RADIOCARBON DATES FROM IRON AGE STRATA AT TEL BETH SHEAN AND TEL REHOV

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ABSTRACT. We discuss the significance of 32 radiocarbon dates from the archaeological sites of Tel Beth Shean and Tel Rehov in northern Israel. All dates are from Iron Age I and II archaeological contexts (12th–8th centuries BCE). Most of the dates were done on short-lived samples (seeds and olive pits), while some are on charred timber. The samples are organized in several homogeneous clusters according to their context. This series is one of the largest groups of ^{14}C dates from the Iron Age in the Levant. The paper discusses the correlation between the ^{14}C dates and the traditional archaeological dates of the same context. Results from two laboratories and two calibration curves are compared, showing some significant differences in one case. We conclude with an evaluation of the relevance of ^{14}C dating for the current debate about the chronology of the Iron Age in Israel, and in historical periods in general.

INTRODUCTION

The Beth Shean Valley, which is part of the Jordan Valley, is situated in one of the most strategic locations in the Land of Israel. The valley is strewn with dozens of archaeological sites from different time periods and cover a broad spectrum of sizes. The Beth Shean Valley Archaeological Project seeks to study the settlement history of the region during the Bronze and Iron ages. The project started in 1989 with the renewed excavations at Tel Beth Shean, a site extensively excavated by the University of Pennsylvania between 1921 and 1933 (for summary and previous literature see Mazar 1993a, 1993b, 1997a, 1999a). After nine seasons of excavations at Tel Beth Shean, ending in 1996 the project was extended to the largest site in the valley, that of Tel Rehov (Tell es-Sarem), where work concentrates on Iron Age strata (Mazar 1999a). At both sites the excavations revealed fine stratigraphic sequences, architectural complexes, and a variety of finds from various periods. In this paper, we will concentrate on the stratigraphic sequence and chronology of the Iron Age period, attempting to compare our stratigraphic results and traditional archaeological dates with the results of radiocarbon dates. We shall examine to what extent the ^{14}C dates are able to refine the traditional chronology and may contribute to solve questions like the current debate over the chronology of the Iron Age in the Southern Levant.

At present, 53 ^{14}C dates from our project are available: 33 from Tel Beth Shean and 20 from Tel Rehov, referring to various archaeological periods. This collection is one of the largest groups of ^{14}C dates from historical sites anywhere in Israel. There are 32 dates related to the Iron Age: 12 from Beth Shean and 20 from Tel Rehov. They range from the early 12th century until the 8th century BCE

All dates except nine were measured in the ^{14}C laboratory of the Weizmann Institute in Israel. Most of these dates were obtained since 1998, using liquid scintillation counters. Nine grain samples from one context at Tel Rehov were dated with accelerator mass spectrometry (AMS) at the University of Arizona-NSF ^{14}C laboratory (reported by Professor D Donahue). Other samples from the same context were dated at the Weizmann Institute (see Table 6). All the samples came from well-stratified contexts. Short-lived samples such as cereals, lentil seeds, and olive pits were used preferentially.

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When such samples were not available, charred timber was dated, following identification by the paleobotanist Dr Uri Baruch.

The standard deviation of most BP dates ranged from 25–50 yr, and in a few cases, 60–70 yr (1σ, 68% certainty). These BP dates were calibrated with the OxCal software (Bronk Ramsey 1999) using the 1998 calibration curve (Stuiver and van der Plicht 1998). Comparisons are made (in the endnotes) with the 1993 calibration curve (Stuiver and Reimer 1993). The differences between the 1993 and 1998 curves are usually negligible, but in two cases, both referring to the 12th century BCE, there is a significant and important difference.

DATING RESULTS AND THEIR INTERPRETATION

The data are presented below as clusters of dates from homogeneous contexts, from the oldest to the latest.

The 12th Century BCE (Historical-Archaeological Age Assessment)

Beth Shean was a stronghold of the Egyptian New Kingdom imperial administration in northern Israel. The site provided a clear stratigraphic sequence, with a series of phases that can be correlated with the 19th and 20th dynasties in Egypt (13th and 12th centuries BCE). This makes Beth Shean one of the most important sites to relate stratigraphic sequences in the Levant with Egyptian chronology. Two groups of ^{14}C dates related to this period are available (clusters 1 and 2 below).

