Mediterranean Archaeology and Archaeometry, Vol. 3, No1, pp. 31-44

THE FINAL NEOLITHIC-EARLY MINOAN I/IIA SETTLEMENT HISTORY OF THE VROKASTRO AREA, MIRABELLO, EASTERN CRETE

BARBARA J. HAYDEN

Mediterranean Section
University of Pennsylvania Museum
33rd and Spruce Sts.
Philadelphia, Pennsylvania 19104

email: bhayden@sas.upenn.edu

Received: 11-10-2002
Accepted: 22-5-2003

ABSTRACT

This paper discusses the FN-EM I/IIA settlement pattern along the west-central coast of the Gulf of Mirabello in eastern Crete. Survey has revealed a settlement pattern that is widespread by EM I, but concentrated primarily along the coast and around a fertile coastal river valley. This pattern is functionally diverse, involving defensive sites, landing-places or harbors, and agricultural/pastoral settlements. The spread of settlement inland during EM I/IIA is focused on regional hydrology and routes, and these settlements can be size-ranked. The depth, breadth, and functional diversity of this pattern may reflect a degree of social complexity by EM I-II. This developed settlement pattern could be the result of the stimulus provided by extensive contacts with the Cyclades, and provides a framework for new data concerning trade in bulk (ceramics) across long distances.

KEYWORDS: settlement pattern, clay fabric, trade, coastal zone, Priniatikos Pyrgos, Cyclades

INTRODUCTION

The intensive and systematic survey of the Vrokastro area of eastern Crete revealed that the settlement history of the area began in the Final Neolithic (this project was directed by B. Hayden and J. Moody, for the University of Pennsylvania Museum through the auspices of the K-D Ephoreia). The survey area extends from the Gournia plain west to the fertile, well-watered Kalo Chorio or Istron River Valley, and south to the upland Meseleroi Valley (Fig. 1), and encompasses the west-central portion of the Gulf of Mirabello coast (Hayden, Moody, Rackham 1992). The study area includes the Early Iron Age settlement of Vrokastro, located on a peak overlooking the coastal zone (Hall 1914). This is the only thoroughly excavated settlement within the survey boundaries, and the name of the survey project was derived from this type-site.

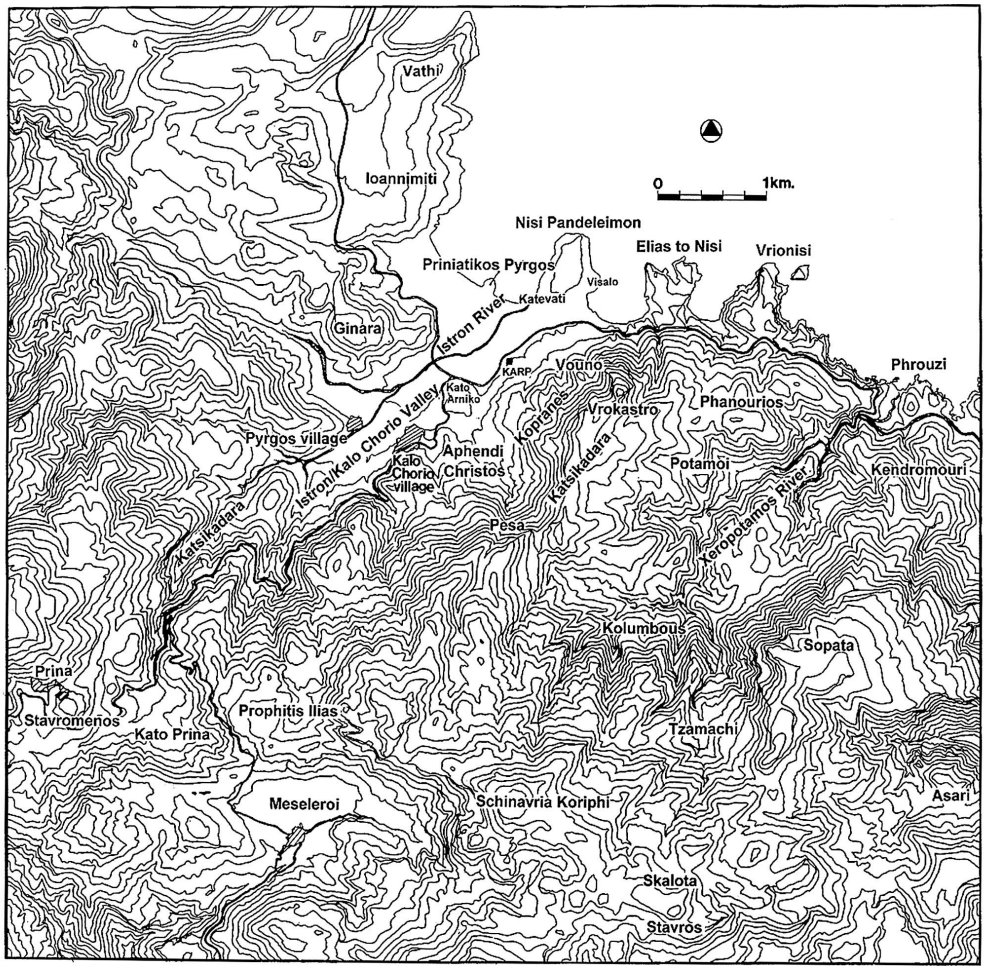

Fig. 1: Survey area showing toponyms.

Data collected through the Vrokastro survey have provided insights concerning the extent, development, and complexity of early settlement in the region, and have been used to establish functional diversity between sites, and to assess what aspects of the landscape were most highly prized by these early settlers. Questions to be addressed in this paper concern how this Mirabello pattern accords with other areas of eastern Crete and the rest of the island. The Vrokastro settlement pattern, which is oriented to the sea, also speaks strongly of contacts with other areas of Crete and the Aegean; these contacts must have stimulated regional growth and development, which culminated in the appearance of a primary center, the harbor town of Priniatikos Pyrgos, during EM I/II.

