

# THE VROKASTRO SURVEY PROJECT, 1986–1989

## RESEARCH DESIGN AND PRELIMINARY RESULTS

(PLATES 75–79)

THE PEAK OF VROKASTRO towers 313 meters above the Bay of Mirabello in eastern Crete (Pl. 75:a). On its summit and north slope in 1910 and 1912 Edith Hall excavated a Late Bronze and Early Iron Age settlement.<sup>1</sup> Vrokastro remains one of the few excavated sites belonging to this transitional period; it is important for its size, length of occupation, and variety of artifacts, tomb types, and burials.<sup>2</sup> Because excavation took place early in this century, data concerning the site and its environment are understandably fragmentary. The goal of the Vrokastro Survey Project is to place this settlement within a regional context in order to understand better how it functioned and related to its environment.<sup>3</sup>

The study area flanks the Bay of Mirabello from the Istron River valley (Pl. 75:b) on the west to a small plain west of Gournia (Figs. 1, 2, 3). The southern limits extend from the village of Prina, at the southwest corner, across the Meseleri basin (Pl. 75:c), to the mountain of Stauromenos on the east (Pl. 75:d). The Istron River valley and gorge north of Prina (Pl. 75:e) form the western boundary, and the eastern boundary lies at the watershed between the Xeropotamos (Pl. 75:f) and Gourniapotamos rivers (Fig. 3).

The mountain of Vrokastro and the Kopranes range rise steeply from the coast to enclose an area of upland hills and fields. South of these fields another mountain range extends from Kolumbous (Pl. 76:a) to Mount Schinauria, at an elevation of 698 meters (Pl. 76:b). This elevation is modest by Cretan standards; it lies within the limits of permanent settlement, and within this range grain, vines, and olives can be cultivated. Much of the mountainous terrain is complex and difficult. Steep ravines, dense wood, and cliffs are obstacles to

<sup>1</sup> Hall 1912a; Hall 1914; Hall 1914–1915; Hayden 1983a; Hayden 1983b.

<sup>2</sup> For the chronology and significance of the site see Desborough 1952, pp. 262–270; Desborough 1972, pp. 117, 235–237, 286, 302–304, 375; Popham 1965, p. 318, note 15, pp. 334–335; Coldstream 1968, pp. 235, 239, 258–261, 417; Coldstream 1977, p. 284; Snodgrass 1971, p. 371; Kanta 1980, p. 133, figs. 50, 51.

<sup>3</sup> Three years of fieldwork and one study season have been completed to date. Project co-directors are Dr. Barbara J. Hayden, Research Associate, Mediterranean Section, The University Museum, and Dr. Jennifer A. Moody, Research Associate, Archaeometry Laboratory, University of Minnesota, Duluth. Staff members who have participated in the project to date include Dr. Oliver Rackham, Research Fellow, Corpus Christi College, Cambridge; Dr. Gene Postma, Environmental Studies Program, University of East Anglia, Norwich, England; Dr. Harold Koster, Adjunct Faculty, Anthropology Department, SUNY Binghamton; Dr. George Harrison, Classics Department, Xavier University; Dr. Margrete Hahn, Research Fellow, Institute of Classical Studies, Odense University, Denmark; James Raab-Rust (satellite imaging); and James Huber (processed pollen samples under the direction of Dr. George Rapp, Director, Archaeometry Laboratory, University of Minnesota, Duluth). Other participants include Donald Haggis, Jane Nosan, Bridgit Crowell, Kevin Glowaki, Mary Jane Ingram, James Knight, Douglass Schaller, Thomas Strasser, and Bessie Argyropoulou.

The survey was undertaken through the auspices of the American School of Classical Studies at Athens with a permit provided by the Greek Ministry of Culture. Funding for the project has been provided by the University Museum, University of Pennsylvania, the American Philosophical Society, the Institute for Aegean Prehistory, and the Wenner Gren Foundation for Anthropological Research. Results of the first two years of fieldwork have been briefly described in Hayden, Moody, and Rackham, forthcoming; see also Moody and Hayden 1988; and Moody and Hayden 1989.

