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. 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 sites of the Late Neolithic and Early Bronze Ages (Kotsakis et al 1989; Papanthimou & Papasteriou 1987a).

The dates were obtained by CO2 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 Savopoulos 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

HD-9597. D12 6630 ± 100
Sample directly overlay sterile layer.
\( \delta^{13}C = -24.8\%o \)

Comment: date is considered too early.

1The laboratory is now fully operational. It will use the code designation, DEM.
HD-9601.  4007  
Sample from destruction level, probably floor, Mandalo Phase Ib.  
$\delta^{13}C = -22.0\%o$

HD-9562.  3120  
Sample from earliest floor of last house in Mandalo Phase Ib.  
$\delta^{13}C = -25.8\%o$

HD-9265.  4020  
Sample from postholes of a house, Mandalo Phase Ib.  
$\delta^{13}C = -24.1\%o$

HD-9557.  5032  
Sample from destruction of the latest house of Mandalo Phase Ib.  
$\delta^{13}C = -25.3\%o$

HD-9559.  2156  
Sample from destruction layer of a pile house; underlain by baby burial in vase, Mandalo Phase II.  
$\delta^{13}C = -24.7\%o$

HD-9563.  2202a  
Sample from earliest part of Mandalo Phase II; corner of house built with wooden posts.  
$\delta^{13}C = -24.0\%o$

HD-9939.  2202b  
Second sample from same layer; dated to check consistency.  
$\delta^{13}C = -24.3\%o$

HD-9595.  2224  
Sample from interior of house.  
$\delta^{13}C = -24.7\%o$

HD-9602.  1022  
Sample from destruction of Mandalo Phase II.  
$\delta^{13}C = -25.2\%o$

HD-9596.  7229  
Sample from same destruction level as 1022, west of stratigraphic section. Sample is associated with storage bin underlying destruction level.  
$\delta^{13}C = -24.8\%o$

HD-9833.  7253  
Sample from destruction level of house, Mandalo Phase II.  
$\delta^{13}C = -24.8\%o$

HD-9834.  7275  
Sample from yellow layer underlying destruction level, with remains of burned clay and small pieces of charcoal, Phase II.  
$\delta^{13}C = -25.9\%o$
### 14C Dates From a Neolithic EBA Site in Macedonia

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Date ± Error</th>
<th>δ¹³C Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD-9835.</td>
<td>8152</td>
<td>4300 ± 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample from layer directly overlying destruction level of Phase II (EBA).</td>
</tr>
<tr>
<td>HD-9915.</td>
<td>8231</td>
<td>4130 ± 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample from destruction level of house, Phase III.</td>
</tr>
<tr>
<td>HD-9216.</td>
<td>7140</td>
<td>4130 ± 70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as HD-9835.</td>
</tr>
<tr>
<td>HD-9907.</td>
<td>8119</td>
<td>3920 ± 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample from pits that were possibly cut from near surface (EBA).</td>
</tr>
<tr>
<td>HD-9146.</td>
<td>1024</td>
<td>3860 ± 70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as above.</td>
</tr>
<tr>
<td>HD-9603.</td>
<td>3040</td>
<td>5520 ± 80</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sample from postholes of wall, Phase Ib.</td>
</tr>
<tr>
<td>HD-9832.</td>
<td>7251</td>
<td>5420 ± 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as HD-9833, above.</td>
</tr>
</tbody>
</table>

**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 ¹⁴C 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 ¹⁴C 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.

ACKNOWLEDGMENTS

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REFERENCES


14C Dates From a Neolithic EBA Site in Macedonia


