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THE DATING OF EARLY BRONZE AGE SETTLEMENTS IN THE NEGEV AND SINAI

Michael Sebbane, Ornit Ilan, Uzi Avner, and David Ilan

Introduction

In the last decade or so, wide-ranging surveys and excavations have significantly broadened our knowledge of ancient settlement in the Negev and Sinai (Fig. 1). The results indicate that for the Early Bronze Age alone, the sites number in the hundreds.

In this paper we will review the problem of dating the EB settlements, evaluate the ceramic and lithic criteria utilized until now, and suggest an alternative chronological scheme based chiefly on radiocarbon dates and petrographic data.

Traditional Approaches to Dating 4th–3rd Millennium B.C.E.

Sites in the Negev and Sinai

In recently published syntheses (Beit-Arieh 1977; 1983; 1986; Beit-Arieh and Gophna 1976; 1981; Cohen 1981; 1985; Haiman 1986; Lender 1990) the EB sites of the Negev and Sinai are generally associated with the EB II, while the EB I and the EB III are either not manifested or only hinted at in the material culture of these zones. Cohen recently suggested (1986:244; 1988:64–66) that settlement may have existed in the Negev Highlands from the EB I through the EB III, reaching its apogee in the EB II concurrent with the ascendancy of Arad and the Sinai metal trade. However, he dates all EB sites to ‘EB II–III’, noting the lack of diagnostic types in the find inventory, and does not include the EB I as a possibility. Apparently, Cohen’s dating is determined by his belief that the urban settlements of EB III Palestine were destroyed by incursions of a population originating in the Sinai and the Negev Highlands (1986:245, 312). Lender (1990:19, n. 13) and Haiman (1989:180) refer to the feasibility of this reconstruction, yet in their site descriptions every EB site is dated to the EB II. Rosen (1987:51) noted the lack of diagnostic EB III ceramic types in the Negev assemblages and suggested a demographic lacuna for this period.

A few authors have either questioned confining EB settlement to the EB II (Sass 1980:44, n. 24; Ilan and Sebbane 1989:148, n. 9; and now Rothenberg and Glass 1992), or preferred a more general chronological terminology so as not to commit themselves to a specific part of the Chalcolithic or EB (e.g., Avner 1990). In their study of EB settlement patterns in Palestine, Broshi and Gophna (1984:41) excluded the Negev data, as the numerous EB sites found there “apparently belong to various subphases of the period”. Stager’s (in press) chronological synthesis makes excellent