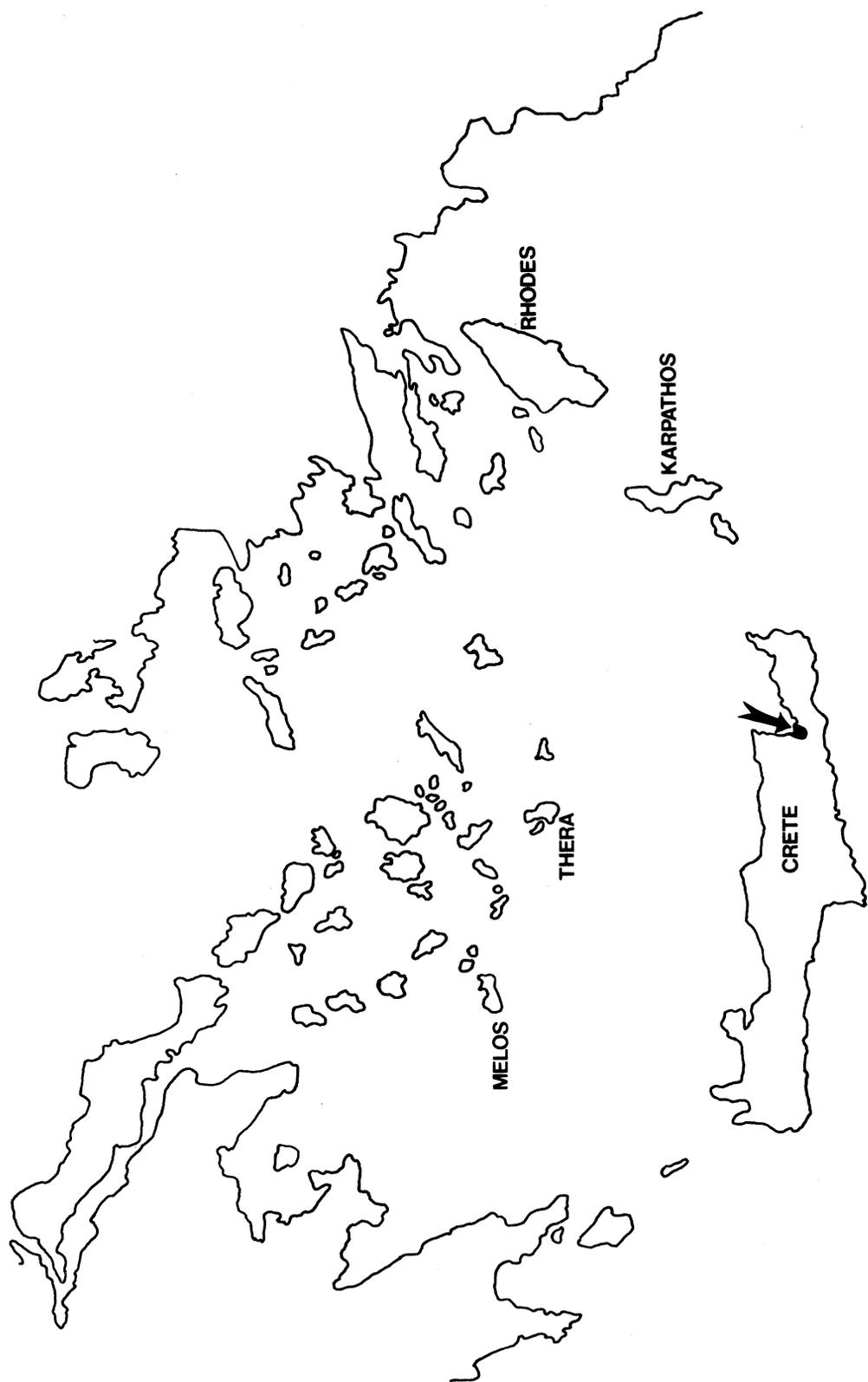


FIG. 1. Map of Crete and the Aegean showing the Bay of Mirabello and the survey area

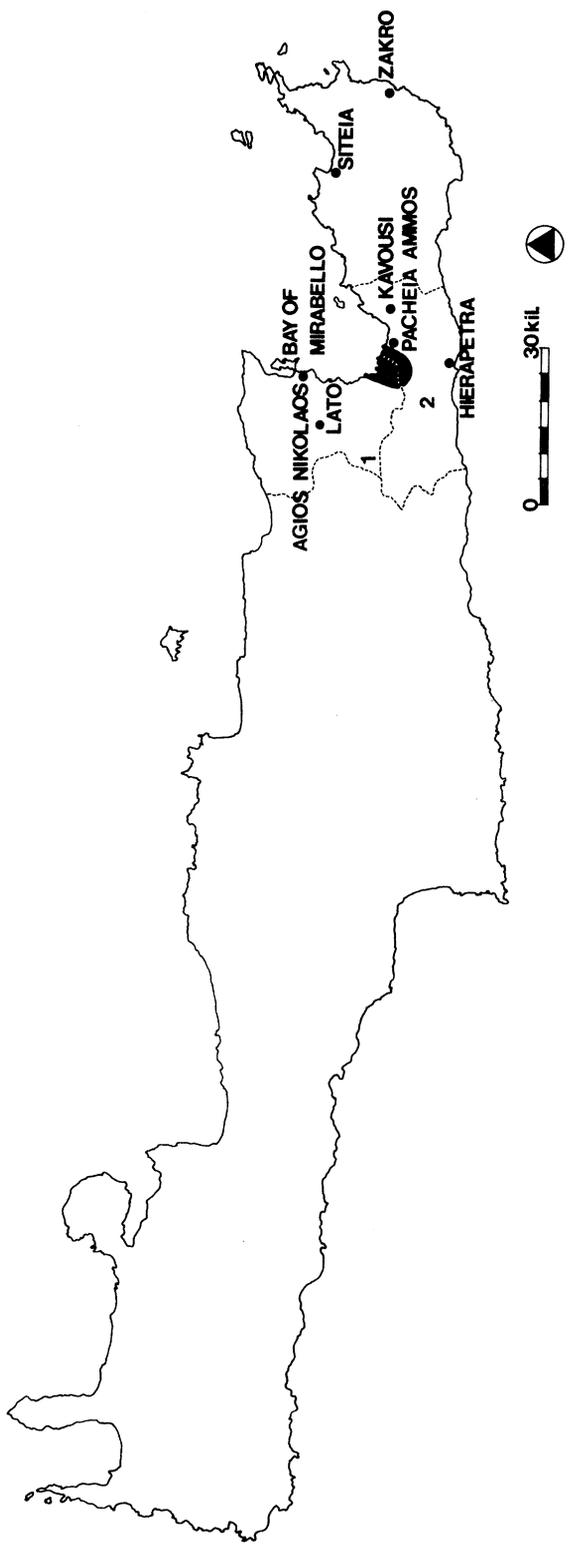


FIG. 2. Map of eastern Crete showing the Vrokastro survey area and modern and ancient towns in eastern Crete

systematic survey. In upland areas cultivable soils, though quite extensive, lie in scattered patches reached by steep stony paths. Only in the Istron River valley and the basins of Meseleri and Prina are more extensive, fertile soils accompanied by four permanent villages: Kalo Chorio, Pyrgos, Meseleri, and Prina.