FINAL NEOLITHIC AND EARLY MINOAN I/II POTTERY

Stratified comparanda for early pottery are sparse, but the recent Kalo Chorio Rescue Project or KARP (Fig. 1), based in Istron, the coastal zone of the Vrokastro area, has revealed a

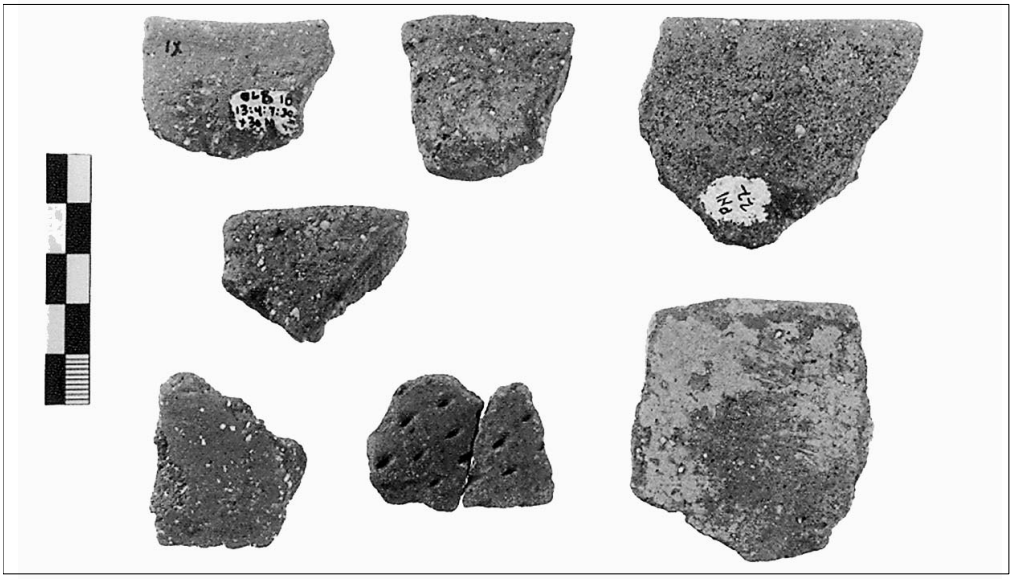

Fig. 2: Photograph of sherds with calcite (marble) inclusions.

stratified sequence of EM I pottery (Haggis 1996). These excavated fabric and ware groups include calcite or marble ware, fine and dark gray wares, red-brown cooking, and pithos ware. Most of the coarser of these EM I fabrics have been identified at early sites in the Vrokastro region, although the fine pattern-burnished gray wares are absent from the repertoire recovered through surface survey.

The earliest sherds from sites within the Vrokastro region were then divided up into basic fabric groups based on the primary inclusion (this study was undertaken by B. Hayden and T. Strasser, in process). These included a quartz/feldspar group and a calcite group (Fig. 2). The calcite sherds were tempered with marble (this is the Kavousi Type 9 fabric; Haggis and Mook 1993), or softer pieces of limestone. A third group has as its primary temper granodiorite; this temper began to be used in production of jars during EM I. A fourth group comprises all sherds tempter with schist, hard phyllites, softer siltstones and claystones. Since phyllites do not occur in the regional geology, the phyllite-tempered vases were imported (probably from the Kavousi region, or other areas of Crete).

Some of the quartz-tempered coarse-ware cooking sherds have pricked decoration; this could be EM I or earlier. Although the sherds tempered with crushed calcite or marble are widely distributed within the Vrokastro region and are EM I in date, they have been recovered primarily from sites located on or near the coast. Recent analysis of Aghia Photia (Siteia) pottery in this fabric suggests a Cycladic origin, or a Cycladic workshop based in Crete (Day, Wilson, and Kiriatzi 1998, 138-139). The higher proportion of calcite-tempered sherds from Vrokastro coastal sites could also indicate a Cycladic origin for this fabric. The EM I and later shapes include small cups, footed cups, small black-burnished bowls, stands, chalices in a medium coarse or coarse ware, and small jars painted in a red wash.

The early settlements within the Vrokastro region also produced a siltstone fabric initially identified by Jennifer Moody as 'Hearth Ware.' This fabric occurs in pierced tubular lugs from closed shapes and bowls with rounded carina-

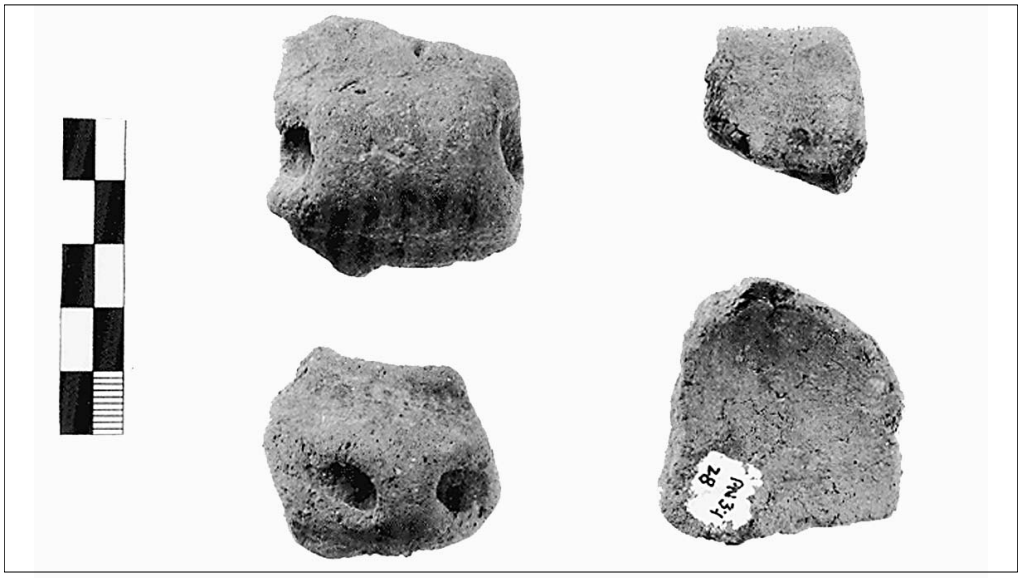

Fig. 3: Tubular lugs from Ioannimiti sites within the Vrokastro region.

tions (Fig. 3; Fig. 5c,f), and in large strap handles with bosses identical to handles from Final Neolithic jars found in a well at Kastelli Phournis (Fig. 4, left; Fig. 5a; Manteli 1992), a site just west of the Vrokastro region. This Final Neolithic fabric can contain a few marble or siltstone inclusions that are soft pink or yellowish.