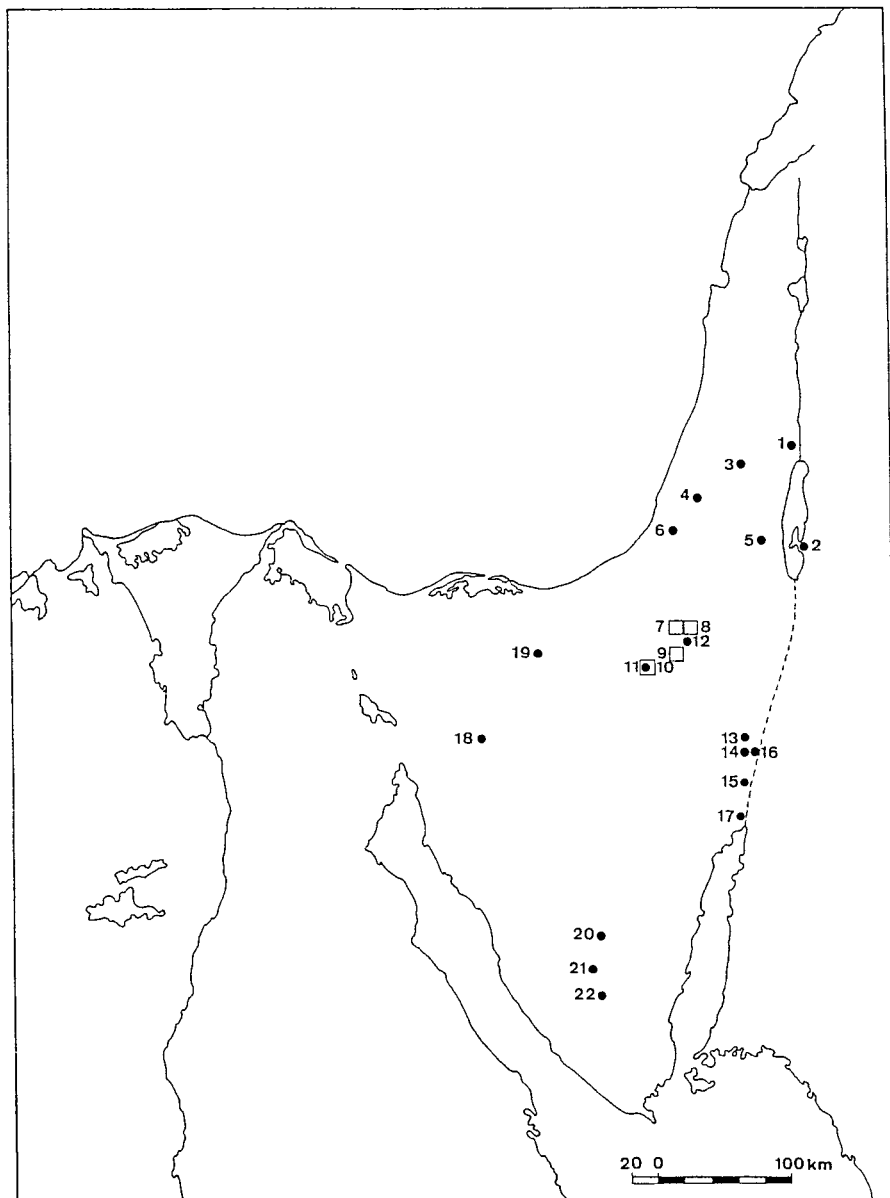


Fig. 1. Selected EB sites and survey areas in southern Palestine and Sinai: 1: Jericho, 2: Bab ed-Dhra, 3: Yarmuth, 4: Tell el-Ḥesi, 5: Arad, 6: ʿEn Besor, 7: Survey Map 167 (Sde Boqer — West), 8: Survey Map 168 (Sde Boqer — East), 9: Survey Map 196 (Har Nafha), 10: Survey Map 198 (Har Hamran), 11: Kadesh-barnea, 12: ʿEn Ziq, 13: Biqʿat Uvda, 14: Shaharut, 15: Timna, 16: Samar, 17: Givat Shoret, 18: Ain Abu Rujm, 19: Mushabi, 20: Gebel Gunna, 21: Sheikh Mukhsein, 22: Nebi Salah.

use of available material. However, following accepted conclusions, all EB settlements are attributed by him to the EB II.

The dating of the Negev and Sinai sites to the EB II is based primarily on the connections and contemporaneity demonstrated between stratified remains from Tel Arad (Strata III–I) and some southern Sinai EB sites studied mainly by Beit-Arieh (e.g., 1983; 1986; Amiran, Beit-Arieh and Glass 1973). This synchronism was founded on ceramic, lithic, metallurgical, and to some extent architectural, criteria. It was mainly Cohen (e.g., 1978:189; 1981:9) who sought contemporary settlements between Arad and southern Sinai that would have served as waystations and supply depots for the proposed Arad-Sinai copper-based trade. When found, these EB sites were conceived of as being geographically bracketed and dated by parallels from Arad and southern Sinai. The subsequent discovery of EB sites in other areas of the Negev led Cohen (1985:9; 1986:216, 227–228) to posit other routes, such as those connecting Transjordan and the Negev.