Extending east from the flood plain of the Istron River the four promontories of Priniatikos Pyrgos (Pl. 76:c), Nisi Pandeimon (Pl. 76:d), Elias to Nisi (Pl. 76:e), and Vrionisi (Pl. 76:f) flank small beaches which today afford meager and insecure anchorages.<sup>4</sup> To some extent the varied terrain behind the coastal zone can be termed “average” Cretan countryside, if there can be such a thing in so complex and dramatic an island. The region lies between the great massif of the Lasithi Mountains and the relatively fertile Isthmus of Hierapetra. It has never been a focus of culture or the scene of documented great events. It produced no Minoan palace or powerful Greco-Roman city-state. Of the two Greco-Roman towns which lie within the study area, little more than their names survives. Preliminary results indicate the primarily rural or “intermediate” nature of the region during most periods: it was a border area, crossed by routes between more celebrated places.<sup>5</sup>

#### HISTORICAL BACKGROUND AND PREVIOUS FIELDWORK WITHIN THE AREA

Three local toponyms are traceable in ancient, Medieval, and modern sources: Minoa, Istron, and Oleros. The first, Minoa, is not uncommon in Crete and is occasionally given to locations with antiquities.<sup>6</sup> Istron and Oleros are two Greco-Roman towns which survive, respectively, as a coastal toponym and in the village name Meseleri (Messaoieros) (Fig. 3).<sup>7</sup>

Strabo and Ptolemy mention a town “Minoa” in their brief descriptions of the Isthmus of Hierapetra area.<sup>8</sup> Although there are a number of contradictory accounts concerning its location, it seems probable that Minoa was located within the study area. In 1586 a Venetian traveler, Honorio Belli, may have mistakenly located “Minoa” eighteen miles east (more probably *west*) of “Settia” (Sitia) at a place called “Paleocastro” and Istrona as six miles farther east.<sup>9</sup> Falkener, who republished Belli’s account, placed the site near the

<sup>4</sup> Agios Nikolaos is the port town of the region, located outside the survey area on the western side of the Bay of Mirabello. This is the site of ancient Kamara, the port of Lato. A long sandy beach and a small mole at Pacheia Ammos, a village east of the survey area, also provide some protection for small craft (Fig. 2).

<sup>5</sup> Two other published surveys undertaken in Crete can be described as comprising primarily rural areas, although environmentally they may be more uniform than the Bay of Mirabello region: Blackman and Branigan 1977, pp. 13–84 and Watrous 1982. The desirability of studying rural areas and the usefulness of intensive systematic survey in reconstructing lower levels of settlement hierarchy have been emphasized by other recent surveys: see Bintliff and Snodgrass 1985, p. 124.

<sup>6</sup> There are at least twenty-four locations called Minoa throughout the ancient world. See Vermeule 1972, pp. 115, 338.

<sup>7</sup> For a summary of the regional historical and archaeological evidence see Boyd 1904, pp. 7–26, esp. pp. 22–26.

<sup>8</sup> *πάλιw δ' ἐντεῦθεν εἰς στενωτέρου τοῦ προτέρου συμπίπτουσιν ἰσθμὸν αἱ ἡλιόνες περὶ ἐξήκοντα σταδίων, τὸν ἀπὸ Μινώας τῆν Λυκτίων εἰς Ἱεράπυτταν καὶ τὸ Λιβυκὸν πέλαγος*: Strabo 10.4.3; Ptolemy (*Geographia* 3.15.4) mentions toponyms in the area, including Minoa. See also *RE* XV, i, 1932, *s.v.* Minoa, col. 1858, no. 5 (Kroll); *RE* Suppl. VII, 1940, *s.v.* Istron, col. 303 (Kirsten).

<sup>9</sup> This potential error or reversal in direction is pointed out by Boyd (1904, p. 24). The account is summarized by Falkener (1854, pp. 14–15). Belli’s account is not cited directly by Falkener but was taken from *An Abstract of Honorio Belli’s History of Candia*, written by Apostolo Zeno (1680–1750).