The clay is soft to fairly hard-fired, with a generally reddish to pink-orange-brown surface, though sherds have been recovered with a greenish to gray caste. The clay surface often contains large discolored clay patches that blend into the clay matrix and are slightly harder than the matrix. The core often has a

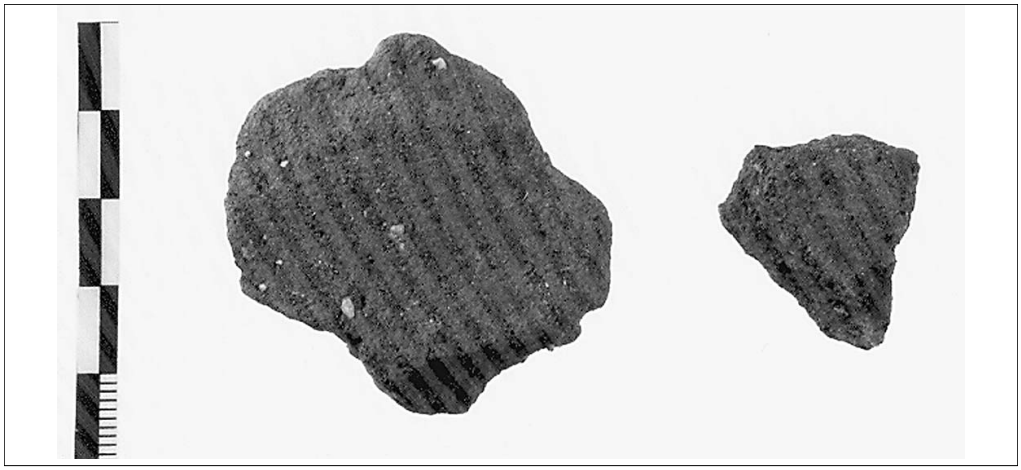

Fig. 4: Handle with large boss from Ioannimiti (left).

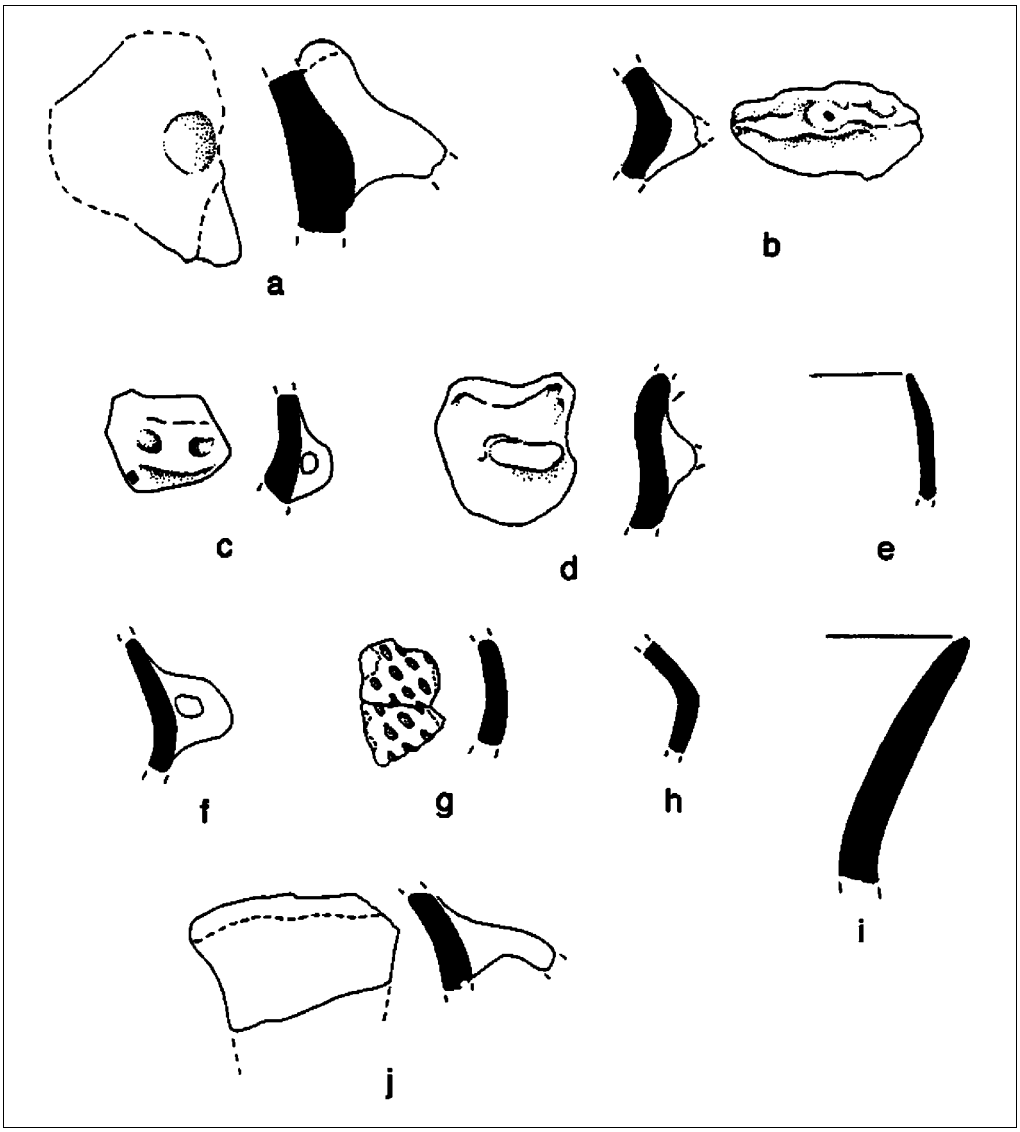

Fig. 5: Profiles of FN-EM I pottery: a: strap handle with boss; b: cheese pot handle; c. lug handle; d. small bowl with strap handle; e. goblet rim in coarse ware; f. lug handle; g. bowl with gouged exterior decoration; FN or earlier; h. carination on dark gray burnished shape; i. tall necked jar rim; j. strap handle.

blocky or layered appearance. These sherds were burnished, and in one case a thick waxy burnish was preserved.