Cluster 1. Samples from Beth Shean, Area N

Three ^{14}C determinations were obtained from one single heap of charred cereal grains (wheat) found in a storage room inside an Egyptian building at Area N at Tel Beth Shean (Locus 18433, Phase N4; Table 1). The room was part of a massive building, perhaps of a public nature, which was destroyed by heavy fire.

Table 1 ^{14}C Dates from Beth Shean Area N (Locus 18433, Silo in Stratum N4)

RT	$\delta^{13}C$ (‰)	pMC (%)	BP	cal BCE (1σ)	cal BCE (2σ)
2594	–21.2	69.5 ± 0.2	2925 ± 25	1210–1040	1260–1010
2597	–21.6	69.2 ± 0.2	2985 ± 25	1270–1130	1370–1120
2156	–21.6	69.7 ± 0.4	2910 ± 50	1210–1000	1270–930

The weighted average and standard error of the mean (Ward and Wilson 1978) of the three dates in Table 1 is 2950 ± 15 BP and the calibrated date is 1260–1240 cal BCE (12% probability) and 1220–1120 cal BCE (88%). These dates fit very well to the generally accepted dates of the archaeological context.

The samples came from a building that contained local Canaanite pottery, Egyptian pottery, a single imported Cypriot White Slip bowl, and other artifacts which can be dated to either the end of the 19th Dynasty or beginning of the 20th Dynasty: around 1200 BCE The University Museum expedition found above this building structural remains attributed to Level VI, which was destroyed at the end of the Egyptian presence, perhaps around 1130 BCE (James 1966: 13–14, Figure 76:1). We established that these structural remains were in fact renovations of the building excavated by us.

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Therefore, the latter building belongs to an earlier stage of the Egyptian occupation at Beth Shean. In the adjacent Area S we found two stratigraphically distinct phases: S4 and S3, both belonging to the time period of the 20th Dynasty. It appears that our phase N4 in Area N corresponds with phase S4 in Area S, and the two should be dated to the early 20th Dynasty, i.e. the early 12th century BCE This date fits all three ^{14}C dates in the one σ group according to the OxCal program (Bronk Ramsey 1995) using the 1998 calibration curve (Stuiver and van der Plicht 1998)[1].

Cluster 2. Samples from Bin 28817 of Phase S3a at Tel Beth Shean

The four samples in Table 2 come from charred linen seeds and grains found in a small bin (Locus 28817). The weighted average of the four dates is 2940 ± 15 BP and the calibrated ages for a 1σ range are 1260–1050[2] and 1260–1040 cal BCE for a 2σ range[3]. This bin was found at the northwestern part of area S, below the foundations of a large building of the Iron Age IIA. It belongs to the last constructional phase of a building, which started its life during the time of the Egyptian 20th Dynasty (Level VI, our Stratum S3). The bin was attributed by us on the basis of its stratigraphic location and historical/archaeological considerations to either the last phase of the Egyptian presence at Beth Shean (Phase S3a, mid 12th century BCE) or to a later phase (Phase S2), which continues into the 11th century, during which older Egyptian buildings were renovated. The calibrated ^{14}C dates support the first alternative. In this case, in spite of the almost 200-year span of the calibrated dates, ^{14}C dates helped us to decide between the two alternatives.

Iron Age I

Cluster 3. Three olive pits from Iron Age I strata at Tel Rehov

Table 3 shows ^{14}C dates of three charred olive pits found in successive stratigraphic phases in a step trench excavated on the slope of the lower mound of Tel Rehov (Area D; Mazar 1999a: 10–16). The pottery associated with these phases is typical Iron Age I painted pottery in Canaanite tradition, traditionally dated to the 11th century BCE. These ^{14}C dates are too low by any standards: the first and last are dated to the 9th century BCE in both 1σ and 2σ ranges. This date is too low even according to the "low chronology" suggested by Finkelstein (see below), while the second date (10th century

[1] However, it should be noted that when we first calibrated the BP dates with an earlier calibration curve (Stuiver and Reimer 1993), the results were as follows:

RT2594: 1153–1043 BCE

RT2597: 1120–1006 BCE

RT2156: 1161–1000 BCE

The earliest date in this calibration (1150 BCE) appears to be too low by about 20–30 years from the probable archaeological date, while the 2σ range of these samples is wide enough to cover the entire 12th century BCE. This significant difference in calibrated ages between two calibration curves issued at a time difference of five years must be emphasized. The 1998 calibration curve better fits the archaeological-historical considerations than the 1993 curve.