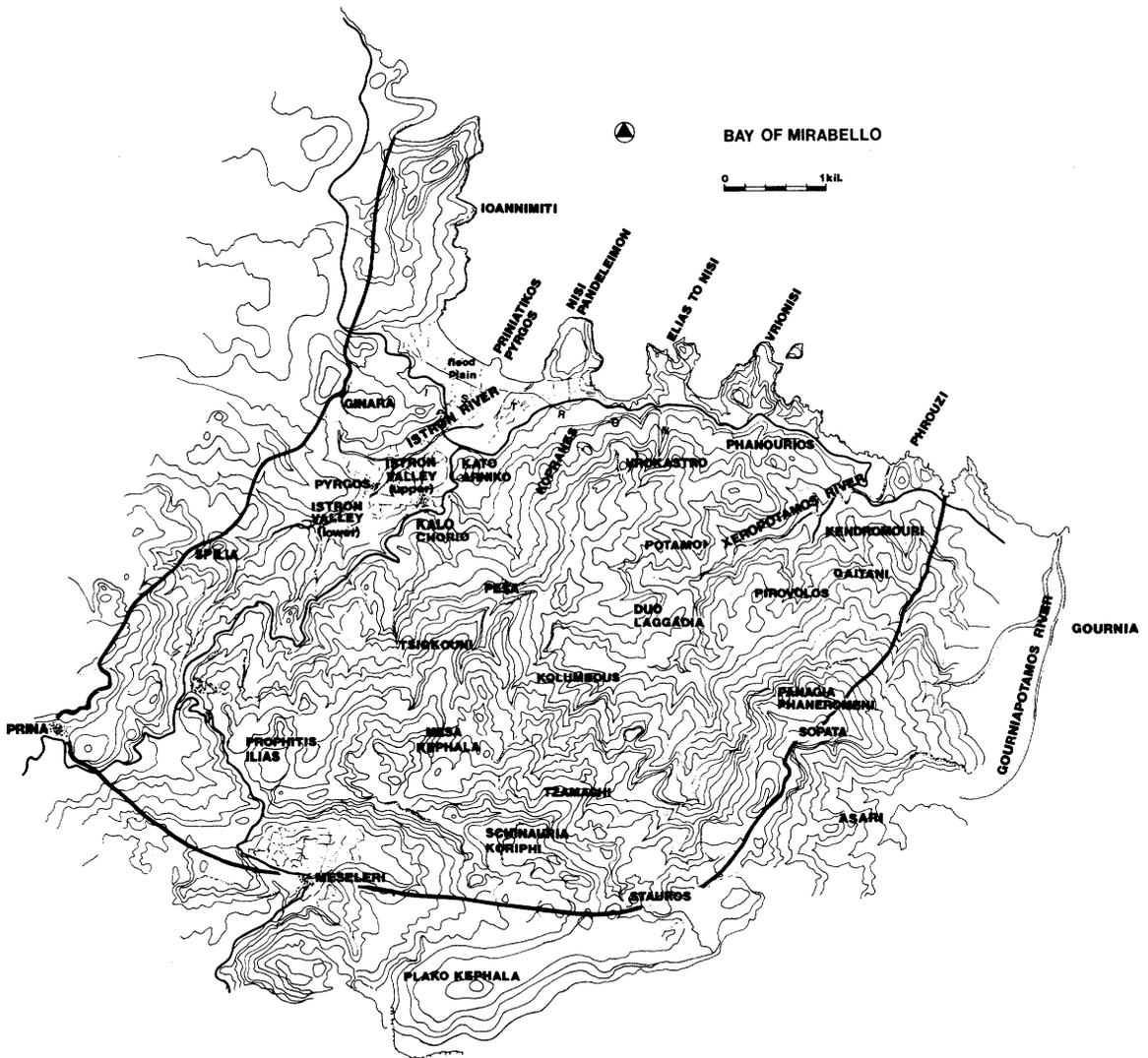


FIG. 3. Map of the Vrokastro survey area with village names and toponyms

mouth of the Istron River at “Katevati”, the landing place or port of Kalo Chorio.<sup>10</sup> Spratt, a 19th-century traveler, associated the name with “a small coastal point of land jutting out from the centre of a sandy bay . . .,” probably Priniatikos Pyrgos.<sup>11</sup> Other associations include the modern coastal village of Pacheia Ammos, just east of the survey area.<sup>12</sup>

<sup>10</sup> This is just southwest of the promontory of Nisi Pandeileimon: Falkener 1854, pp. 14–15 and Boyd 1904, p. 24. (Falkener’s map, however, places Minoa on the coastal promontory of Ioannimiti near the mouth of the Istron River, just west of Priniatikos Pyrgos.) Bursian follows Falkener in associating Minoa with Katevati, suggesting that Minoa may be the port of Istron (Bursian 1862–1872, p. 574 and note 1).

<sup>11</sup> Spratt 1865, p. 138. Spratt traveled across the survey region from Kalo Chorio/Pyrgos to Meseleri and then to Episkopi and describes the site of Minoa as having the place name of Istrona.

<sup>12</sup> Boyd 1904, p. 24; Sanders 1982, p. 17. This place name also occurs in an inscription (involving Lato and Olonte; see note 23 below) that mentions several toponyms within the area. Faure (1967, p. 96) associates it with Gournia.

The location of the ancient town of Istron is less problematic because the name survived into the 19th century as that of the modern village Kalo Chorio,<sup>13</sup> and it is still the general toponym for the area of coast from this village to the foot of Vrokastro (Fig. 3). Although its general location seems well fixed, the exact site of the ancient town is less certain. Literary sources suggest that the town was either coastal or set slightly inland. Among those who favor a location slightly inland are Buondelmonti, a Venetian traveler who passed through the area in the early 15th century,<sup>14</sup> and Falkener.<sup>15</sup> Belli favored a coastal location and claimed the town was completely submerged near the mouth of the “Noyaona” (Istron) River; Sanders and Pendlebury placed the city on the promontory Nisi Pandeimon.<sup>16</sup> The Vrokastro Survey has identified Greco-Roman remains near Kalo Chorio and Pyrgos and at many coastal locations, although the most extensive physical evidence for the Hellenistic town exists on Nisi Pandeimon.<sup>17</sup>

The general location of the ancient city “Oleros” is fairly well fixed in the vicinity of the modern village of Meseleri.<sup>18</sup> Sanders locates the ancient city north of the village.<sup>19</sup> A corruption of the name survived as Oleria, a possible Byzantine and Venetian settlement in the valley, east and northeast of the modern village.<sup>20</sup> It is also possible that Meseleri is the surviving village of a pair: Mesa Oleros and Exo Oleros.<sup>21</sup>

<sup>13</sup> Falkener 1854, p. 15: Kalo Chorio “within the memory of living men” was once called Nistrōna (Istron). Boyd reports that Kalo Chorio within her time was remembered by the name Istron or Nistrōna (εἰς τὴν Ἰστρώνα; Boyd 1904, p. 23). See also Stavrakis 1890, p. 74.

<sup>14</sup> Buondelmonti 1897, pp. 125–126. He traveled through Crete in 1415–1416 and associated “Ystrinam” with ruins which may be those of Roman and later date at a place in the upper Istron Valley called Marmara, just north of the village of Pyrgos; see also Boyd 1904, p. 23 and Mariani 1895, col. 282. See the Catalogue and “Settlement History” (pp. 332–333 below).

<sup>15</sup> Falkener 1854, pp. 14–15. Falkener associated Istron with the village of Kalo Chorio, perhaps because of Greco-Roman remains nearby. Davaras places Istron in the general area of Pyrgos, where he excavated a Roman kiln, found on the western branch of the Istron River west of Pyrgos: Davaras 1975, p. 110 and references cited in note 4. Boyd appears inclined to give the name to both the Katevati and the Kalo Chorio areas, although she noted that it was still used in her time for Katevati: Boyd 1904, p. 24.

<sup>16</sup> Falkener 1854, pp. 14–15; Sanders 1982, pp. 18, 142. Pendlebury, Money-Coutts, and Eccles 1932–1933, p. 95: “The Roman sherds continue around the bay. At Katavati, the landing-place of Kalochorio, they begin to be mixed with Hellenistic and Hellenic, and after a small ruined fort, of which only the rough foundation blocks remain in the fields called Palekmo, they merge into the big Greco-Roman site of the promontory of Nisi.”