A soft cooking fabric that contains large burned pieces of chaff and quartz (Fig. 6) is also probably Final Neolithic, as are lug handles that belong to baking or cheese pots in this fabric (Fig. 5b). These are from coastal sites and from a settlement flanking the Istron Valley. Other possible Final Neolithic sherds have crackled

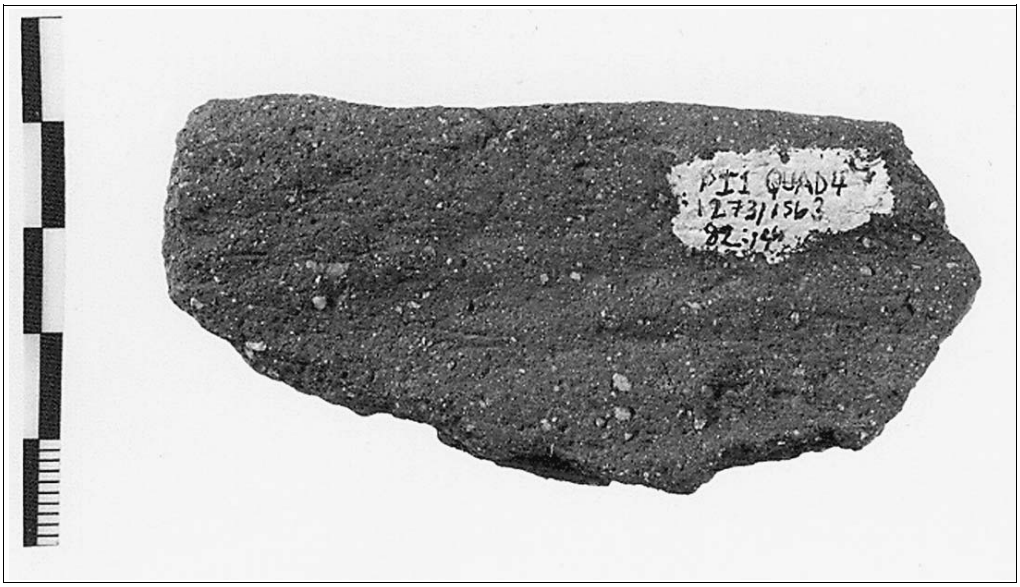

Fig. 6: Cooking dish rim.

and burnished black-red or brown surfaces, and layered blocky cores that are striated in bands of color, the result of pit-firing.

These FN fabrics are from bowls, jars, and jugs, some whole-mouthed and some high-necked. The presence and range of these fabrics and shapes were used to establish the chronology of the earliest sites within the Vrokastro region.

DESCRIPTION OF SURVEY AREA

The survey area was initially divided into 13 physiographic zones (Fig. 7) used to analyze settlement distribution for every cultural period. These zones were defined by J. Moody and O. Rackham based on topographical features, elevation, aspect, and to a lesser extent on geology, soil, vegetation, and land-use. The most relevant zones to this analysis are zone 1: the coastal strip; zone 2: the Istron River Valley; zone 11: the hills enclosing this valley; and zone 12: the Katsikadara gorge directly south of the Istron Valley, and the area near modern Prina village up to the Prophitis Ilias pass/valley, west of Mount Schinavria (Figs. 1, 7).

Schinavria Koriphi is in zones 7 and 8, forming the watershed for the Vrokastro area. This mountain separates zone 4, the hills and ridges south of the peak of Vrokastro, from the upland Meseleroi Valley, which is zone 13. This topographically diverse region has an elevational range to 700 meters and contains all of one (Xeropotamos) and part of another (Istron or Kalos Potamos) riverine system, the mountain ranges of Kopranes-Vrokastro flanking the coast and the Schinavria mountains, fertile coastal and inland valleys, a deep gorge extending south from the Istron Valley, and upland hills and ridges cultivated for millennia in grain and now in olives. Even during these earliest phases of settlement differences between zones that contain settlement can be established, based on the number and size of sites, site function, and the relationship of settlements to landforms, routes, and resources.

THE FINAL NEOLITHIC PERIOD

The coastal zone 1 is defined by large and small promontories that flank sandy embayments and two river estuaries: the Istron River

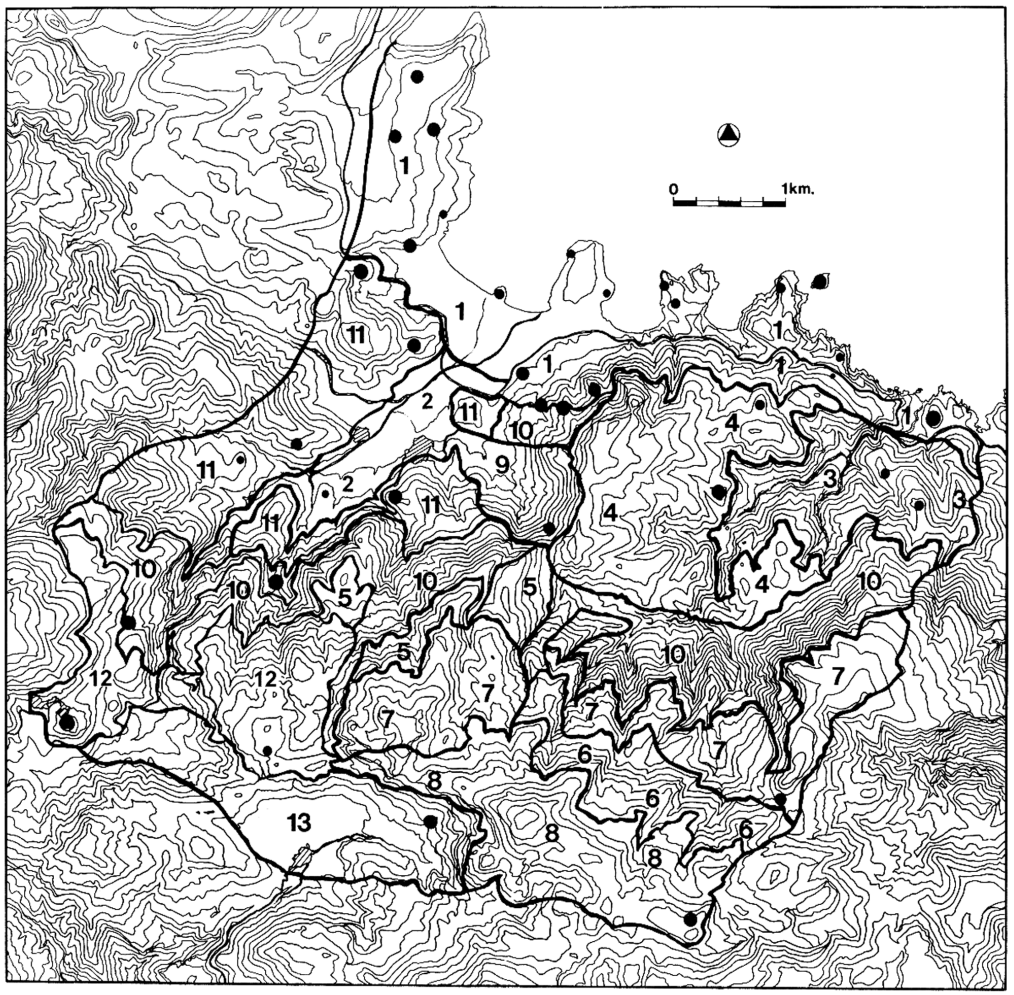

Fig. 7: Map with physiographic zones.

and delta to the west and the Xeropotamos River near the eastern boundary. This zone contains 50% of settlement for the FN and EM I periods (Fig. 8). Within this zone small hamlets of Final Neolithic date were found on the long north-south promontory of Ioannimiti (Figs. 1, 8); these involve later phases of settlement. This is typical of the Vrokastro region, where most settlements involve many phases of occupation. The sites that produce only a handful of FN or EM I sherds in relationship to later periods, therefore, were not given a dimension.