[2] Mr H Bruins calculated the following for 1σ: 1260–1240 (3.3%); 1220–1110 (60%); 1100–1080 (3.4%); and 1060–1050 (1.6%) cal BCE.

[3] Calibration with the 1993 Pearson-Stuiver calibration curve provided lower dates: (1σ range):

RT2323: 1152–999 cal BCE (99%)

RT2325: 1260–1128 cal BCE (100%)

RT2527: 1127–1040 cal BCE (100%)

The statistical average would be 1210–1120 cal BCE. Yet, in spite of the differences, these lower dates do not contradict the conclusion that the bin belongs to the last phase of the Egyptian presence at Beth Shean. Only RT2527 is slightly beyond that time frame. Yet, like in the previous case, the significant differences between the results of the two calibration curves should be noted. As in the previous case, the results of the 1998 calibration curve are more in accord with the archaeological/historical dates than those of the 1993 curve.

Table 2 Beth Shean Stratum S3a Bin (Locus 28817) Calibrated with OXCAL 1999, using the 1998 calibration curve (Stuiver et al. 1998)

Lab nr (RT–)	Material	$\delta^{13}C$ (‰)	pMC (%)	BP	cal BCE (1σ)	cal BCE (2σ)
2323	Charred linum seeds	–24.7	69.7 ± 0.4	2900 ± 45	1190–1000	1260–930
2325	Charred grains	–24.9	69.0 ± 0.3	2980 ± 40	1300–1120	1380–1040
2527	Common oak, Common carob, Linum seeds	–24.7	69.5 ± 0.2	2920 ± 25	1210–1040	1260–1010
2596	Charred seeds	–22.7	69.2 ± 0.2	2960 ± 25	1260–1050	1290–1050

BCE) could fit this "low chronology". The 2σ range of this sample fits also the traditional chronology of this pottery assemblage (11th century BCE). It should be noted that the samples are arranged in the table according to the stratigraphic sequence: Phase D3 is younger than Phase D4 and Phase D6 is the oldest. However, the ^{14}C dates do not fit this sequence. Thus, these three dates are suspected as being both unreliable and significantly too low.

Table 3 Tel Rehov, Area D, olive pits from Iron Age I levels

RT	Locus	Basket	Strat.	$\delta^{13}C$ (‰)	pMC (%)	BP	Cal BCE (1σ)	Cal BCE (2σ)
3120	1858	28395	D3	–20.8	71.7 ± 0.3	2670 ± 40	895–795	900–790
3121	1845	28243	D4	–21.1	70.6 ± 0.3	2800 ± 40	1000–900	1050–830
3119	1876	28536	D6	–20.7	71.6 ± 0.4	2685 ± 40	900–800	920–790

Iron Age II

Cluster 4. Timber from the construction of Stratum S1 at Tel Beth Shean

Table 4 shows dates of two samples of olive tree wood found as construction material in the foundations of a massive building of Stratum S1 at Beth Shean (Mazar 1999b: 92–93). The beams were laid on top of massive basalt stone foundations of the walls, and served as foundations for a mudbrick superstructure[4].

Table 4 Charred olive tree beams from Stratum S1 at Tel Beth Shean (Locus 38416)

RT	Basket	$\delta^{13}C$ (‰)	pMC (%)	BP	cal BCE (1σ)	cal BCE (2σ)
2734	384271	–21.5	69.2 ± 0.2	2955 ± 25	1260–1120	1270–1040
2733	384283	–21.8	70.2 ± 0.4	2835 ± 40	1050–920	1130–890

The archaeological date of the structures, based on stratigraphic considerations and on a small amount of pottery, is either 10th or early 9th centuries BCE. The ^{14}C date of sample RT 2734 (1260–1120 BCE) indicates that this was a beam from an old olive tree or taken from the inner part of the

[4]Using the 1993 Pearson-Stuiver calibration curve the results are:
RT2734: 1208–1118 BCE 100%
RT2733: 1016–919 BCE 100%

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tree trunk, where cells could die long before the tree was cut down. RT2733 (1050–920 BCE) could fit the time of construction in the 10th century BCE, though it could also be considered as being earlier and providing a *terminus post quem* for the construction of the building.