<sup>17</sup> See Settlement History (p. 332 below) and the Catalogue.

<sup>18</sup> References to the town and its location occur in Halbherr 1890, cols. 639–642; Evans 1896, p. 463; Mariani 1895, cols. 318–319; Faure 1959, p. 184; Spanakis 1957, pp. 291, 300; *RE* XVII, ii, 1937, *s.v.* Oleros, cols. 2451–2453 (Kirsten); Spratt 1865, p. 134; Cornaro 1755, p. 118. Hoeck (1832, p. 425) associated the name Allaria, found on coins, with Meseleri.

<sup>19</sup> Sanders 1982, p. 138.

<sup>20</sup> Locals associate the name Oleria with an area just outside and northeast and east of the modern village, near the ruins of Venetian and Turkish houses. Fields and field walls here contain many pieces of carved marble, including column bases, drums, and blocks, and Greco-Roman and later pottery is scattered across these fields. The distribution of pottery extends westward, in the direction of the modern village. This area may be linked to information published by Sanders concerning the village (1982, p. 139): “Local tradition claims that there is another site under the village of Meseleri, but nothing is visible.”

<sup>21</sup> Such village pairs are common throughout Crete: Mesa and Exo Lakonia near Agios Nikolaos, Mesa and Exo Moulia on the road to Sitia, etc.

What is known of Istron and Oleros is derived from epigraphical evidence, including treaties and brief references to local cults, temples, and tombstones.<sup>22</sup> Treaties or fragments of treaties survive between the Hellenistic city-states of Lato and Hierapytna, between Lato and Olonte, and between the towns Istron and Teos.<sup>23</sup> One of the longest accounts is a 2nd-century B.C. treaty between Lato and Olonte (Olous) that records a number of place names within the eastern territory of Lato, some of which are thought to be within the Vrokastro region.<sup>24</sup> It is possible that the eastern boundary of Lato's territory within this period was set at or near the Xeropotamos River (Fig. 3), and that the southern (and disputed) boundary between Lato and Hierapytna was in or near the Meseleri basin.<sup>25</sup>

Early in this century, fieldwork including excavation took place within the Vrokastro region and in contiguous areas. Excavated sites within the study area include Priniatikos Pyrgos (PP 1) and Vrokastro town (VK 1) and its accompanying burials;<sup>26</sup> Roman buildings were also identified near Kalo Chorio and Pyrgos.<sup>27</sup> The excavated Minoan settlement

<sup>22</sup> For references to treaties, festivals, temples, and local officials of Istron, see *IC I* viii, 4b, line 14, and p. 58 (an inscription mentioning a temple of Ares and Aphrodite, perhaps at Istron); *IC I* xiv, 1, 2 (the temple of Athena Polias of Istron mentioned in a treaty between Teos and Istron and an inscription describing a temple of Ares and Aphrodite found in a house in the village of Pyrgos); *IC I* xiv, 3–6 (for other inscriptions, including tombstones from Katevati and the village of Kalo Chorio). For epigraphical evidence related to both towns: *IC III* v, 1, 2 (Oleros); Halbherr 1890, cols. 639–642 (Oleros), cols. 641–644 (Istron); Willetts 1955, pp. 133, 142, 144, 198, 237; Willetts 1962, pp. 281, 284, 286. A summation of historical and epigraphical sources for the two towns can be found in *RE IX*, ii, 1916, *s.v.* Istron, col. 2267 (Bürchner); *RE Suppl. VII*, 1940, *s.v.* Istron, cols. 301–310 (Kirsten); and *RE XVII*, ii, 1937, *s.v.* Oleros, cols. 2451–2453 (Kirsten).

<sup>23</sup> Teos treaty: *IC I* xiv, 1. The Eumenes Treaty of 183 B.C. provides a mention of the town of Istron: Sanders 1982, p. 11; *CIG II* xiv, 3, no. 3048. Istron was pro-Macedonian, as was Lato: see Willetts 1955, p. 237. The sideropetra stele recording a treaty with Olonte (dated *ca.* 111–110 B.C.) found at the sanctuary of Aphrodite on Mount Oxa, near Olonte, records the extent of Lato's territory: see Van Effenterre and Bougrat 1969; Faure 1967; and note 24 below.

<sup>24</sup> Van Effenterre and Bougrat 1969, p. 38, note 47. Faure (1967, pp. 94–112) has published a related fragment (his date 113/112 B.C.). Faure attempts to match the place names of the inscription, beginning with the river *Κυμαῖος*, with topographical features and current place names within the Vrokastro region. Van Effenterre and Bougrat assume that the place names were possibly spaced at somewhat regular intervals along the frontier between the two states. Both interpretations agree that *Βένκασος* is the area of Mount Sopata (Fig. 3) and extend the eastern boundary of Lato to the Xeropotamos River.

<sup>25</sup> Van Effenterre and Bougrat 1969, p. 38, note 47: the Xeropotamos is identified as the *Κυμαῖος* [River] of this inscription. A Lato-Hierapytna inscription mentions an attempt by Hierapytna to take over some of the highland territory of Lato near Benkasos (possibly Mount Sopata) that was eventually ceded back to Lato (*ibid.*, pp. 38–39). Sanders also suggests (1982, p. 11) that Hierapytna at one point “took over” Istron, as well as Praisos. The name of a *protokosmos* of Lato mentioned in an inscription of Istron (*IC I* xiv, 2) suggests that Istron may have been subject to Lato, at least during certain periods.

<sup>26</sup> Priniatikos Pyrgos: Hall 1914, pp. 84–85, fig. 46; Hall 1915, p. 36; Betancourt 1983, pp. 15–21; Betancourt 1978, pp. 381–387. Vrokastro town: see note 1 above. Toponyms have been used to label sites, for example, “PP” for the Priniatikos Pyrgos area and “NP” for the coastal promontory of Nisi Pandeileimon and fields and beaches contiguous to this promontory, “SP” for Spilia in the lower Istron Valley, and “KK” for the Kalo Chorio area.

