site name	Type of site	Lab No.	M[b]	years (BP)	cal BC[c]	Mean	Reference
	W. Fidan 4		HD16380	C	4702 ± 37	3630–3370	3500	
	W. Fidan 4		HD16327	C	4718 ± 25	3630–3380	3505	
11	H. Hamdan If-dan	Habitation	HD16533	C	4044 ± 44	2630–2470	2550	
	H. Hamdan If-dan		HD16534	C	3914 ± 45	2470–2310	2390	
12	Ras al Naqab 1	Copper smelt	HD10574	C	3971 ± 67	2580–2350	2465	
13	Tel W. Faynan	Habitation	HD10567	C	6410 ± 115	5490–5260	5375	Najjar et al. 1990
	Tel W. Faynan		HD12335	C	6360 ± 45	5470–5300	5385	
	Tel W. Faynan		HD13775	C	6312 ± 50	5210–4950	5080	Hauptmann 2000
	Tel W. Faynan		HD12338	C	6110 ± 75	5210–4850	5030	Najjar et al. 1990
	Tel W. Faynan		HD12337	C	5740 ± 35	4680–4500	4590	
	Tel W. Faynan		HD12336	C	5375 ± 30	4330–4110	4200	
14	W. Ghwir 4	Copper smelt	HD10573	C	4059 ± 55	2840–2470	2655	Hauptmann 2000
15	W. Ghwir 3	Copper smelt	HD16529	C	3919 ± 26	2470–2350	2410	
16	Fainan 16	Copper smelt	HD10579	C	3923 ± 61	2490–2300	2395	
17	Barqa al Hetiye	Habitation	HD13975	C	4376 ± 57	3090–2900	2995	
	Barqa al Hetiye		HD13976	C	4267 ± 43	2920–2780	2850	
18	‘Uvda 4		RT724D	C	5400 ± 110	4350–4040	4195	Avner et al. 1994
19	‘Uvda 96/III	Threshing fl.	RT648B	C	4250 ± 50	2920–2700	2810	
20	‘Uvda 6	Sanctuary	RT628A	C	6560 ± 200	5710–5310	5510	
	‘Uvda 6		RT628B	C	6400 ± 70	5470–5310	5390	

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No	Site name	Type of site	Lab No.	M[b]	years (BP)	cal BC[c]	Mean	Reference
	ʻUvda 6		Pta3621	C	6400 ± 60	5470–5310	5390	
	ʻUvda 6		RT1739	OE	6390 ± 60	5470–5310	5390	Segal and Carmi 1996
21	ʻUvda 7	Habitation	RT724B	C	6410 ± 120	5490–5260	5375	Avner et al. 1994
	ʻUvda 7		RT724C	C	4540 ± 100	3490–3040	3267	
22	ʻUvda 124/IV	Habitation	RT1419	C	4370 ± 100	3310–2880	3095	Avner et al. 1994
	ʻUvda 124/IV		RT1452	C	4370 ± 50	3090–2910	3000	
	ʻUvda 124/IV		RT1449	C	4285 ± 60	3020–2710	2865	
	ʻUvda 124/IV		RT1451	GC	4280 ± 60	3020–2700	2860	
	ʻUvda 124/IV		RT1448	C	4120 ± 60	2870–2570	2720	
	ʻUvda 124/IV		RT1450	C	4075 ± 55	2860–2490	2675	
	ʻUvda 124/IV		RT3174	GC	4030 ± 45	2620–2470	2545	
	ʻUvda 124/IV		RT3172	GC	4015 ± 40	2580–2470	2525	
	ʻUvda 124/IV		RT3173	GC	4010 ± 45	2580–2460	2520	
23	ʻUvda 16	Habitation	RT640A	C	4800 ± 70	3660–3380	3520	Avner et al. 1994
	ʻUvda 16		RT640B	C	4400 ± 60	3260–2910	3085	
24	ʻUvda 17	Habitation	Pta3340	C	4100 ± 50	2860-2500	2680	Bet Arieh unpublished
	ʻUvda 17		Pta3342	C	3870 ± 40	2460-2280	2370	
25	ʻUvda 9 (124/XVII)	Upright standing stone	RT670D	C	7960 ± 200	7200-6550	6875	Avner et al. 1994
	ʻUvda 9 (124/XVII)		Pta3646	C	6960 ± 70	5890-5730	5810	Avner in press