Cluster 5. Timber from Tel Rehov, Stratum V (construction)

Table 5 brings the dates of three samples of wood from Strata V–IV at Tel Rehov. (These new strata numbers replace the temporary ones used in the first preliminary report; Stratum V corresponds to strata C1b and E1b, stratum IV to C1a and C1a of that report (see Mazar 1999a: 9–28). RT2997 came from beams used in the construction of Stratum V in Area C (Mazar 1999a: 20–3). The wood served as foundation for both the floor and walls of a large building. RT2996 came from Stratum IV in area E and its functional context is not entirely clear.[5]

Both strata V and IV in area C were destroyed by heavy fire and the destruction debris contained abundant pottery vessels of similar forms that belong to the Iron Age IIA (10th-mid 9th centuries BCE). The destruction of stratum IV probably occurred during the events following the end of the Omride dynasty (second half of 9th century), while stratum V was destroyed sometime earlier.

Table 5 Wood remains from Tel Rehov, Strata V–IV. RT 2995 and 2996 are olive wood; RT 2997 is elm tree

RT	Locus	Basket	Area	$\delta^{13}C$ (%)	pMC (%)	BP	cal BCE (1σ)	cal BCE (2σ)
2995	1479	14537	C	−21.8	68.3 ± 0.3	3070 ± 40	1400–1260	1430–1210
2997	1475	14488	C	−23.0	69.9 ± 0.2	2875 ± 25	1130–990	1130– 930
2996	1664	16628	E	−22.7	70.9 ± 0.2	2770 ± 25	970–840	1000–830

The beams from Area C come from the construction of this level. The first (RT2995) is dated to the 14th–13th centuries BCE and thus points to the use of old olive wood in the construction, as in the case of Stratum S1 at Beth Shean (above). The second sample (RT2997) comes from an elm tree, which has a much shorter life span than an olive tree: its average life span in Israel today is about 50 years (information provided by U Baruch). Our elm tree beam is dated to the late 11th early 10th century BCE in the 1σ range, while a lower date in the 10th century is suggested within the 2σ range. This date may therefore provide sound evidence for the 10th century date of construction of this building.

The olive tree wood from Area E (RT2996) gave a date between 980 and 840 BCE, a time range which fits almost exactly the entire Iron Age IIA phase to which Strata V–IV belong. However, such a range does not allow a more precise date within this time range.

Cluster 6. Charred Grain from the Destruction of Stratum V at Tel Rehov

A heap of charred grain was found in a small chamber of Stratum IV in Area C at Tel Rehov, sealed by a layer of fallen mudbricks (Mazar 1999a:21; Figure 9, Room in Square Y-3; for a photo see Figure 6). Grain samples from this layer were sent to two laboratories: nine samples were dated at the Weizmann Institute and nine samples were measured by Professor D Donahue at the University of Arizona, using AMS (Table 6)[6].

[5]Using the Pearson-Stuiver calibration curve from 1993 the results would be:
RT2995: 1391–1268 BCE
RT2997: 1113–993 BCE
RT2996: 930–845 BCE
Two of these dates are somewhat lower than the OxCal99 dates.

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Table 6 Tel Rehov, Area C. Charred Grain from Locus 2425, Basket 24251, Stratum V (=C1). Nr 1–9: Weizmann Institute; Nrs 10–18: University of Arizona