<sup>27</sup> Just north of Pyrgos, at a place called “Marmara”, “Helleniko”, or “Anousa”: Boyd 1904, pp. 13–14; Buondelmonti 1897, p. 125. Mariani (1895, cols. 281–282) saw the marble fragments at Marmara and noted a cement foundation (described as having two rooms), as well as fragments of architectural decoration built into houses and a church within the village of Pyrgos. Some architectural fragments remain in the area (see the Catalogue, PR 1, and Settlement History, p. 333 below). Sanders (1982, pp. 18, 142) suggests a coffered

of Gournia is slightly east of the eastern boundary of the survey region, and an extensive Minoan cemetery at Pacheia Ammos lies only two kilometers beyond.<sup>28</sup> Recent work includes excavation of a Roman kiln west of Pyrgos, as well as excavation of accidentally discovered local tombs and pottery.<sup>29</sup> The Isthmus of Hierapetra region has also become a renewed focus of exploration within the last decade; excavations and surveys undertaken at Kavousi, Vasilike, Pseira, and Mochlos will provide a rich comparative data base.<sup>30</sup>

## PROJECT METHODS

### *The Topographical Zones* (Figs. 4, 5, Pls. 3a–f, 4a–4b)

Reconstruction and integration of the environmental and archaeological landscapes are essential to any survey project whose goal is to understand better the processes of settlement occupation and abandonment. Fundamental to the understanding of modern and recent settlement and land use is a detailed record of climate, native plant communities, and water and soil conditions.<sup>31</sup> These data can then provide a base line against which to form hypotheses or create models of past environments.<sup>32</sup>

In 1986 two long transects were walked across the survey area from north-northeast to south-southwest, and the area was explored by foot and car. Following this reconnaissance, the study area was divided into thirteen zones based on landscape features such as geology, slope, elevation, and topography (Figs. 4, 5). These zones were established for two reasons: (1) to implement a systematic, stratified sample<sup>33</sup> in varied, dissected terrain, and (2) to

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building or villa at Elleniko (probably this site). The inscription recording the Istron-Teos treaty mentions a temple of Athena Polias at Istron, and Marmara may be the site of that temple (*IC* I xiv, 1, line 42; Willetts 1955, p. 133) or possibly the site of the temple of Ares and Aphrodite (*IC* I viii, 4b, line 14; *RE* Suppl. VII, 1940, s.v. Istron, col. 303 [Kirsten]).

<sup>28</sup> Boyd 1904; Boyd 1905, pp. 177–190; Hawes *et al.* 1908; Seager 1916.

<sup>29</sup> Davaras 1975, p. 110; Alexiou (1967, p. 440; also 1963, p. 405 for Goula burial) excavated a LM IIIB tomb at Goula near Kalo Chorio. Platon (1959, p. 388) removed three pots with Hellenistic decoration found in the hollow side of an old well at Katevati (contemporary with the settlement on Nisi Pandeileimon); these were given to the museum in Hierapetra. For a Greek tombstone found at Katevati see *IC* I xiv, 4.

<sup>30</sup> Kavousi: Gesell, Day, and Coulson 1983; Gesell, Day, and Coulson 1985; Day, Coulson, and Gesell 1986; Gesell, Day, and Coulson 1988. Pseira: Betancourt and Davaras 1986; Betancourt and Davaras 1988. Vasilike: Zois 1976. Mochlos: Soles 1990, pp. 302–303.

<sup>31</sup> Part of the ecological study combined on-foot reconnaissance of the coastal and inland regions with use of a vehicle. Plants and soils were collected for analysis. Aerial and satellite photographs are being used to study the density and type of plant communities. Although several studies of Cretan vegetation are available (Zohary and Orshan 1965; Gradstein and Smittenberg 1977; Barbero and Quezel 1980), detailed investigations of small areas are rare.

<sup>32</sup> Methods and sources for gathering data include (1) recording present plant communities and “relic” or surviving vegetation (especially on cliffs) which has, at least in part, escaped grazing, burning, and wood-cutting; (2) recording Byzantine, Venetian, and Turkish fieldhouses, limekilns, animal folds, threshing floors (*alonia*), and timber used in village construction; (3) assessing written records and conducting interviews to establish what crops are grown, consumed, and sold; (4) recording soil, sediment, and water resources; (5) spatial analysis of regional herding.

<sup>33</sup> The Cambridge/Bradford survey is also described as systematic and stratified, although in this instance one area was chosen for survey that was considered representative of the whole of Boiotia in terms of geomorphology: Bintliff and Snodgrass 1985, p. 124. The Melos survey can be described, by contrast, as systematic random; 1-kilometer-wide strips were walked, and 20 percent of the island was sampled: Wagstaff and Cherry 1982, p. 137.

determine if settlement location can be related to specific environments. Given the overall stability of the Cretan landscape during the Holocene, it is assumed that these zones will have maintained their essential differences throughout human history, although changes have occurred in vegetation, land use, and to some extent in geomorphology.

### *Transects*

In 1987 each of the zones was divided into units or strips 250 meters wide, oriented north-northeast–south-southwest, and every other strip was then subdivided into five transects 50 meters wide.<sup>34</sup> In this ongoing project, every other transect in alternating units is walked by two to four individuals placed at evenly spaced intervals, i.e., three to four walking lines per transect (see Fig. 6). At 50-meter intervals ecological and archaeological observations are made on recording forms, and sherd counts are taken. Every diagnostic artifact observed is collected and labeled by zone number, unit number, transect number, line number, and meter number (i.e., Zone 11: Unit 1: Transect 4: Line 1, Meter 4).<sup>35</sup> These narrow transects insure recovery of all large sites within each unit walked, and enough small to medium-sized sites to reconstruct settlement hierarchies.<sup>36</sup> The systematic, simultaneous recording of land use, soil conditions, and plant communities as the transects are walked provides the zonal environmental framework.