Two major methodological difficulties arise upon inspection of the published data:

(a) Most of the surveyed sites identified as “EB II” (e.g., Haiman 1986) and sometimes “EB II–III” (Cohen 1985:9; 1986; Lender 1990:19, n. 13), were published without illustrations or descriptions of specific dating criteria.

(b) Generally, the two prevalent criteria for dating EB sites in the Negev and Sinai are holemouth vessels and flint tools, whose chronological value is extremely limited, although a more fundamental analysis holds some promise for refining survey and excavation results.

Holemouth Vessels

Certain holemouth types already appear in the Chalcolithic period (e.g., Amiran 1969:24; Commenge-Pellerin 1987:40) and are not always distinguishable from the EB types. Chalcolithic holemouth vessels can usually be discerned when a complete vessel is illustrated (according to the proportions) or better still, upon visual and petrographic inspection. They cannot be discerned by the illustration of rim sherds.

Holemouth vessels make up approximately 50% of the EB I–II ceramic assemblage at Tel Arad, the type site for our topic. Two major classes are distinguished: storage jars with flat bases (Fig. 2:1–5) and cooking-pots with rounded bases (Fig. 2:6–9). These two types differ in both ware and shape; the ware of the holemouth storage jars is soft and porous in contrast to the dense, almost metallic ware of the holemouth cooking-pots. The wall of the holemouth cooking-pot is thinner — especially in relation to the thickened rim — than that of the holemouth jar. The rims of the holemouth storage jars are usually rounded, while those of the holemouth cooking-pots are sharp in profile (Amiran a.o. 1978:48–49).

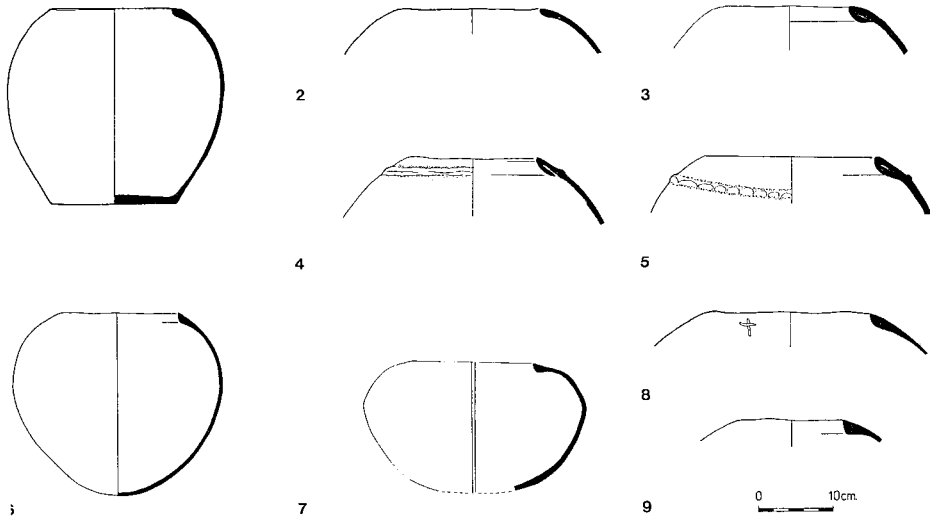


Fig. 2. 1–5) Holemouth jars and 6–9) holemouth cooking-pots from Arad Strata IV–II (EB I–II) (Amiran a.o. 1978: Pls. 46:3 (No. 1), 8:32 (No. 2), 21:5 (No. 3), 51:3 (No. 4), 8:18 (No. 5), 43:3 (No. 6), 45:17 (No. 8), 18:11 (No. 9). No. 7 is unpublished. Scale 1:5.

Both vessel types, in all their variants, are present at Arad in both the EB I (e.g., *ibid.*: Fig. 2:2, 5, 7) and the EB II strata (e.g., *ibid.*: Fig. 2:1, 3–4, 6, 8–9). The holemouth jars with the same rim variants found in EB I–II Arad are found at other sites in southern Palestine with EB III assemblages (e.g., Jericho, Tell el-Ḥesi, Tel Halif, Tel Erani and Bab ed-Dhra). However, the holemouth cooking-pot is absent from these same EB III repertoires (Fargo 1980:27). Thus, the distinction between the two types may have chronological importance.