Other sites with a large proportion of Final Neolithic sherds include one along the cliff at the western edge of the promontory of Elias to Nisi, and two linked settlements, one on a high knoll at the tip of the Vrionisi promontory, and one on the islet off the tip of this promontory, which may represent a land-fall community. Coastal subsidence has been extensive, and if the islet and promontory were

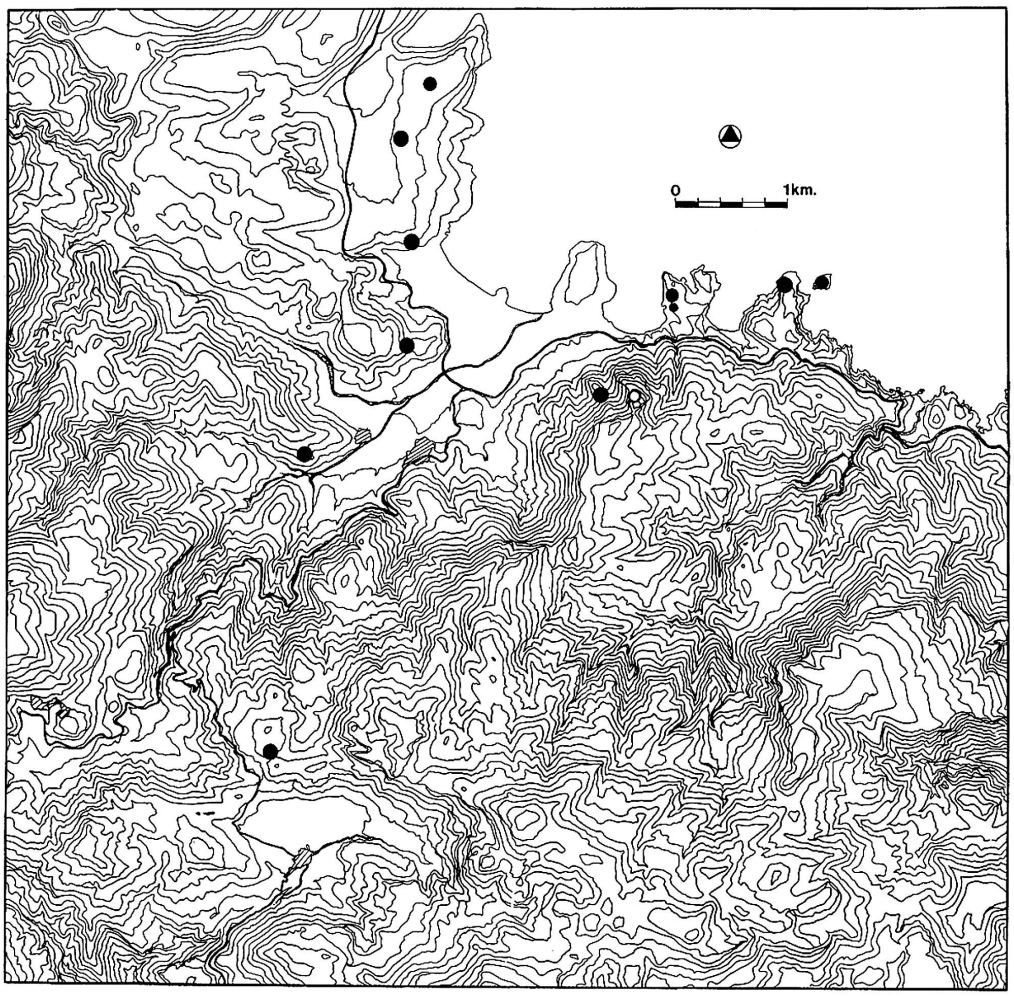

Fig. 8: Map showing location of Final Neolithic sites.

once connected, then a protected harbor existed at this location.

As the map demonstrates (Fig. 8), Final Neolithic sites have begun to flank the fertile Istron Valley, and occur on the upper northern face of Kopranes, including sherds found on the Vrokastro peak. A few Final Neolithic sherds were also found near an inland route in zone 12, in Prophitis Ilias. This range of sites is a conservative estimate based on the settlements producing the most pottery; it is very probable that more sites of Final Neolithic date were located within the region.

The settlements closest to the Istron Valley were cultivating an area blessed with abundant water, including a copious spring north of Pyrgos village within the Istron Valley, and it is probable that the Istron River was perennial during these early periods. It should also be pointed out that many of these sites are on high places, for example, one on the crest of Mount Vathi, at the northern tip of Ioannimiti. This