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No	Site name	Type of site	Lab No.	M[b]	years (BP)	cal BC[c]	Mean	Reference
	'Uvda 9 (124/ XVII)		RT3369	C	4130 ± 90	2880-2580	2730	
	'Uvda 9	Habitation	RT899A	C	4530 ± 50	3360-3100	3230	Avner et al. 1994
	'Uvda 9		RT889B	C	4520 ± 60	3360-3100	3230	
	'Uvda 9		RT864B	C	4440 ± 180	3360-2890	3125	
	'Uvda 9		RT1436	O E	4440 ± 60	3330-2920	3125	
	'Uvda 9		RT864A	C	4310 ± 90	3110–2700	2905	
	'Uvda 9		RT714A	O E	4070 ± 100	2860–2470	2665	
26	"Uvda 151	Standing stone	RT684A	O E	5670 ± 85	4610–4360	4485	Avner et al. 1994
27	Shaharut IV	Tombs	RT899C	W	3700 ± 55	2200–1970	2085	Avner et al. 1994
	Shaharut IV		RT771B	W	3582 ± 130	2140–1740	1940	
28	'Uvda 166	Habitation	RT714B	C	3850 ± 80	2460–2200	2330	Avner et al. 1994
	'Uvda 166		RT1421	C	3680 ± 50	2140–1970	2055	
29	'Uvda 14[d]	Habitation	RT1516	C	7460 ± 95	6410–6230	6320	Carmi et al. 1994
	'Uvda 14		RT1640	C	7135 ± 95	6160–5890	6025	
	'Uvda 14		RT1691	C	7100 ± 70	6030–5840	5935	
	'Uvda 14		RT1606	C	6680 ± 85	5670–5480	5575	
	'Uvda 14		Pta2999	C	6460 ± 70	5480–5360	5420	
	'Uvda 14		RT1692	C	6350 ± 90	5470–5210	5340	
	'Uvda 14		Pta3486	C	6130 ± 70	5210–4940	5075	
	'Uvda 14		RT1663	C	5755 ± 85	4710–4490	4600	
	'Uvda 14		RT1608	C	5690 ± 55	4600–4450	4525	
	'Uvda 14		RT1506	C	5635 ± 70	4540–4360	4450	

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No	Site name	Type of site	Lab No.	M[b]	years (BP)	cal BC[c]	Mean	Reference
	'Uvda 14		RT1630	C	5625 ± 70	4530–4360	4445	
	'Uvda 14		RT1513	C	5170 ± 55	4050–3810	3930	
	'Uvda 14		RT1518	C	4990 ± 50	3910–3700	3805	
30	Yotvata Hill	Ramp	RT1548	C	5468 ± 55	4360–4240	4300	Segal and Carmi 1996
	Yotvata Hill	Copper smelt	RT1546/7	C	4650 ± 70	3520–3360	3340	
31	Yotvata 6	Habitation	RT1439	C	3980 ± 60	2580–2350	2565	Avner et al. 1994
	Yotvata 6		RT1438	C	3770 ± 50	2290–2060	2175	
32	J. Queisa (J24)	Habitation	SMU804	C	5770 ± 40	4690–4550	4620	Henry 1995
33	Samar	Kite	RT2716	C	4080 ± 25	2840–2500	2670	Avner et al. 1994
	Samar		Pta3627	C	3940 ± 60	2560–2310	2435	Holzer and Avner in press
	Samar		RT2715	C	3775 ± 40	2290–2130	2210	
34	Timna S27	Copper mine	Bonn2538	C	7680 ± 120	6650–6410	6530	Rothenberg, unpublished
35	Timna 39	Habitation	OxA7632	C	5485 ± 45	4430–4250	4340	Rothenberg and Merkel 1998
36	Timna S28/2	Copper mine	Bonn2363	C	4000 ± 90	2840–2340	2590	Conrad and Rothenberg 1980
	Timna S28		Bonn2632	C	3890 ± 70	2470–2230	2350	
37	Timna 30	Copper smelt	Ham215	C	4020 ± 100	2900–2350	2625	Rothenberg 1990
38	Shehoret hill	Copper smelt	RT591	C	4010 ± 150	2900–2300	2600	Avner et al. 1994
39	Eilat IV/16	Tumuli	RT989	C	6470 ± 80	5490–5320	5405	Avner et al. 1994
	Eilat IV/3		RT926A	C	6340 ± 60	5470–5260	5365	
	Eilat V/27		RT1215	C	6400 ± 210	5650–5050	5350	

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No	Site name	Type of site	Lab No.	M[b]	years (BP)	cal BC[c]	Mean	Reference
	Eilat V/28		RT1216	C	6060 ± 65	5050–4850	4950	
	Eilat V/22		RT1214	C	5980 ± 130	5050–4710	4880	
	Eilat V//18		RT1212	C	5930 ± 80	4910–4710	4810	
	Eilat IV/8		RT1210	W	5710 ± 75	4680–4450	4565	

[a] Sites where excavators are not mentioned in the table are: Har Dimon – G. Tal; Mushabi 103 – Sass & Klemer; Hagamal Site – Rosen; Feidan 8 – Adams; Feidan 4– Adams & Genz, Adams & Levy; Hamra Ifdan – Adams; Baqa a Hatiye – Fritz; 'Uvda 4 – Eisenberg; 'Uvda 7 – Saas & Goren; 'Uvda 16 – Yogev; 'Uvda 17 – Beit Arieh; 'Uvda 9 – Amiran, Arnon, Ilan and Avner; Yotvata Hill – Meshel; Yotvata 6 – Meshel & Sass; Ras el Naqeb – Avner; Hashem el Taref XVII – Avner; Hashem el Taref 650, 317, 317a, W. Kyke 649. W. Malha 332, Themel 699 – Kosloff; ein Abu Rugum – Sass; W. Watir – Avner; 'Ein Um Ahmed – Goren; W. Zalaqa – Avner; W. Dab'yia – Goren, Avner; Serabit el Khadim – Beit Arieh; J. 'Adeideh – Goren; Abu Khalil – Goren; Sinai 1130/3 – Beit Arieh; Sheikh 'Awad – Beit Arieh.

[b] The abbreviation are: M – material; C – charcoal; GC – goat coprolite; OE – ostrich eggs; W – wood; SS – sea shell

[c] Calibration based on OxCal 3.4 (Bronk Ramsey, 2000). 1σ confidence is used. Mean values were calculated for the construction of the histogram.

[d] Uvda 14 is the same as N. 'Issaron. For additional 22 dates see Figure 3.

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