The mineral content of the holemouth cooking-pot ware is also of significance. Petrographic examination indicates that many holemouth cooking-pots contain a combination of minerals (mica and metamorphic minerals) which originate in Sinai, testifying to the ties between Arad and southern Sinai (e.g., Amiran, Beit-Arieh and Glass 1973; Ilan and Sebbane 1989; Porat 1989). These Sinaitic minerals occur in vessels from both EB I and EB II contexts (at Small Tel Malḥata and Arad; Ilan and Sebbane 1989:153; Porat 1989).

Intermediate Bronze Age holemouth vessel rims can usually be distinguished in southern Palestine and its periphery. They tend to have either a squared profile (e.g., Dever 1980: Fig. 4:20), and external gutter or groove (e.g., *ibid.*: Fig. 4:21) or an internal bevelling (e.g., *ibid.*: Fig. 3:1). However, the same features appear randomly in the EB and conversely, the usual rounded types sometimes occur in the Intermediate Bronze Age as well.

In summary, it can be said that as a general category, holemouth rims are not indicative of either EB I, II, or III — but of the EB in general. The typological

distinction between holemouth storage jars and cooking-pots should be made, however, since this may have chronological significance. It follows that presence/absence of Sinaitic tempers may aid in distinguishing between EB I–II and EB III holemouth cooking-pots.

Flint Industry

The flint implements used to date EB sites in the Negev and Sinai are: tabular scrapers, drills, borers, blades, lunates, transversal arrowheads, axes, and adzes. None of these features are diagnostic of EB II *per se*. They indicate little more than a 6th–3rd millennium date (Rosen 1989).¹ When flint tools of these types are found in surveys together with characteristic holemouth vessel sherds, it is probable that a general EB date is appropriate. However, when flint tools alone make up the assemblage, a much wider temporal range must be conceded. Special note should be made of the backed sickle blade which is confined to the Chalcolithic in the north but continues into the EB in the southern periphery (Rosen 1989:209–210). Perhaps the only indicative EB flint tool type is the Canaanite blade, infrequent in southern assemblages (Rosen 1989:206–209), and not confined to any particular EB phase.

Re-evaluating the Date of EB Settlement in Sinai and the Southern Negev.

It was noted above that holemouth cooking-pots often contain minerals of Sinaitic origins. It was also emphasized that this type was recovered from *both* EB I and EB II contexts at Arad and Tel Malḥata. This is valuable evidence for long-range interaction between Sinai and southern Palestine during both periods. Therefore, one should expect EB I remains in southern Sinai and at points between Sinai and the Arad basin. The *nawamis* and “circle settlements” of Sinai are one expression of this EB I settlement (Sass 1980; Bar-Yosef a.o. 1986; Ilan and Sebbane 1989).

Further evidence of EB I settlement is provided by radiocarbon dating. Confining ourselves to the 4th and 3rd millennia B.C.E., Table 1 sets out most of the radiocarbon dates available from the southern periphery (i.e., the southern Negev and Sinai) at the present juncture. It does not include radiometric dates from southern type sites such as Arad, Erani, Ai, Jericho, Shiqmim and Gilat. These can be found in Callaway and Weinstein 1977; Weinstein 1984; Gilead 1988; Alon and Levy 1989; Stager (in press). Also, we have excerpted 4th and 3rd millennia B.C.E. dates from the more extensive list collected by U. Avner.

1 At Arad axes and adzes are confined to the Chalcolithic level (Stratum V). Rosen (1984) has shown that bifacial core tools rapidly dwindled in the early EB. This suggests that, lacking other datable material, such finds (e.g., Haiman 1986:115) are more likely to date a site to the Neolithic or Chalcolithic.