### *Sites and Scatters or “Off-Site” Material*

The term “site” is used here by convention to denote a collection of artifacts: usually pottery, sometimes accompanied by chipped and ground stone, metal, glass, and architectural remains.<sup>37</sup> Site dimensions are determined by the extent of pottery dispersal, which can be affected or distorted by degree of slope or recent disturbance (for example, bulldozing) and can vary in relation to many factors, including function, from a few square meters involving one possible structure (fieldhouse, storage room, tomb, guard or watch station, sheepfold, shrine, etc.) to a settlement, which in the Vrokastro area may have a maximum dimension of one-half kilometer.<sup>38</sup>

A “scatter” of pottery or “off-site” material is less easily identified and defined in the field; generally it is an area of low sherd density unaccompanied by architectural remains (except terraces) and may be small in extent.<sup>39</sup> A scatter may be the result of breakage of

<sup>34</sup> This orientation approximates that of the long transects of 1986. For the progress of the survey through 1989, see note 74 below.

<sup>35</sup> Heavy distributions of artifacts (“sites”) are mapped in the field and later recorded; see Site Recording (pp. 304–306 below). Artifacts are stored for future analyses. We would like to thank the Directors of the Kavousi Excavation for providing space within their storage facility for this material.

<sup>36</sup> Bintliff and Snodgrass (1985, p. 130) emphasize that widely spaced transects can often completely miss even large sites.

<sup>37</sup> Murray and Kardulias 1986, p. 22: “. . . concentrations of cultural materials (called ‘sites’) . . .”; Van Andel and Runnels 1987a, p. 33: “. . . any location where a concentration of cultural materials with a recognizable boundary was found”; also Van Andel and Runnels 1987b, p. 307, in which a “primary site” is described as one having artifacts brought up from buried contexts.

<sup>38</sup> For example, a settlement on the promontory Nisi Pandeimon (NP 1) and the settlement of Oleros in the Meseleri Valley (OL 1; see the Catalogue below).

<sup>39</sup> Also related to sherd density and distribution are factors such as erosion and extent of “traffic” or movement of herds or people across the site. Another potentially complicating element in site or scatter identification



FIG. 4. Map of the Vrokastro survey area and the zones

vessels (during transport, hunting, fieldwork, or manuring activities) or downwash from a site that could not be located. Distinguishing small sites from scatters is often difficult (or not feasible) and requires detailed knowledge of the area, its routes, and settlement locations. When scatters are identified, sherd densities are then taken, the areal extent of distribution is recorded, and potential relationships to routes or nearby sites are noted.

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(though not evidenced in the Vrokastro area) is the practice of manuring or spreading of top soil collected from town sites; see Wilkinson 1982. Testing of potential “non-sites” or small scatters in order to determine the potential subsurface existence of architectural remains is discussed in Powell and Klesert 1980.

Zone No.	Description	Topography	Elevation	Slope	Geology	Vegetation	Land Use	Km <sup>2</sup>
1	Coastal strip area within 0.5 kilometers of the sea Pls. 75:a, 76:c-f	beach, peninsulas, floodplain, coastal slopes	0 to 260 m.	1 to 24	alluvium, clay, gravel, marl, limestone, greenstone conglomerate, granodiorite	juniper woods, lentisk, some olive, carob, thyme, spiny broom; riverine wood of plane and cane	urban, recreation, tourism; 60-70% cultivation: olives, irrigated gardens, thermokopia, abandoned terraces	5.5
2	Istron River valley Pl. 75:b	valley bottom and slopes, numerous springs	7 to 90 m.	2 to 18	alluvium, marl	juniper, lentisk, carob with some prickly oak; some pine invasion	irrigated gardens, carobs, olives; tourism; urban	1.5
3	Xeropotamos River valley Pl. 75:f	valley bottom and slopes	20 to 180 m.	3 to 26	limestone conglomerate, marl, granodiorite, crys. limestone, river gravels and boulders	juniper woods, olive, carob, lentisk, some phillyrea and prickly oak; garigue of thyme, ebonus, thorny burnet; pine invasion	50% cultivated with recent bulldozed terraces, mostly olive; 50% excultivation; some browsing and woodcutting	1.5
4	Vrokastro plateau/basin Pl. 76:a	plateau, hills, and lesser ravines, at least 2 springs	100 to 300 m.	12 to 24	marble, granodiorite, greenstone conglomerate, marl, sandstone, crys. limestone	juniper woods with prickly oak, olive, carob; ebonus, thyme, spiny broom; pine invasion	new olive terraces, carobs, almonds; extensive bulldozing, well browsed, woodcutting	3.7
5	Middle Range plateau Pl. 77:a	very dissected ridge tops, 1 spring	300 to 700 m.	15 to 23	marl, crys. limestone, greenstone conglomerate, limestone breccio-conglomerate	mostly garigue of thyme, cistus, thorny burnet; scattered olives, carobs; pine invasion	excultivated terraces, abandoned fieldhouses; woodcutting (pollarded prickly oaks)	1.3
6	Steep Upper slopes Pl. 77:b	very dissected steep slopes	500 to 600 m.	15	well cemented marl, greenstone conglomerate	some prickly oak, phillyrea, lentisk, carob; mostly garigue of heather, few pines and ilexes	no cultivation, no evidence of excultivation; much browsing and burning	1.1
7	Tzamachi Terrace Pl. 77:c	gentle slopes and ridge tops, 3 springs	350 to 570 m.	15	alluvium, greenstone conglomerate, well cemented marls	juniper, prickly oak, lentisk, much spiny broom, thyme	cultivated vines, grain, olives; fieldhouses, TF's, many abandoned < 50 years; much browsing and burning	3.5
8	Schinauria plateau Pl. 77:d	plateau, slopes, and lesser ravines, at least 3 springs	600 to 698 m.		crys. limestone, marl, greenstone, conglomerate, karst hollows with alluvium	prickly oak, lentisk, carob, olive, some pear and pine; garigue of spiny broom, ebonus, thyme, heather	cultivated olives, grain, some vines; beekeeping, used and abandoned TF, terraces, fieldhouses, enclosures	2.2
9	Aphendi Christos Valley Pl. 77:e	steep slopes and ravine, 2 springs	25 to 240 m.	18 to 28	marl, crys. limestone, greenstone conglomerate, limestone breccio-conglomerate, granite, granodiorite	mostly garigue of phlomis and spiny broom; maquis in ravine bottom, myrtle, prickly oak smilax; some pine	much recent bulldozing; cultivated olives and almonds	.75
10	Steep ravines and cliffs Pl. 77:f	cliffs, gorges, and steep slopes, dripping cliffs, waterfalls	100 to 500 m.	23 to 110	crys. limestone, marble, limestone breccio-conglomerate, marl	riverine wood of oleander, cane, myrtle, plane, smilax, and bramble; juniper woods with prickly oak, olive, lentisk, spiny broom, phillyrea; much pine invasion	beekeeping, woodcutting; some browsing; little or no burning	4.7
11	Slopes of the Istron River valley Pl. 78:a	slopes and lesser ravines	40 to 200 m.	11 to 20	greenstone conglomerate, limestone breccio-conglomerate	juniper maquis with olive, lentisk, phillyrea, and prickly oak	cultivated olive terraces	3
12	Prina Pass Pl. 78:b	hills and slopes around the pass into the Prina and Meseleri basins	240 to 417 m.	12 to 22	marl, sandstone, crys. limestone	prickly oak, lentisk, carob, spiny broom; much pine invasion	cultivated olives and grain; used and abandoned terraces	3.2
13	Meseleri basin Pl. 75:c	mountain basin and slopes	340 to 420 m.	11 to 20	alluvium, crys. limestone, marl	pinewoods, prickly oak, phillyrea, cistus, heather	cultivated olives, grain and some vines; used and abandoned terraces, enclosures; beekeeping	2.5