Nr	Code	$\delta^{13}C$ (%)	pMC (%)	BP	cal BCE (1σ)	cal BCE (2σ)
1	RT3122A	–20.8	71.5 ± 0.2	2700 ± 20	900–810	900–805
2	RT3122A1	–20.8	72.1 ± 0.2	2655 ± 25	824–803	895–790
3	RT3122A2		72.8 ± 0.2	2655 ± 25	824–803	895–790
4	RT3122B	–21.0	71.3 ± 0.2	2720 ± 20	900–830	910–815
5	RT3122B1		71.4 ± 0.2	2700 ± 25	900–810	900–805
6	RT3122B2		71.9 ± 0.3	2650 ± 30	826–800	900–790
7	RT3122BB		71.2 ± 0.2	2725 ± 15	900–830	905–825
8	RT3122C	–20.7	70.0 ± 0.2	2860 ± 20	1050–940	1130–920
9	RT3122D	–20.9	71.4 ± 0.2	2710 ± 20	900–825	900–810
10	AA30431 U3-11	–22.5	70.3 ± 0.5	2830 ± 55	1110–900	1190–830
11	AA30431 U3-12	–22.5	71.0 ± 0.5	2745 ± 50	970–820	1000–800
12	AA30431 U3-13	–22.5	71.2 ± 0.5	2730 ± 45	970–820	1000–800
13	AA30431 U3-21	–22.7	70.4 ± 0.4	2815 ± 50	1040–890	1130–830
14	AA30431 U3-22	–22.7	70.8 ± 0.4	2770 ± 50	980–830	1020–810
15	AA30431 U3-23	–22.7	71.4 ± 0.4	2710 ± 45	900–820	970–790
16	AA30431 U3-31	–23.2	71.6 ± 0.4	2685 ± 45	900–800	920–790
17	AA30431 U3-32	–23.2	70.9 ± 0.5	2760 ± 60	980–830	1050–800
18	AA30431 U3-33	–23.2	71.1 ± 0.5	2740 ± 50	920–820	1000–800

The weighted average of the nine samples measured at the Weizmann Institute is 2720 ± 7 BP and the calibrated age is 900–830 BCE for 1σ and 900–825 BCE for 2σ ranges[7]. The weighted average of the nine samples measured at Arizona was calculated by Professor Donahue to 2750 ± 16 BP and the calibrated age is 905–835 BCE for 1σ and 925–830 BCE for 2σ ranges[8]. The weighted average of the combined Tucson and WIS dates is 2725 ± 6 BP and the calibrated age is 900–830 for 1σ and 900–830 for 2σ ranges. Note, however, that 1σ values for the two sets of measurements is 20 and 48 years in WIS and Tucson, Arizona respectively. The difference between the two estimates is 1.4σRT and 1.0σAA. Therefore the pooling together of the sets of measurements is justified and 900–830 BCE is the true age of the grains. Note, however, that the 1σ dates nr 8, 10, and 13 fall in the 10th century. Four additional 1σ dates from Arizona (Nrs 11, 12, 14, and 17 in Table 6) provide a wide range, which includes much of the 10th and 9th centuries. Nr 2 in Table 6, falls at the end of the 9th century and is later than the assumed archaeological age. These results illustrate the possible mistakes, which may occur when only few samples are dated from a certain deposit.

The grain in these samples comes from the same building where the elm tree in Table 5 was used for construction. On the basis of the calculated average in Table 6 and the results of the previous para-

[6]The sample number is AA30431, TRE-2425 U3. We thank Professor D Donahue for carrying out the measurements. Report was submitted in a letter by Professor Donahue from October 8, 2000, from which we cite in this paper.

[7]Using the 1993 calibration curve the dates would be 906–843 (1σ) or 916–832 (2σ).

[8]The weighted average of the Fraction Modern was F = 0.7101 ± 0.0015. The calculations in the above paragraph are citated from a letter from Professor Donahue dated 8 October 2000. Professor Donahue also writes: “the error quoted is the standard deviation of the average of the nine measurements. In this instance, the error resulting from the scatter of the nine measurements was equal to the uncertainty resulting from statistics. This agreement indicates that the final result is a very good one. In fact, it is the best that we have done in our laboratory”. And: “the results of the nine measurements are completely consistent, and the weighted average of the nine is a correct statistical result.”

graph, we thus may conclude that this building was constructed during the 10th century BCE and destroyed during the 9th century BCE, before 830 BCE These conclusions are in accord with the archaeological age assessment based on comparative pottery study (see Mazar 1999a: 37–42 and below).

Cluster 7. Tel Beth Shean: Final Iron Age II Destruction

In Area P at Beth Shean we excavated a large dwelling, which was destroyed by a heavy conflagration (Mazar 1999b). Table 7 shows three ^{14}C dates of charred seeds found on the floor, in the destruction level of this building. The weighted average of these dates is 2465 ± 20 BP; the calibrated ages are 760–630 BCE (67%), 600–510 BCE (30%), 450–400 BCE (3%) for a 1σ range and 770–410 BCE (100%) for a 2σ range.