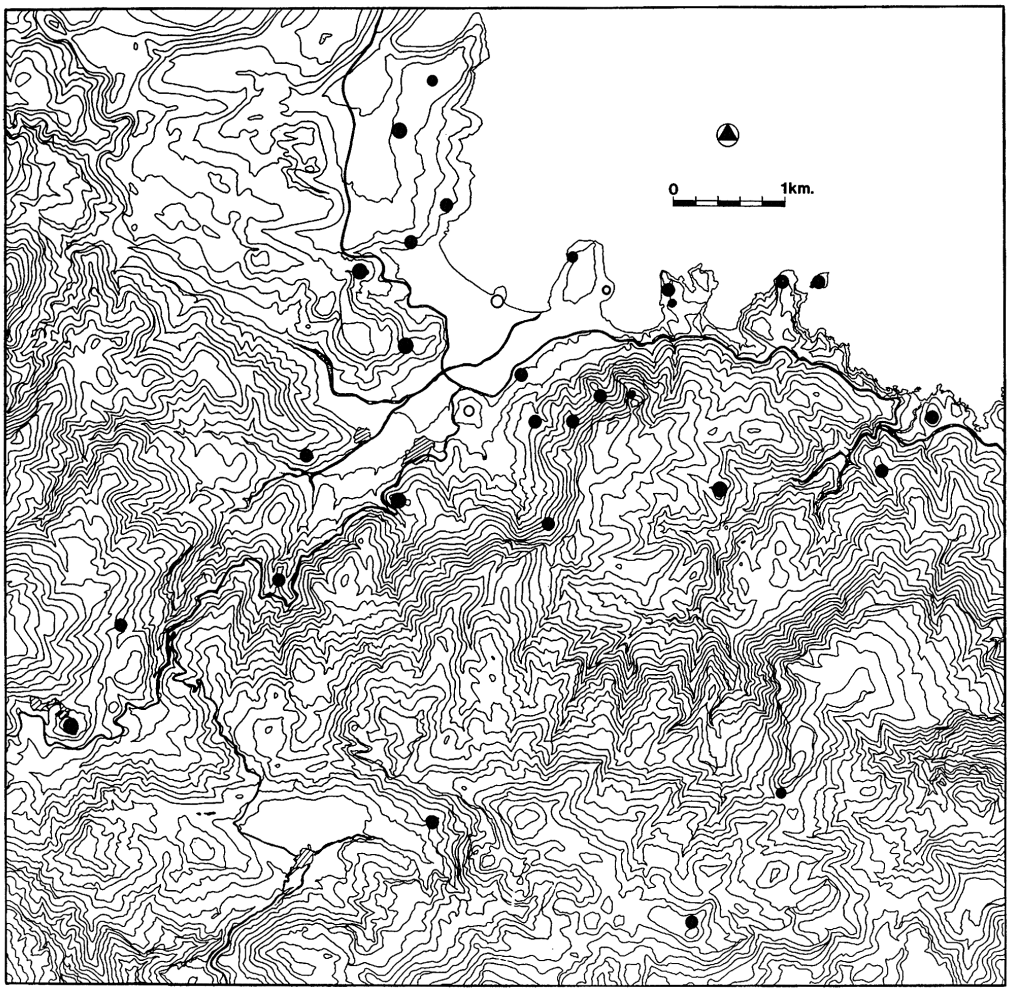

Fig. 9: Map showing location of EM I sites.

exposed site was established for the commanding view this prominent peak afforded across the Gulf of Mirabello. The sites at the northern end of Vrionisi also have a broad view across the Gulf. All of these high places flanking the coast were visible from the upper slopes of Kopranes and Vrokastro, and the one inland location flanks a route linking the coastal zone to the Meseleroi area. This appears to be a defensive system, in place from the earliest settlement of the area (see also Nowicki 1999).

THE EARLY MINOAN I PERIOD

The marked expansion of settlement in EM I (Fig. 9), which in the Vrokastro area involves a near-tripling of sites, is witnessed in a few other areas of Crete, especially those with broad and fertile agricultural valleys and plains. Settlement increases in the coastal zone, with EM I red-brown cooking ware sherds indicating activity on the eastern flank of the long promontory of Nisi Pandeleimon, which suggests use of another protected harbor site. The presence of

EM I or IIA decorated dark-on-light pottery from the headland of Priniatikos Pyrgos also suggests the genesis of this port town. Edith Hall in 1912 test-trenched only a small portion of this large settlement, which is located on the beach, clustered around a low limestone promontory which has been defined by coastal subsidence (Hall 1914, 84-85, fig. 46). Walls along the beach and extending into the sea indicate this multi-period Bronze Age town extends at least 100 m. west of the headland. Its location is inauspicious, since it lies in the floodplain of the river, but can perhaps be explained if the nearby estuary of the river, to the east, was utilized as a small protected harbor. The topographical situation of this important town requires further elucidation.

Settlements flanking the primary area of deep soils, the Istron and Aphendi Christos Valleys (Figs. 1, 9), increase in number and size, indicating further exploitation of these fertile coastal valleys. The EM I inland sites marked by the presence of Calcite wares flank routes and springs, indicating control of these resources, especially the water, was a priority. There is evidence from site location that an important route through the Katsikadara Gorge, which links the north to the south coasts near Myrtos, was in use.

The defensive settlement system is still in place, and more elaborate. Settlements often are placed with views to one another, and out across the Gulf. For example, a site on the west side of the hill Ginara (Figs. 1, 9) overlooks a major route into the area from the west, and an EM I site on the cone-shaped peak of Timios Stavros near Prina village can be seen from a settlement on the eastern flank of Ginara, which is near the Istron Valley. Early pottery was also recovered from Stavromenos, a high peak dominating the Isthmus of Hierapetra, along the eastern edge of the survey region (Figs. 1, 9).

The Istron catchment is among the most fertile in Mirabello, with abundant water, certainly worth defending, and would have been a tempting prize for new groups looking to settle permanently. Thus the coastal pattern, in which 65% of the sites are within 1 km. of the sea, appears to be an organized attempt to settle and protect the landscape, a cooperative effort made by individuals who lived in separate settlements, but were part of one community. Appearance may not always be reality, of course, since all these sites, based within these long chronological periods, need not be contemporary. Still it is an aspect of early settlement within Crete that needs to be investigated further.

Many of the coastal sites flank arable pockets, but are located on peaks with views inland and out to sea. On the east side of the survey area, settlement begins to expand inland within zones 3 and 4, along the Xeropotamos River. These settlements are placed for agricultural exploitation of the best soils, but also for defense and control of the local hydrology. The presence of greenstone celts from the northern slopes of Vrokastro and the high sites on Kopranes suggest the possible exploitation of timber. Some of the Kopranes high sites also flank routes and more gentle slopes that could be cultivated in grain.

Thus the EM I pattern is a development of the earlier. The KARP excavation in Istron, with its EM I building, is located just south of the modern coastal highway and is part of this pattern. The largest settlements, based on the amount of pottery recovered and the size of the pottery distribution, overlook the Istron River Valley and the Xeropotamos River.

THE EARLY MINOAN IIA PERIOD

By EM IIA the pace of new settlement slows somewhat (Fig. 10), but new sites do appear in areas such as Phanourios, the hills that climb from the coast just east of Vrokastro. The high defensive sites are abandoned, perhaps because a larger local population and an expanding horizon of trade contacts equate to more security. Consolidation or nucleation at coastal harbor settlements such as Priniatikos Pyrgos is also likely, and this may slow somewhat the development of new sites inland. More sites appear flanking the coastal valleys; these are located closer to, but not on, the valley floors.

