THE BRONZE AGE BEGINS

The Ceramics Revolution of Early Minoan I and the New Forms of Wealth that Transformed Prehistoric Society
Frontispiece. Pithos holding 165 kg with decoration of applied clay moldings. From Early Minoan I, from Aphrodite’s Kephali (photograph by Chronis Papanikolopoulos).
THE BRONZE AGE BEGINS

The Ceramics Revolution of Early Minoan I and the New Forms of Wealth that Transformed Prehistoric Society

by

Philip P. Betancourt

Published by
INSTAP Academic Press
Philadelphia, PA
2008
Betancourt, Philip P., 1936–
The Bronze Age begins : the ceramics revolution of early Minoan I and the new forms of wealth that transformed prehistoric society / by Philip P. Betancourt.
p. cm.
Includes bibliographical references and index.
ISBN 978-1-931534-52-9 (pbk.)
DF221.C8B54 2008
939’.1801—dc22
2009006204
The transition from the Neolithic to the Minoan Bronze Age is defined in terms of radical changes in pottery fashions.

Sinclair Hood, *The Minoans*  
1971
# Table of Contents

LIST OF FIGURES ......................................................... ix  
PREFACE ................................................................. xv  
ACKNOWLEDGMENTS .................................................... xvii  
ABBREVIATIONS ......................................................... xix  

## PART I

1. Introduction .......................................................... 1  
2. The Change in Ceramic Technology in EM I ....................... 13  
3. The Clays and the Fired Fabrics .................................. 25  
4. The Pottery Shapes .................................................. 33  
5. EM I Surface Treatments and Decoration and their Relation to  
   Fabrics, Shapes, and Methods of Manufacture .................... 43  
6. Comments and Conclusions on the Pottery ......................... 85  

## PART II

7. The Transformation of Cretan Society ............................ 91  

REFERENCES .................................................................. 113  
INDEX .......................................................................... 131
List of Figures

Figure 1.1. Map of Crete. .................................................................2
Figure 1.2. Map of the Mesara. ....................................................5
Figure 1.3. Map of East-Central Crete. ...........................................6
Figure 1.4. Map of the Ierapetra Peninsula. .................................8
Figure 1.5. Map of East Crete. .....................................................9
Figure 1.6. Fine Gray Style pyxis from Hagia Photia Siteias, Tomb 211,
HNM 4207. Ht. 11 cm. ..............................................................10

Figure 2.1. Detail of a coarse, dark vessel using the Final Neolithic technol-
ogy, from a rock shelter at Pacheia Ammos, PAR 46. ................. 14
Figure 2.2. EM I jug from Hagios Onouphrios, a burial site near Phaistos
in southern Crete, HM 5. Ht. 21.5 cm. ..................................... 17
Figure 2.3. Detail of the surface of the Hagios Onouphrios Style
name-vase, HM 5. ................................................................. 18
Figure 2.4. Graph showing the relative percentages of different technol-
gies identified in the sherds from Aphrodite’s Kephali:
1. sherds using all FN technology; 2. sherds with FN clay
recipe but not burnished and fired in a kiln 3. sherds with
EM I clay recipe and shape but burnished and fired dark;
4. sherds using all EM I technology. .............................. 19
Figure 2.5. Theoretical reconstruction of the superstructure over the
channel kiln from Kommos, Crete, LM IA. ......................... 23
Figure 3.1. Large white fragments of calcite are easily visible within the fabric of this conical pyxis with interior divisions from Hagia Photia Siteias, Tomb 27, HNM 3653. Ht. 7.5 cm. ................. 29

Figure 3.2. Angular red inclusions are visible on the surface of this sherd from Aphrodite's Kephali, AK 38. Size of field ca. 3 cm. ........................................ 30

Figure 4.1. Deep open shapes. Not to scale ............................................. 35
Figure 4.2. Shallow open shapes. Not to scale ............................................ 37
Figure 4.3. Closed shapes. Not to scale .................................................... 39