Table 7 Charred seeds from Tel Beth Shean, Area P Stratum P7, Locus 28616

Lab nr (RT–)	Basket	$\delta^{13}C$ (‰)	pMC (%)	BP	cal BCE (1σ)	Cal BCE (2σ)
2587	286105	–21.4	73.5 ± 0.2	2480 ± 25	770–520	770–410
2588	286105	–21.5	73.0 ± 0.4	2525 ± 40	800–750 (23%) 690–540 (77%)	800–510
2320	286096	–20.4	74.4 ± 0.4	2380 ± 40	520–390	760–380

Based on archaeological and historical considerations, the destruction of this building occurred in the mid-8th century BCE, most probably during the conquest of the northern part of the kingdom of Israel by Tiglath-Pilesser III at 732 BCE.

The flat shape of the calibration curve between 800 and 400 BCE makes ^{14}C dates almost useless for this period. The BP dates of the three samples in conventional ^{14}C years differ by up to 145 years with a standard deviation of up to 40 years. The 1σ calibrated dates diverge: two of them are in accord with the archaeological date, while the third is too low by at least 200 years. The 2σ range of all three provides a time range of 410 years, which includes the 8th century BCE

CONCLUSIONS

Most of the calibrated ^{14}C determinations and the weighted averages of dates from homogeneous contexts from the Iron Age strata at Tel Beth Shean and Tel Rehov generally fit the traditional archaeological and historical chronology of the period under discussion, in spite of the problems mentioned above. Exceptions are the two olive pits from Tel Rehov area D (Table 3, above), and one of the dates from Area P at Tel Beth Shean (Table 7, above), which are considerably low. There is also the problem of divergence between the results of two different calibration curves, as mentioned in relation to Tables 1 and 2, both relating to the 12th centuries BCE The differences between the two curves are significant in relating the finds to historical events. In these two cases, the 1993 curve provided dates, which are later than the end of the Egyptian New Kingdom presence in Canaan, while the 1998 curve provided earlier dates, which are within the time span of the Egyptian presence. These earlier dates fit better the archaeological situation.

What are the implications of our dates for the current controversy over the chronology of the Iron Age I-IIA in Israel? This dispute stems from I Finkelstein's suggestion in 1996 that archaeological assemblages traditionally attributed to the 12th–10th centuries BCE should be lowered by 50–80 years (Finkelstein 1996; 1998). In fact, a similar controversy existed in the early 1950s when B

Maisler (Mazar) supported a low chronology (ending Tell Abu Hawam III in the late 9th century BCE) while G van Beek, following WF Albright, supported a high chronology (Tell Abu Hawam III in the 10th century BCE; Maisler 1951; van Beek 1955). Finkelstein's suggestion faced strong opposition from other scholars (Mazar 1997b; Ben-Tor and Ben-Ami 1998; Ben-Tor 2000). This controversy has far reaching implications on the correlation of archaeological data with the historical period of the United Monarchy of David and Solomon, as well as on correlations between the Levant, Cyprus and the Aegean in the Iron Age.

Tel Rehov is important for this discussion, since it produced one of the best stratigraphic sequences and abundant pottery assemblages from the Iron Age IIa in Israel (the suggested dates for this period according to Mazar are from around 980 BCE to around 930 BCE).[9] Strata VI, V, and IV at Tel Rehov, indicate a great deal of continuity in the pottery production during this period: red slip and hand burnish techniques are typical, and the pottery forms show only minor changes. The assemblage of these three strata recalls that of Megiddo Strata IVB-VA, Hazor Strata X-VIII, Ta`anach Periods IIA-IIB, Jezreel and other sites which belong to the same archaeological horizon. Finkelstein (1996; 1998) suggested dating all these assemblages to the 9th century BCE (in fact only to part of this century, ending ca. 830 BCE). However, Mazar (following earlier suggestions by Aharoni and Amiran) proposes to allow it a longer time span: from sometime during the first half of the 10th to around 840–830 BCE (Mazar 1997b). This would allow the appearance of the same assemblage in several strata of sites like Hazor and Tel Rehov. In these sites one can observe the continuity in pottery production from the 10th to the 9th century BCE The excavations at Jezreel seem to provide an historical anchor for the end of this assemblage (for more detailed discussion see Mazar 1999a: 37–42), yet not for its beginning, which probably dates back to the 10th century BCE

Finkelstein (in lectures submitted during the year 2000), Sharon and Gilboa (2001) claim that ^{14}C dates from Megiddo and Dor support the low chronology suggested by Finkelstein. Our results are ambiguous. Our dates of timber used in construction at Tel Rehov Stratum V and Beth Shean Stratum S1 tend to show that in both cases the buildings were erected during the 10th century BCE. As mentioned before, however, these dates may be interpreted as providing only a *terminus post quem* for the construction, and thus it could be claimed that the buildings could have been built in the 9th century BCE. Such a claim, however, seems to be untenable in the case of the elm tree from Tel Rehov. Its radiometric date (RT 2997) indicates that it was cut in the beginning of the 10th century, and it would not be logical to assume that it was used for construction almost 100 years later.