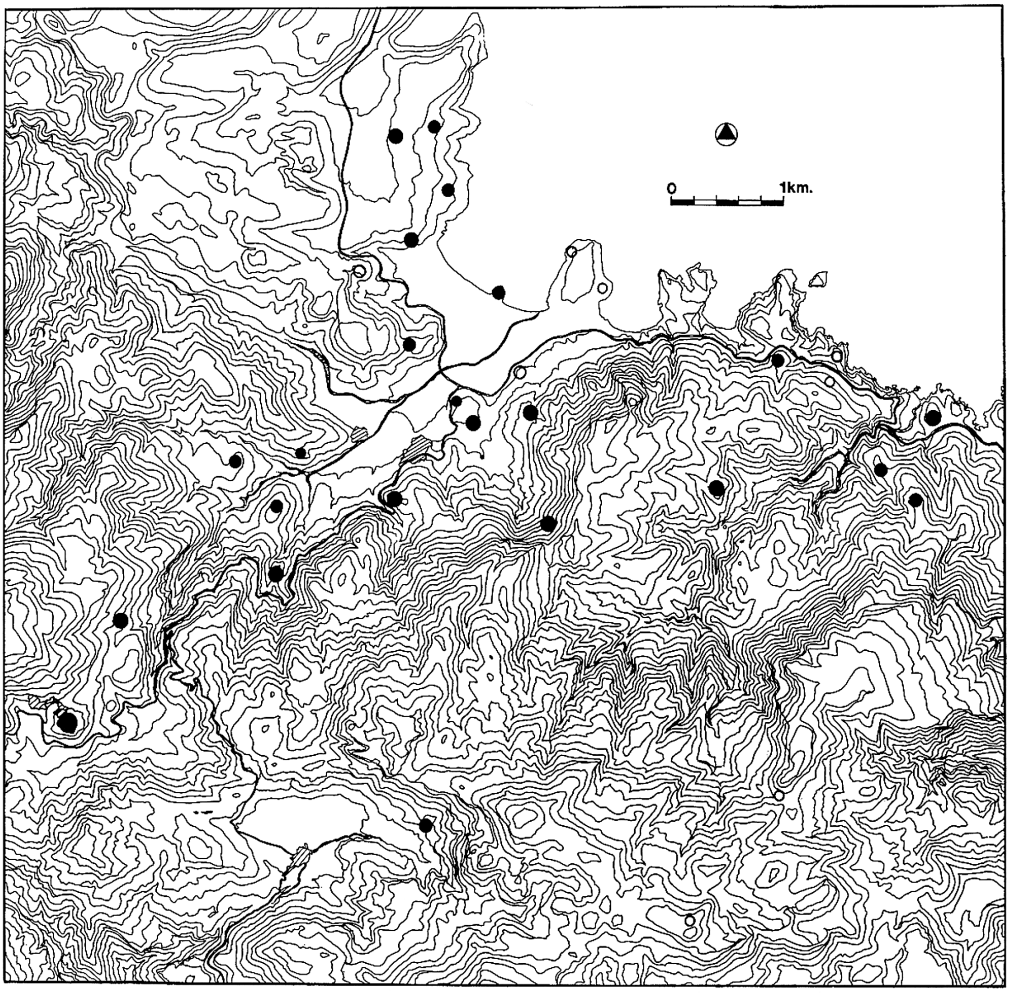

Fig. 10: Map showing location of EM IIA sites.

The pattern throughout these long epochs is one of continuous development, suggesting small-scale immigration, perhaps, but no massive and disruptive incursion of newcomers to the area.

CONTEMPORARY SETTLEMENT IN CRETE

Eastern Crete has thus far produced sparse evidence for Final Neolithic (Haggis 1992, 269-274; 1993), yet sites appear widely dispersed, from coastal areas flanking the Gulf of Mirabello to inland, perhaps pastoral communities in Lasithi (Watrous 1982, 10) and the Ziros Plain (Branigan *et al.* 1998). Settlements elsewhere are also associated with routes and springs. In Mirabello, the dense coastal pattern of the Vrokastro region, with open-air sites, none associated with caves (Betancourt 1999a), is more developed, reflecting cultivation of the rich Istron catchment. The coastal bias in settlement also suggests that immigration into the area was

by sea and that contacts with the world outside of Mirabello may have been important, even during the Final Neolithic. Seasonal reliance on the seas for subsistence is also a possibility. This link to the sea is also reflected in early settlement on the island of Pseira and Mochlos.

In southern Crete sites that can be ranked by size appear in the Mesara (Watrous et al. 1993, 223), and penetration begins of more marginal areas contiguous to this fertile plain. These are found on Miocene conglomerate slopes and ridges above the plain, topographically similar to the Vrokastro pattern (Watrous *et al*. 1993, 223; Strasser 1992, 143-149). In the far west, the Akrotiri also experiences growth during Final Neolithic and EM I, with caves abandoned for open sites. Sites that produce obsidian are coastal, as they are in the Vrokastro region.

AGRICULTURE AND TRADE

We can only speculate concerning the subsistence base of these early settlements; the main crop cultivated was likely to be grain, with viticulture and olive cultivation less probable (Hamilakis 1996). Flax, which would provide both oil and rope, could be cultivated in the Istron River delta, and the deep soil and water today sustain innumerable gardens and fruit trees. The fertility of the area would have allowed for agricultural surplus available for trade or livestock, but only if the labor pool was sufficient to cultivate beyond the needs of the family. This could be attempted through extended-family or clan-based endeavors, and the need for extra hands would certainly provide incentive for high birth rates and modest immigration.

In the Vrokastro area, the coastal bias in settlement indicates a strong link to the sea, perhaps for obtaining raw materials, such as obsidian, or for exchange of high-value commodities such as salt, metal, or worked stone. The earliest of the Vrokastro sites produce worked chert, which implies that chert was used in Final Neolithic before obsidian became widely available, though obsidian was present at Knossos in Early Neolithic. Obsidian was also abundant in Mirabello by EM I, as the KARP excavation in Istron demonstrates. Broodbank in this regard posits that the Mirabello coast was part of a sea-route linking Crete and the Cyclades (Broodbank 2000, 297-298, 309, 317). The abundant water and fertile coastal valleys make the Istron coast a likely stopping point along this route.

Ceramic and metallurgical evidence from Chrysokamino near Kavousi and Aghia Photia in Siteia indicate intense contact with the Cyclades (Broodbank 2000, 298-299; Betancourt 1999b, 363), indeed that the north coast of eastern Crete might be considered part of zone of Cycladic 'cultural influence,' as has been suggested (Day, Wilson, Kiriatzi 1998, 141). Recent petrographic studies indicate the movement of pottery in bulk long distances within the island was occurring in EM I, and Mesara jugs were recovered from the KARP excavation in Istron (Day, Wilson, Kiriatzi 1997, 285; 1998, 142; Haggis 1996). This would engender the development of port towns such as Priniatikos Pyrgos during EM I (Hayden 1999), these to facilitate such trade.