TABLE 1. 4TH AND 3RD MILLENNIA B.C.E. RADIOCARBON DATES FROM THE NEGEV AND SINAI

<i>Laboratory and Sample</i>		<i>Calibrated</i>		<i>Publication</i>	
<i>No.</i>	<i>No.</i> ²	<i>Site</i>	<i>BP</i>		<i>Range BC</i> ³
1	RT640A	Biq'at Uvda 16	4800+70	3692-3393	Carmi 1987:103
2	HV5296	Sheikh Muhsein	4710+50	3617-3376	Beit-Arieh 1977
3	RT899A	Biq'at Uvda 9	4530+50	3353-3103	Carmi and Segal 1991
4	RT899B	Biq'at Uvda 9	4520+60	3352-3098	Carmi and Segal 1991
5	RT724C	Biq'at Uvda 7	4540+100	3370-3045	Carmi and Segal 1991
6	RT?	Biq'at Uvda 7	4490+?	3316-3102	Carmi 1987:103
7	RT640B	Biq'at Uvda 16	4400+60	3255-2922	Carmi 1987:103
8	SMU6597	Gebel Gunna 100	4373+64	3093-2916	Bar-Yosef a.o. 1986:132
9	RT864A	Biq'at Uvda 9	4310+90	3035-2786	Carmi and Segal 1991
10	RT640C	Biq'at Uvda 16	4280+80	3018-2782	Carmi 1987:103
11	RT648D	Biq'at Uvda 96/III	4250+50	2916-2782	Carmi 1987:103
12	RT447A	Ain Abu Rujm	4180+300	3296-2398	unpublished (U. Avner)
13	RT724F	Biq'at Uvda 21	4015+80	2854-2664	Carmi and Segal 1991
14	RT714A	Biq'at Uvda 9	4070+100	2873-2480	Carmi and Segal 1991
15	SMU6597	Gebel Gunna 25	4056+72	2862-2492	Bar-Yosef a.o. 1986:128
16	BONN2363	Timna S28	4000+90	2853-2459	Conrad and Rothenberg 1980:179
17	RT591	Givat Shoret	4010+150	2870-2340	unpublished (U. Avner)
18	RT885A	Ein Ziq	3960+90	2584-2355	Carmi and Segal 1991
19	PTA3627	Samar	3940+60	2564-2398	unpublished (U. Avner)
20	BONN2632	Timna S28	3890+70	2471-2288	Conrad and Rothenberg 1980:179
21	RT885B	Ein Ziq	3880+60	2466-2288	Carmi and Segal 1991
22	RT885B	Ein Ziq	3850+50	2458-2208	Carmi and Segal 1991
23	RT447B	Mushabi 103	3800+330	2862-1772	Haas 1977
24	RT714B	Biq'at Uvda 166	3850+80	2464-2149	Carmi and Segal 1991
25	RT899C	Shaharut IV	3700+55	2194-2033	Carmi and Segal 1991

2 All determinations were made from charcoal samples, except Nos. 2 (HV5296), 12 (RT447A) and 23 (RT447B) which were of unknown material. The context is almost invariably a hearth or ash and charcoal deposit associated with a living floor and architecture. Samples Nos. 8 and 15, originating from different sites, were published with the same laboratory numbers.

3 Calibrated dates are calculated according to Pearson a.o. 1986. The standard deviation is calculated using one sigma.

While long-lived samples (e.g., charred wood) may reflect a greater age than that of the site's actual occupation, the calibrated dates presented above show an even distribution throughout most of the 4th and 3rd millennia B.C.E. This reflects settlement continuity at least in the areas for which C14 dates were obtained (see Fig. 3). Moreover, these organic samples were collected from sites with visible material remains, undermining the idea, (for this period at least), of nomads who left no archaeological manifestation subsequently sedentarizing and leaving archaeological remains (cf. Finkelstein and Perevolotsky 1990).

