

## RADIOCARBON DATING OF THE NEOLITHIC EARLY BRONZE AGE SITE OF MANDALO, W MACEDONIA

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### INTRODUCTION

The following list of dates was obtained in a joint German-Greek project to establish a radiocarbon dating laboratory in the National Research Centre for Physical Sciences "Demokritos," Athens, Greece.<sup>1</sup> Although our initial aim in selecting these samples was to study laboratory procedures, we found that when the dates were arranged in stratigraphic order they provided a chronological framework for Thessalian and northern Macedonian site of the Late Neolithic and Early Bronze Ages (Kotsakis *et al* 1989; Papanthimou & Papasteriou 1987a).

The dates were obtained by CO<sub>2</sub> gas counting in the Heidelberg laboratory (Schoch *et al* 1980). Dates are expressed as radiocarbon years relative to 1950 (Stuiver & Polach 1977) and are corrected for isotopic fractionation. Errors quoted are based on counting statistics of sample, background and standard (SRM 4990) and expressed as 1 standard deviation ( $\sigma$ ).

All samples listed here come from the prehistoric site of Mandalo in Western Macedonia, (40°52'N, 22°13'E) 65km northwest of Thessaloniki. The site is being excavated by archaeologists A Pilali-Pasteriou, A Papanthimou-Papaefthimiou and K Kotsakis of the University of Thessaloniki and T Savopoulou of the Archaeological Museum of Thessaloniki. The samples were all charcoal and were submitted by the excavators (Papasteriou *et al* 1983; Papanthimou & Papasteriou 1987b).

The site of Mandalo is approximately 20km west of the classical capital of Macedonia Pella. It is in the foothills of Mount Paikou in the lowland hills that separate the now dried Yannitsa Lake from Aridaia Plain. It is a small tell site that covers an area of not more than 0.2ha in its base, and has a height of 7m. The site can be divided into 4 occupational phases: Ia, Ib, II and III. Mandalo is perhaps the first prehistoric site in Greece that has been radiocarbon dated so consistently and systematically. It therefore provides a very significant chronological reference.

### ARCHAEOLOGICAL SAMPLES

<b>HD-9597.</b>	<b>D12</b>	<b>6630 ± 100</b>
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Sample directly overlay sterile layer.

$\delta^{13}C = -24.8\text{‰}$

*Comment:* date is considered too early.

<sup>1</sup>The laboratory is now fully operational. It will use the code designation, DEM.

<b>HD-9601.</b>	<b>4007</b>	<b>5710 ± 150</b>
Sample from destruction level, probably floor, Mandalo Phase Ib.		$\delta^{13}C = -22.0\text{‰}$
<b>HD-9562.</b>	<b>3120</b>	<b>5600 ± 70</b>
Sample from earliest floor of last house in Mandalo Phase Ib.		$\delta^{13}C = -25.8\text{‰}$
<b>HD-9265.</b>	<b>4020</b>	<b>5540 ± 70</b>
Sample from postholes of a house, Mandalo Phase Ib.		$\delta^{13}C = -24.1\text{‰}$
<b>HD-9557.</b>	<b>5032</b>	<b>5440 ± 60</b>
Sample from destruction of the latest house of Mandalo Phase Ib.		$\delta^{13}C = -25.3\text{‰}$
<b>HD-9559.</b>	<b>2156</b>	<b>5490 ± 60</b>
Sample from destruction layer of a pile house; underlain by baby burial in vase, Mandalo Phase II.		$\delta^{13}C = -24.7\text{‰}$
<b>HD-9563.</b>	<b>2202a</b>	<b>5430 ± 70</b>
Sample from earliest part of Mandalo Phase II; corner of house built with wooden posts.		$\delta^{13}C = -24.0\text{‰}$
<b>HD-9939.</b>	<b>2202b</b>	<b>5430 ± 45</b>
Second sample from same layer; dated to check consistency.		$\delta^{13}C = -24.3\text{‰}$
<b>HD-9595.</b>	<b>2224</b>	<b>6410 ± 190</b>
Sample from interior of house.		$\delta^{13}C = -24.7\text{‰}$
<b>HD-9602.</b>	<b>1022</b>	<b>5460 ± 100</b>
Sample from destruction of Mandalo Phase II.		$\delta^{13}C = -25.2\text{‰}$
<b>HD-9596.</b>	<b>7229</b>	<b>5290 ± 70</b>
Sample from same destruction level as 1022, west of stratigraphic section. Sample is associated with storage bin underlying destruction level.		$\delta^{13}C = -24.8\text{‰}$
<b>HD-9833.</b>	<b>7253</b>	<b>5460 ± 50</b>
Sample from destruction level of house, Mandalo Phase II.		$\delta^{13}C = -24.8\text{‰}$
<b>HD-9834.</b>	<b>7275</b>	<b>5340 ± 100</b>
Sample from yellow layer underlying destruction level, with remains of burned clay and small pieces of charcoal, Phase II.		$\delta^{13}C = -25.9\text{‰}$