These developments might, in turn, be the genesis of a ranked society related to these coastal sites, a matter that is still much debated (Watrous 1994, 717; Haggis 1999, 60). In this regard within the Vrokastro area a three-level ranking by size can be established for EM I sites, at .14, .4, and 1.3 hectares. The meaning of this size ranking is open to interpretation—the actual size of the earliest settlements can be obscured by later phases of occupation, and deposition and erosion can obscure or distort site size. These size differences, at least for the EM I period, are to some degree genuine, however, as they are reflected in the density of the early pottery recovered related to later phases, and the overall size of the sherd dispersal.

CONCLUSIONS

The settlement pattern of the Vrokastro area during the Final Neolithic and Early Minoan I and IIA periods presents a more complex and developed system than any yet docu-

mented for the Gulf of Mirabello area. This may suggest some degree of social complexity, at least by EM I and II, which reinforces the merging evidence for ceramic workshops, movement in bulk of pottery across long distances, and extensive contacts between the Cyclades and the north coast of Crete. It is possible that the foundation for the expansion witnessed in EM I and II was in place by the close of the Final Neolithic, although this will not be provable until the relationship between these periods is better known through survey and excavation of coastal settlements such as Priniatikos Pyrgos. As Edith Hall recognized nearly a century ago, this port town is key to understanding the economic and social development of the Vrokastro region, for this early period, and many subsequent phases of the Bronze Age.

ACKNOWLEDGMENTS

The Vrokastro Survey Project was undertaken through the auspices of the American School of Classical Studies and the Kappa-Delta Ephoreia, Eastern Crete. Special thanks are owed to Professor Costas Davaras, the late Nikolas Papadakis, and Villy Apostolakou, all past and present members of this ephoreia.

REFERENCES

Betancourt, P. P. (1999a) What is Minoan? FN/EM I in the Gulf of Mirabello Region. In P. P. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier (eds), *Meletemata. Studies in Aegean Archaeology Presented to Malcolm H. Wiener I. Aegaeum 20*, 33-9. Universite de Liège and University of Texas, Austin, Program in Aegean Scripts and Prehistory.

Betancourt, P. P. (1999b) Research and Excavation at Chrysokamino, Crete, 1995-1998, *Hesperia*, vol. 68, 343-369.

Branigan, K., with T. Carter and P. O'Connor (1998) Prehistoric and Early Historic Settlement in the Ziros Region, Eastern Crete, *BSA*, vol. 93, 23-90.

Broodbank, C. (2000) *An Island Archaeology of the Early Cyclades*. Cambridge University Press, Cambridge.

Day, P. M., D. E. Wilson, and E. Kiriatzi (1997) Specialization in Prepalatial Cretan Ceramic Production. In R. Laffineur and P. Betancourt (eds), *TEXNH: Craftsmen, Craftwomen and Craftsmanship in the Aegean Bronze Age*, 275-290. *Aegaeum* 16. Universite de Liège and University of Texas, Austin, Program in Aegean Scripts and Prehistory.

Day, P. M., D. E. Wilson, and E. Kiriatzi (1998) Pots, Labels and People: Burying Ethnicity in the Cemetery of Aghia Photia, Siteia. In E. Branigan (ed), *Cemetery and Society in the Aegean Bronze Age*, 133-149. University of Sheffield Press, Sheffield.

Haggis, D. C. (1992) The Kavousi-Thriphti Survey: An Analysis of Settlement Patterns in an Area of Eastern Crete in the Bronze Age and Early Iron Age. Ph.D. diss., University of Minnesota.

Haggis, D. C. (1993) The Early Minoan Burial Cave at Ayios Antonios and Some Problems in Early Bronze Age Chronology. *SMEA*, vol. 31, 7-34.

Haggis, D. C. (1996) Excavations at Kalo Khorio, East Crete. *AJA*, vol. 100, 645-681.

Haggis, D. C. (1999) Staple Finance, Peak Sanctuaries, and Economic Complexity in Late Prepalatial Crete. In A. Chaniotis (ed), *From Minoan Farmers to Roman Traders*, 53-85. Franz Steiner Verlag, Stuttgart.

Haggis, D. C., and M. S. Mook (1993) The Kavousi Coarse Wares: A Bronze Age Chronology for Survey in the Mirabello Area, East Crete. *AJA*, vol. 97, 265-293.

Hamilakis, Y. (1996) Wine, Oil and the Dialectics of Power in Bronze Age Crete: A Review of the Evidence, *OJA*, vol. 15, 11-30.

Hayden, B. (1999) The Coastal Settlement of Priniatikos Pyrgos: Archaeological Evidence, Topography, and Environment. In P. P. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier (eds), *Meletemata. Studies in Aegean Archaeology Presented to Malcolm H. Wiener I. Aegaeum* 20, 351-356. Universite de Liège and University of Texas, Austin, Program in Aegean Scripts and Prehistory.

Hayden, B. J., J. A. Moody, and O. Rackham. 1992. «The Vrokastro Survey Project, 1986-1989: Research Design and Preliminary Results. *Hesperia*, vol. 61, 293-353.

Hayden, B. J., T. Strasser Final Neolithic-Early Minoan I/IIA Settlement in the Vrokastro Area, Eastern Crete. *AJA*, (in process).

Manteli, K. (1992) The Neolithic Well at Kastelli Phournis in Eastern Crete. *BSA*, vol. 87, 103-120.

Nowicki, K. (1999) Final Neolithic Refugees or Early Bronze Age Newcomers? The Problem of Defensible Sites in Crete in the Late Fourth Millennium B.C. In P. P. Betancourt, V. Karageorghis, R. Laffineur and W.-D. Niemeier (eds), *Meletemata. Studies in Aegean Archaeology Presented to Malcolm H. Wiener*, 575-581. Université de Liège and University of Texas, Austin, Program in Aegean Scripts and Prehistory.

Strasser, T. (1992) Neolithic Settlement and Land-Use on Crete. Ph.D. diss., Indiana University.

Watrous, L. V., *et al*. (1993) A Survey of the Western Mesara Plain in Crete: Preliminary Report of the 1984, 1986, and 1987 Field Season.» *Hesperia*, vol. 62, 191-248.

Watrous, L. V. (1994) Review of Aegean Prehistory III: Crete from Earliest Prehistory through the Protopalatial Period. *AJA*, vol. 98, 695-753.