Appendix I is a breakdown of 4th-3rd millennia B.C.E. sites in the Negev and Sinai published to date. Based on the published data, and in some cases our own examination of the material, the dating of these sites has been adjusted when necessary. Thus, those sites from which only holmouth vessels or flint tools were recovered are given a more general temporal ascription. The adjusted chronological attributions illustrate the dearth of precisely-dated sites in contrast to the large number of sites. Many sites could, and probably should, be attributed to stages of the Early Bronze Age other than EB II.

Conclusions

A re-appraisal of dating criteria leads to the following conclusions:

1) Lacking absolute dates derived from methods such as radiocarbon, we must rely on typological criteria. Typologically, most of the "EB" sites in the Negev and Sinai could be either EB I, II, or III. Some may even date to the Chalcolithic or Intermediate Bronze Age. In the absence of certain indicative material culture types (see Ilan, Sebbane and Ilan, forthcoming), only a general "4th-3rd millennium B.C.E." designation for most of these sites is admissible.

2) On the basis of petrographical data and radiocarbon dates, it is clear that much of the Sinai and the southern Negev was settled throughout the Early Bronze Age, not just in EB II. Scanty as the material remains are, cultural continuity is a dominant characteristic of the desert region. Pastoral seminomadism, field-crop agriculture, wide-ranging trade and discernable architecture are all evident throughout the period from the mid-4th to the late 3rd millennia B.C.E. (e.g., Avner 1990).

3) The suggestion that settlement in the arid southern periphery of Palestine reached its floruit in the EB II due, at least in part, to the copper trade is not disputed here. However, based on evidence from Arad, it must be emphasized that the process was evolutionary.⁴ The copper trade was but one element in a larger and

4 Cf. Ilan and Sebbane 1989, *contra* Stager (in press), and Finkelstein and Perevolotsky 1990, who accept the previous EB II dating as given, and see all EB architecture as indicating a strictly EB II process of sedentarization of nomadic pastoralists.