The calibrated average date of the 18 measurements of grain seeds from the destruction of Tel Rehov Stratum IV (Cluster 6 and Table 6) is 900–830 BCE This gives the possible range of dates of this destruction. In the first preliminary report on Tel Rehov the destruction of Stratum IV (= C1 in that report) was assigned with reservations to the second half of the 9th century BCE, though a possibility for an earlier date was not ruled out (Mazar 1999a: 41–42). This conclusion was based on both the ^{14}C dates and on one Cypriot pottery vessel: a bichrome globular jug which is considered in Cyprus to belong to the Cypro Geometric III period, not earlier than 830 BCE. However, it should be recalled that the chronology of Iron Age Cyprus depends to a large extent on that of the Levant, and that the attribution of types to chronological periods is based on mere typological consider-

[9](AM) The dates 1000–800 suggested by Aharoni and Amiran (1958) to their "Iron Age II" appear to be too long on both edges; the date 1000 is a round number which is based on the tentative date of David's accession to the throne; the date 800 BCE is also schematic. I suggest giving the Iron Age IIA period a rough time span of around 150 years, from somewhere in the first half of the 10th century to somewhere during the second half of the 9th century, perhaps after the Aramean wars, when a new pottery tradition started to appear in both Israel and Judah.

ations, and perhaps needs reevaluation. Thus the date of this destruction could be anywhere in the time range provided by the calibrated average mentioned above.

The chronological debate concerning the 10–9th centuries BCE in Israel is over a time range of between 50 and 100 years. Can ^{14}C dates contribute to a debate over such a narrow time span? The ^{14}C dates discussed above show that modern, sophisticated dating technology, careful selection of well stratified samples and a sufficient number of ^{14}C dates may provide an important contribution, even to chronological debates over such a narrow time span. There are, however, problems, which may hamper the utilization of ^{14}C dates for historical periods. Some of these are:

- The high cost of dating a large number of samples from the same assemblage.
- The fact that calibrated ^{14}C dates sometimes gives a time range that is too wide or ambiguous for the problem to be solved. Even when 1σ range dates provide close dating, there is always the option of the legitimacy of the 2σ range dates, which may provide much wider chronological time spans.
- Errors in dating yielding unrealistic dates. Examples are the olive pits from area D at Tel Rehov.
- In periods when the calibration curve is flat, like between 750 and 400 BCE, ^{14}C dates are of little value for historical periods.
- Changes in recent versions of calibration curves imply that calibrated date ranges may yet change for samples of interest to chronological questions involving a time span of only 50–80 years. The case of our Clusters 1 and 2 illustrates this problem; other, less severe changes are exemplified in the footnotes.

Dating archaeological contexts in historical periods depended traditionally on correlations to documented historical events. However, the precise correlation of events with particular archaeological phenomena in the period under discussion in this paper is not an easy task. There are only few such events: the conquest of the Galilee by Tiglath Pilesser III in 732 BCE, of Samaria in 722 BCE, the invasion of Judah by Sennacherib in 701 BCE and the destruction of Jerusalem by the Babylonians in 586 BCE In many other cases the attribution of a particular destruction layer to a certain historical event remains ambiguous. Thus, the military campaign of Pharaoh Shoshenq I (biblical Shishak) around 925 BCE is well documented by Shishak's monumental inscription at Karnak as well as in the bible, but archaeologists disagree whether certain destruction levels were caused by this invasion.

Debates over the dates of archaeological strata are unavoidable. In spite of the above-mentioned problems, ^{14}C dates are our last resort in establishing a precise as possible absolute chronology for the Southern Levant in the time span between the mid 12th century BCE and the late 8th century BCE. The current debate over the 10th–9th centuries BCE is an excellent case study. Yet it seems that there is a long way to go before the final word will be said in this debate.

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