Figure 5.1. Simple bowls and jars, Coarse Dark Burnished Class, FN–EM I. A. Pacheia Ammos Rock Shelter, PAR 46. B. Pseira, Tomb 7, INSTAP-SCEC, PS 2343. Scale 1:6. ............... 46
Figure 5.2. Specialized goblet shapes, Coarse Dark Burnished Class, EM I. A. Hagios Charalambos Cave, INSTAP-SCEC, HCH 149. B. Hagia Photia Siteias, Tomb 28, HNM unnumbered. C. Kalo Chorio (after Haggis 1996, 665, fig. 23, no. KT 24). D. Pseira, Tomb 1, INSTAP-SCEC, PS 1307. Scale 1:6. ............ 47
Figure 5.3. An EM I stand from Knossos (after Hood 1990a, fig. 2, no. 18) and an EM I–IIA stand from Hagios Charalambos, HNM 12,580. Scale 1:6 ........................................ 47
Figure 5.4. Hagios Onouphrios Style jug from Hagia Photia Siteias, Tomb 195, HNM 4197. Ht. 23.5 cm. ............................ 48
Figure 5.5. Hagios Onouphrios Style vases illustrating the stylistic changes during EM I from vases with globular bodies and rounded bottoms from early in the period (A and C) to taller forms with piriform bodies and flat bases late in the period (B and D). A. Jug from Lebena, Tomb II, HM 15,384. B. Jug from Hagia Photia Siteias, Tomb 202, HNM 4335. C. Tankard from Lebena, Tomb II, HM 15,322. D. Tankard from Hagia Photia Siteias, Tomb 96, HNM 3617. Scale 1:6 ........................................ 50
Figure 5.6. Specialty vases made in the Hagios Onouphrios Style, from Lebena, Tomb II. A. Small quadruped, HM 15,368. B. Animal with legs and a tail and a raised bar along the back (wild boar?), HM 15,399. Scale 1:3 ........................................ 50
Figure 5.7. Hagios Onouphrios Style collared jar from Kalo Chorio. Scale 1:3 .......................................................... 51
Figure 5.8. Hagios Onouphrios Style barrel vase from Koumasa .......... 51
Figure 5.9. Tankard from Lebena, made in the Lebena Style, Tomb II, HM 15,373. Scale 1:3 ........................................... 54
Figure 5.10. Lebena Style pyxis with an elliptical shape from Hagios Onouphrios, HM 7. Length 15 cm. ......................... 54
Figure 5.11. Specialty vases made in the Lebena Style. A. Oval-shaped vase in the form of a gourd, from Lebena, Tomb II, HM 15,391. B. Small bottle from Lebena, Tomb II, HM 15,372. Scale 1:3.... 54
Figure 5.12. Fragment of a chalice from Knossos. Ht. 10 cm. ................. 56
Figure 5.13. Chalices made in the Fine Dark Gray Burnished Class, from Hagia Photia Siteias. Left: Tomb 226, HNM 2885. Ht. 24.2 cm. Right: Tomb 134, HNM 4157. Ht. 23.6 cm. .......... 57
Figure 5.14. Chalices of several sizes. A–C. From the Pyrgos Cave. D. From Knossos. E–F. From Hagia Photia Siteias. Scale 1:6.... 58
Figure 5.15. Variations in chalice rims from Kalo Chorio. Scale 1:6.... 58
Figure 5.16. A chalice from the Pyrgos Cave, HM 7489. Scale 1:5. ......... 60
Figure 5.17. Chalice from the Pyrgos Cave with a scalloped rim, HM 7487. Ht. 20.5 cm. ................................. 60
Figure 5.18. A ring-footed bowl (chalice with low base) from Hagia Photia Siteias, Tomb 200, HNM 3576. Ht. 13.8 cm.... 61
Figure 5.20. Cups and pyxis in the Fine Dark Burnished Class. A. Cup from Knossos. B. Two-handled cup from Knossos. C. Two-handled cup from Kalo Chorio. D. Pyxis from Knossos. Scale 1:6.... 62
Figure 5.21. Pyrgos Style bottle from Hagia Photia Siteias, Tomb 209, HNM 4204. Ht. 10.6 cm. ................................. 63
Figure 5.22. Biconical pyxides from Hagia Photia Siteias, Tomb 2, HNM 2474 (left) and HNM 2506 (right). Ht. 10.6 cm (left) and 14.4 cm (right, including the lid). ............................... 63
Figure 5.23. Scored Style jug from the Platylvola Cave. Restored ht. ca. 30–40 cm. ................................. 65