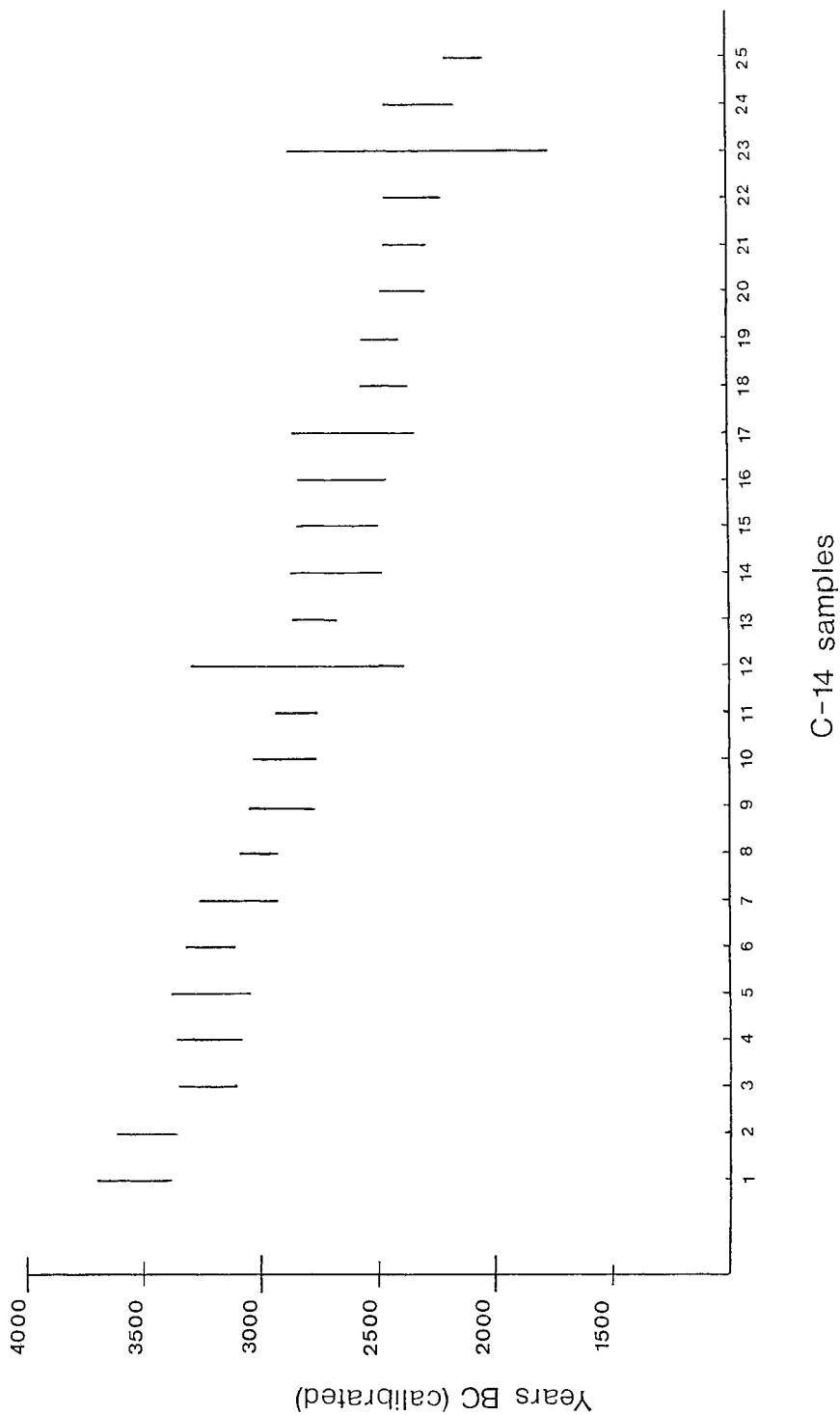


Fig. 3. Calibrated radiometric age ranges for the C14 samples in Table 1.

well-entrenched cultural system. While the relative importance of copper may have waxed and waned, and while it may have been crucial to the character of urban Arad's economy, for most of that region's population the basic subsistence strategies of pastoral nomadism and field-crop agriculture did not change over large parts of the southern periphery.

Appendix. Data from the Negev and Sinai Surveys

This breakdown includes the EB sites surveyed and excavated in the Negev and Sinai, the surveyors' dating,⁵ and our adjusted dating based on the material culture criteria outlined above.⁶ A hyphen, e.g., EB I–III, is used to indicate the range of possible dating, and not the duration of occupation.

Area/Map: Har Hamran (Map No. 198)

Surveyor: Haiman (1986)

No. of EB sites surveyed: 55

No. of EB sites excavated: 4 (Sites 5, 10, 80, 384)

Dating as published: all EB II

Adjusted dating:

49 EB I–III

5 Chalcolithic — EB III (Sites 29, 41, 136, 141, 383)

1 Pottery Neolithic — EB III (Site 127)

Area/Map: Sde Boqer — East (Map No. 168)

Surveyor: Cohen (1981)

No. of EB sites surveyed: 4

No. of EB sites excavated: 1 (Site 52)

5 Many of the sites noted contain finds dated to the Intermediate Bronze Age and later periods which are not discussed here.

6 For the most part, this breakdown does not include material from preliminary reports or sector surveys which have been completed but not yet published.

The pioneering surveys of Rothenberg, carried out mostly in the 1960's and 1970's in the Negev, *Aravah* and Sinai (Rothenberg 1967; 1968; 1970; 1975; 1979), dated many sites to the Chalcolithic, and few to the EB, based on the sort of finds discussed in this paper. Many of these sites were subsequently re-surveyed so that a presentation of Rothenberg's data would be redundant. Furthermore, almost none of the artefacts from the Rothenberg surveys have been published, making chronological evaluation impossible. The scanty lithic material published from Sinai (Ronen 1970), and from Site 39 in the *Aravah* (Bercovici 1978), is not indicative beyond a general 4th–3rd millennia date (cf. Ilan and Sebbane 1989:142, n. 3), and an even earlier determination cannot be ruled out. The few ceramics published by Rothenberg (1970: Fig. 9; Pl. III) are perhaps attributable to the EB.