<b>HD-9835.</b>	<b>8152</b>	<b>4300 ± 100</b> $\delta^{13}C = -26.0\text{‰}$
Sample from layer directly overlying destruction level of Phase II (EBA).		
<b>HD-9915.</b>	<b>8231</b>	<b>4130 ± 40</b> $\delta^{13}C = -25.3\text{‰}$
Sample from destruction level of house, Phase III.		
<b>HD-9216.</b>	<b>7140</b>	<b>4130 ± 70</b> $\delta^{13}C = -25.7\text{‰}$
Same as HD-9835.		
<b>HD-9907.</b>	<b>8119</b>	<b>3920 ± 40</b> $\delta^{13}C = -25.1\text{‰}$
Sample from pits that were possibly cut from near surface (EBA).		
<b>HD-9146.</b>	<b>1024</b>	<b>3860 ± 70</b> $\delta^{13}C = -25.2\text{‰}$
Same as above.		
<b>HD-9603.</b>	<b>3040</b>	<b>5520 ± 80</b> $\delta^{13}C = -24.8\text{‰}$
Sample from postholes of wall, Phase Ib.		
<b>HD-9832.</b>	<b>7251</b>	<b>5420 ± 40</b> $\delta^{13}C = -24.5\text{‰}$
Same as HD-9833, above.		

*General Comment:* Figure 1 shows the calibrated dates placed in their stratigraphic order. The data were calibrated using the computer program supplied by Stuiver and Reimer (1986). The calibration is based on Stuiver and Pearson (1986), Pearson and Stuiver (1986), Pearson *et al* (1986), Linick, Suess and Becker (1985), Stuiver *et al* (1986), Kromer *et al* (1986) and Linick *et al* (1986). The age ranges in the figure are represented by bars where the length represents the age range and the height represents the percent probability that the sample is in the specific range.

It is obvious that the dates form two well-defined groups. Phases Ib and II are clearly dated to the 5th millennium BC whereas Phase III dates to the 3rd millennium. There are no <sup>14</sup>C determinations from the 4th millennium. According to archaeological interpretation (Kotsakis *et al* 1989; Papanthimou & Papasteriou 1987a) there is no apparent discontinuity in the sampling along the stratigraphic transition between Mandalo II and Mandalo III. Our results corroborate this finding and indicate that habitation was interrupted and resumed at the site after a long period had passed, perhaps as much as a millennium.

On the basis of typological similarities, Mandalo Ib and II can be associated with Malia II, Suplevac, Bakarno-Gumno I-II and Ernobuki I-II (Kotsakis *et al* 1989; Papanthimou & Papasteriou 1987a). There are no <sup>14</sup>C dates for these Albanian, south Yugoslavian sites. These groups are usually linked with the Rachmani culture of Thessaly.

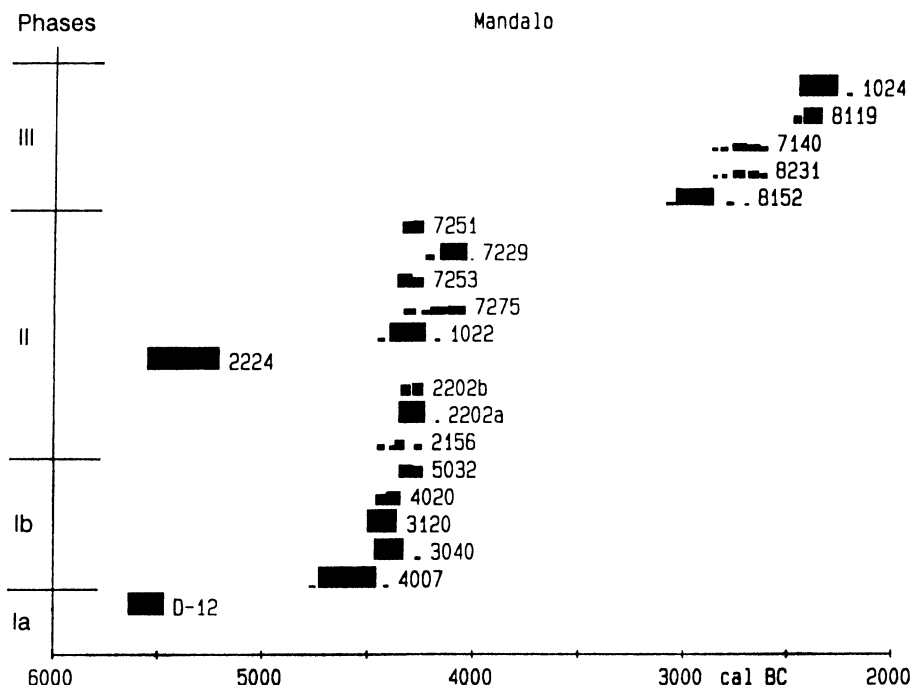


Fig 1. The distribution of dates for the Mandalo site, West Macedonia, Greece. The length of the bars represents the age range; the height represents the percent probability that the sample lies in the specific range.

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