Figure 5.24. Open bowls with rounded bases from Knossos, with a red burnished surface. The restored handles are uncertain. Scale 1:8. ................................. 66
Figure 5.25. Conical cup with horns on the rim from Nea Roumata, Chania, P 5376. Ht. 11.2 cm. ................................. 67
Figure 5.26. Monochrome pyxis with a long spout and two vertically pierced lugs, covered with its cylindrical lid, from Hagia Photia Siteias, Tomb 179, HNM 3837. Ht. 8.2 cm. ................................. 68
Figure 5.27. Pyxis from Gavdos, Chania, P 9605. Ht. 10 cm. ................. 68
Figure 5.28. Cylindrical pyxis from Nea Roumata, Chania, P 5375. Ht. 13.2 cm. ................................. 68
Figure 5.29. Red-slipped monochrome pyxis with horn-like handles on both the shoulder and lid, from Lebena, Tomb II, HM 15,306. Ht. including the handles 14.3 cm. .............................. 69
Figure 5.30. Amphora from Gavdos, Chania, P 9604. Ht. 18 cm. ............... 69
Figure 5.31. Jug from Debla, Chania, P 3368. Ht. 20.5 cm. ..................... 70
Figure 5.32. Tripod cooking pot from Hagia Photia Siteias, Tomb 17, HNM 5059. Ht. 31 cm. ........................................ 71
Figure 5.33. Cooking dish from Knossos. Scale 1:6. .............................. 72
Figure 5.34. Cycladic style globular pyxides from various sites on Crete. Scale 1:3. .................................................. 73
Figure 5.35. Cycladic style conical pyxides from sites on Crete. Scale 1:3. . 73
Figure 5.36. Cycladic style lid for either a globular or a conical pyxis, from Pseira. Scale 1:2. ........................................... 74
Figure 5.37. Cycladic style kernos composed of three conical pyxides supported on a conical base, from Hagia Photia Siteias, Tomb 203, HNM 3895. Ht. 9 cm. .............................. 74
Figure 5.38. Cycladic style chalice from Hagia Photia Siteias, Tomb 166, HNM 4939. Ht. 29 cm. ........................................ 75
Figure 5.39. Jar with cut-outs from Hagia Photia Siteias, Tomb 85, HNM 3970. Ht. 20 cm. ............................................. 75
Figure 5.40. Two bottles from Hagia Photia Siteias, Tomb 2, HNM 2513 and HNM 2518. Both 10 cm high. ......................... 76
Figure 5.41. Cycladic style bottle modified to create the image of a bird, Hagia Photia Siteias, Tomb 216, HNM 4890. Scale 1:6. . 76
Figure 5.42. Bowl with tab handle from Hagia Photia Siteias, Tomb 122, HNM 3954. Ht. 6.5 cm. ...................................... 77
Figure 5.43. The underside of a bowl with tab handle from Hagia Photia Siteias, Tomb 1, HNM 2501. Ht. 4.4 cm, width with the handle 24.0 cm. ............................ 77
Figure 5.44. Frying pan as seen from the side, from Hagia Photia Siteias, Tomb 89, HNM 2627. Ht. 4.2 cm. ............................. 77
Figure 5.45. Underside of a decorated frying pan from Hagia Photia Siteias, Tomb 71, HNM 2674. Ht. 4.3 cm. ............................ 77
Figure 5.46. A spool pyxis from Hagia Photia Siteias, Tomb 2, HNM 2510 with lid HNM 2491. Ht. 2.8 cm. ............................ 78
Figure 5.47. Pithos from Aphrodite’s Kephali, AK 9. Ht. 74.6 cm. .......... 79
Figure 5.48. The upper part of a pithos from Aphrodite’s Kephali, AK 113. Dia. of rim 54 cm. ........................................... 80
Figure 5.49. Part of the lower two thirds of a pithos from Aphrodite’s Kephali, AK 111. Dia. of base ca. 42 cm. .......................... 80
Figure 5.50. Part of the shoulder of a pithos from Aphrodite’s Kephali, AK 110. Dia. of body ca. 78–80 cm. ......................... 81
Figure 5.51. Cycladic style versions of the collared jar from Hagia Photeia Siteias. A. Collared jar, HN 3136, Tomb 111. B. Bottle, HN 2946, Tomb 62. C. Bottle HN 3477, Tomb 19. Scale 1:3.