Dating:

- 1 EB II (Site 52)
- 1 Epi-Palaeolithic, Neolithic and EB II (Site 78).
- 1 Epi-Palaeolithic and EB II (Site 89).
- 1 Chalcolithic and EB II (Site 90).

Adjusted dating:

- 1 EB I–III (Site 52).
- 2 Epi-Palaeolithic — EB III (Sites 78, 79).
- 1 Neolithic — EB III (Site 90)

Area/Map: Sde Boqer — West (Map No. 167)

Surveyor: Cohen (1985)

No. of EB sites surveyed: 8

No. of EB sites excavated: 2 (Sites 5, 66)

Dating as published:

- 6 EB II–III.
- 1 Neolithic and EB II–III (Site 66).
- 1 Chalcolithic and EB II–III (Site 5)

Adjusted dating:

- 5 EB I–III (Sites 3, 19, 74, 89, 99).
- 1 Chalcolithic — EB III (Site 5).
- 1 Neolithic and EB I–III (Site 66)

Area/Map: Kadesh-barnea

Surveyor: Beit-Arieh and Gophna (1976; 1981)

No. of EB sites surveyed: 11

No. of EB sites excavated: 1 (Site 1201)

Dating as published: all EB II

Adjusted dating: all EB I–III

Area/Map: Har Nafha (Map No. 196)

Surveyor: Lender (1990)

No. of EB sites surveyed: 26

No. of EB sites excavated: 0

Dating as published:

- 23 EB II
- 2 Neolithic — EB II (Sites 51, 349).
- 1 Palaeolithic and EB II? (Site 364)

Adjusted dating:

- 17 unknown (Sites 84, 150, 212, 309, 333, 349, 356, 360, 363, 373, 382, 385,

396, 399, 430, 478, 487, 491).⁷
5 EB I–III (Sites 23, 59, 113, 228, 492).
2 Neolithic — EB (Sites 51, 447).
1 Palaeolithic — EB (Site 364)

Area/Map: Southern Sinai

Surveyor: Beit-Arieh (1977; 1983; 1986)

No. of EB sites surveyed: 54

No. of EB sites excavated: 4 (Sites 1014, 1042, 1046, 1049)

Dating as published:

41 EB II
3 EB II?
10 PPNB — EB I

Adjusted dating:

30 EB I–III
2 EB II (1046, 1049)
2 EB I or II (1014, 1042)
4 Chalcolithic — EB III (1018, 1036, 1065, 1073).
16 unknown (1001, 1012, 1013, 1017, 1024, 1025, 1027, 1029, 1037, 1040, 1055, 1066, 1067, 1075, 1076, 1081)⁸

7 None of the finds from these sites were published. In his preface Lender (1990:19–20) informs us that the artifactual repertoire of such sites generally consists of holemouth vessels.

8 We would like to thank I. Finkelstein, L. Kolska-Horwitz and A. Yoffe for reading drafts of this paper and providing constructive criticism.

Addendum

This article was completed prior to the appearance of the article by Rothenberg and Glass (1992). We are gratified to learn that our central theses agree concerning: a) the existence of an “autochthonous” population in the arid periphery, b) the importance of metallurgy as an ecocultural subsystem and c) the continuity and socio-economic heterogeneity of settlement throughout the 4th-3rd millennia B.C.E. We disagree, however, as to the importance of metallurgy and trade to the rise of Arad. Also, we have certain misgivings about the methods of inquiry and the archaeological criteria used by Rothenberg and Glass, which we feel damage the integrity of their conclusions. More extensive comments will appear elsewhere.

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