Figure 6.1. Bird-shaped bottle photographed from above the vase, Hagia Photia Siteias, Tomb 216, HNM 4890. Ht. 15.3 cm.

Figure 6.2. Hagios Onouphrios Style jug from Hagia Photia Siteias, Tomb 202, HNM 4335. Ht. 25.4 cm.
Preface

This is a book about economic and social changes and how they occur. Its focus is the opening phase of the Minoan “civilization” on the island of Crete, which is a useful venue for examining such cultural transformations, because we have a considerable amount of evidence for this early phase in human history. The conclusion is that new developments in ceramics that reached Crete at the end of the Neolithic period acted as the final piece in a set of complex factors that were already converging to create the economic, technological, social, and religious advancements we call the Early Bronze Age. The arguments are set out in two parts, a detailed explanation of the ceramics we call Early Minoan I and the differences that set it apart from its predecessors, and an explanation of how these new and highly superior containers changed the storage, transport, and accumulation of a new form of wealth consisting primarily of agricultural and animal products. The increased stability and security provided by an improved ability to store food from one year to the next would have a profound effect on the society.

The book is dedicated to the many graduate students who undertook pottery projects in my courses at Temple University’s Tyler School of Art suburban campus. Between 1970 when I began teaching at the university and 2008 when the campus moved into its new building in Philadelphia, I offered a seminar where graduate students had an opportunity to experiment with ancient technology. In addition to making faience, building warp-weighted looms, working on various metals techniques, and other possibilities, the students could undertake various ceramics projects including building a wood-burning kiln. The kilns were especially successful vehicles for understanding more about ancient pyrotechnology, and students learned the subtle differences in construction design that can affect
the resulting effectiveness of the firing. Some of the projects resulted in publications (Betancourt et al. 1979; Betancourt, Berkowitz, and Zaslow 1990; Gosser and Sapareto 1984), while others were simply presented as seminar papers. All of the projects led to a better appreciation of ancient technology by the instructor as well as the students.
Acknowledgments

Many people deserve thanks for the information presented here. Much of the research was conducted in connection with excavations supported by Temple University and the Institute for Aegean Prehistory, both located in Philadelphia, Pennsylvania. I am grateful to my colleagues Peter Warren and Robert Koehl for reading early versions of this book and offering several useful suggestions. Some of the most helpful ideas were developed in connection with the study of Hagia Photia Siteias, in collaboration with my good friend Costis Davaras, and Aphrodite’s Kephali, for which thanks are expressed to Theodore Eliopoulos and Stavroula Apostolakou for permission to publish this site and its pottery. I am grateful to Yannis Tzedakis and Maria Vlasaki for the images and information about vases from West Crete.

The illustrations come from sources that are cited in the captions. Drawings and photographs without credits are by the author.
### Abbreviations

Abbreviations of journals not listed here follow the conventions used by the *American Journal of Archaeology* 111.1 (2007), pp. 14–34.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>Aphrodite’s Kephali</td>
</tr>
<tr>
<td>C</td>
<td>Celcius</td>
</tr>
<tr>
<td>Chania</td>
<td>Chania, Archaeological Museum</td>
</tr>
<tr>
<td>ca.</td>
<td>approximately</td>
</tr>
<tr>
<td>cm</td>
<td>centimeter</td>
</tr>
<tr>
<td>dia.</td>
<td>diameter</td>
</tr>
<tr>
<td>EC</td>
<td>Early Cycladic</td>
</tr>
<tr>
<td>EM</td>
<td>Early Minoan</td>
</tr>
<tr>
<td>FN</td>
<td>Final Neolithic</td>
</tr>
<tr>
<td>gr</td>
<td>gram(s)</td>
</tr>
<tr>
<td>HCH</td>
<td>Hagios Charalambos Cave</td>
</tr>
<tr>
<td>HM</td>
<td>Herakleion, Archaeological Museum</td>
</tr>
<tr>
<td>HNM</td>
<td>Hagios Nikolaos, Archaeological Museum</td>
</tr>
<tr>
<td>ht.</td>
<td>height</td>
</tr>
<tr>
<td>INSTAP-SCEC</td>
<td>INSTAP Study Center for East Crete, Pacheia Ammos, Crete</td>
</tr>
<tr>
<td>km</td>
<td>kilometers</td>
</tr>
<tr>
<td>KrChron</td>
<td><em>Kritika Chronika</em></td>
</tr>
<tr>
<td>LM</td>
<td>Late Minoan</td>
</tr>
<tr>
<td>m</td>
<td>meters</td>
</tr>
<tr>
<td>mm</td>
<td>millimeters</td>
</tr>
<tr>
<td>MM</td>
<td>Middle Minoan</td>
</tr>
<tr>
<td>PAR</td>
<td>Pacheia Ammos Rock Shelter</td>
</tr>
</tbody>
</table>
pers. comm. personal communication
PS Pseira
SEM Scanning Electron Microscopy