FIG. 5. Descriptive chart of ecozones

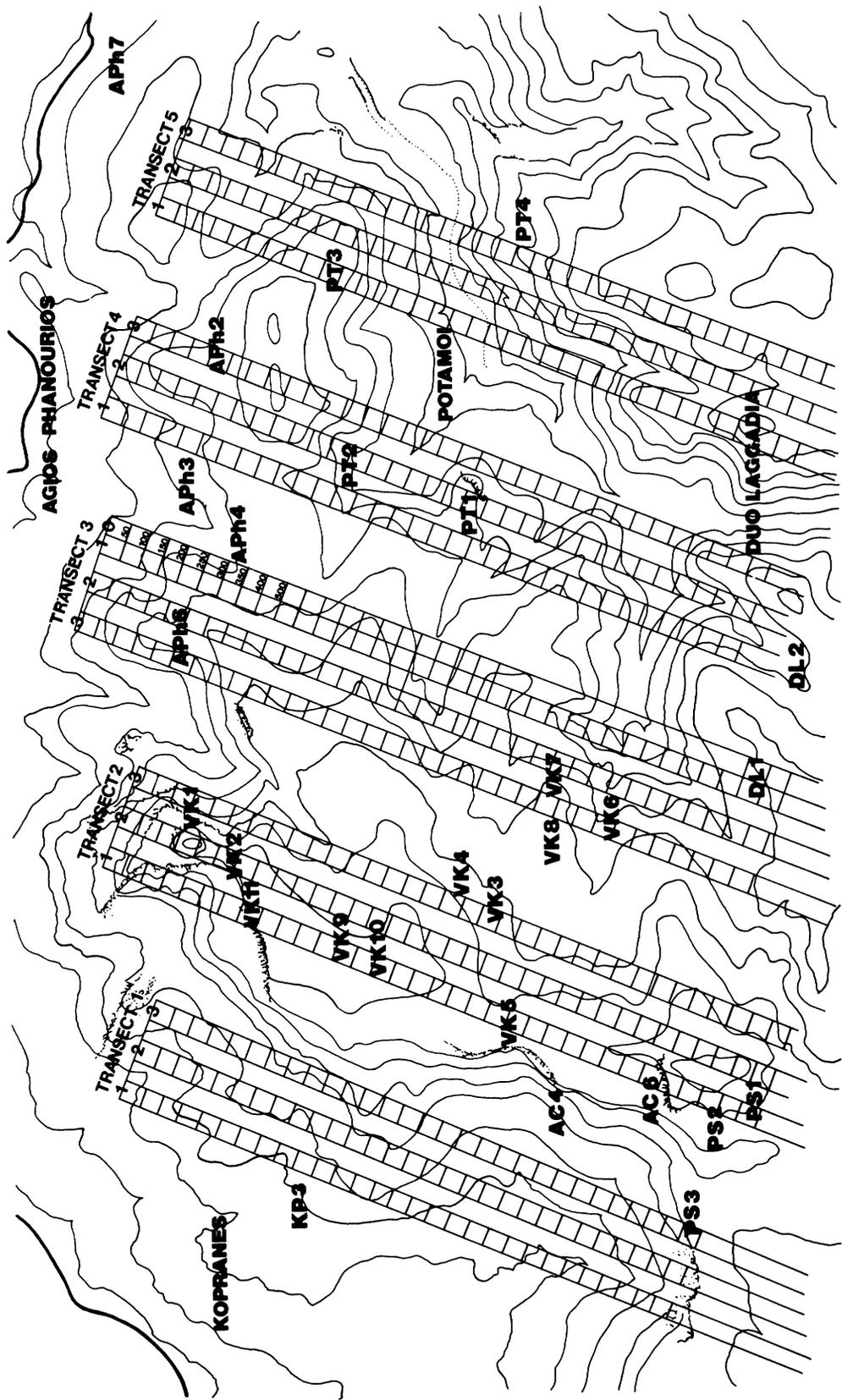


FIG. 6. Gridded axial transects established for pottery collection at Agios Phanourios 2 (Aph 2)

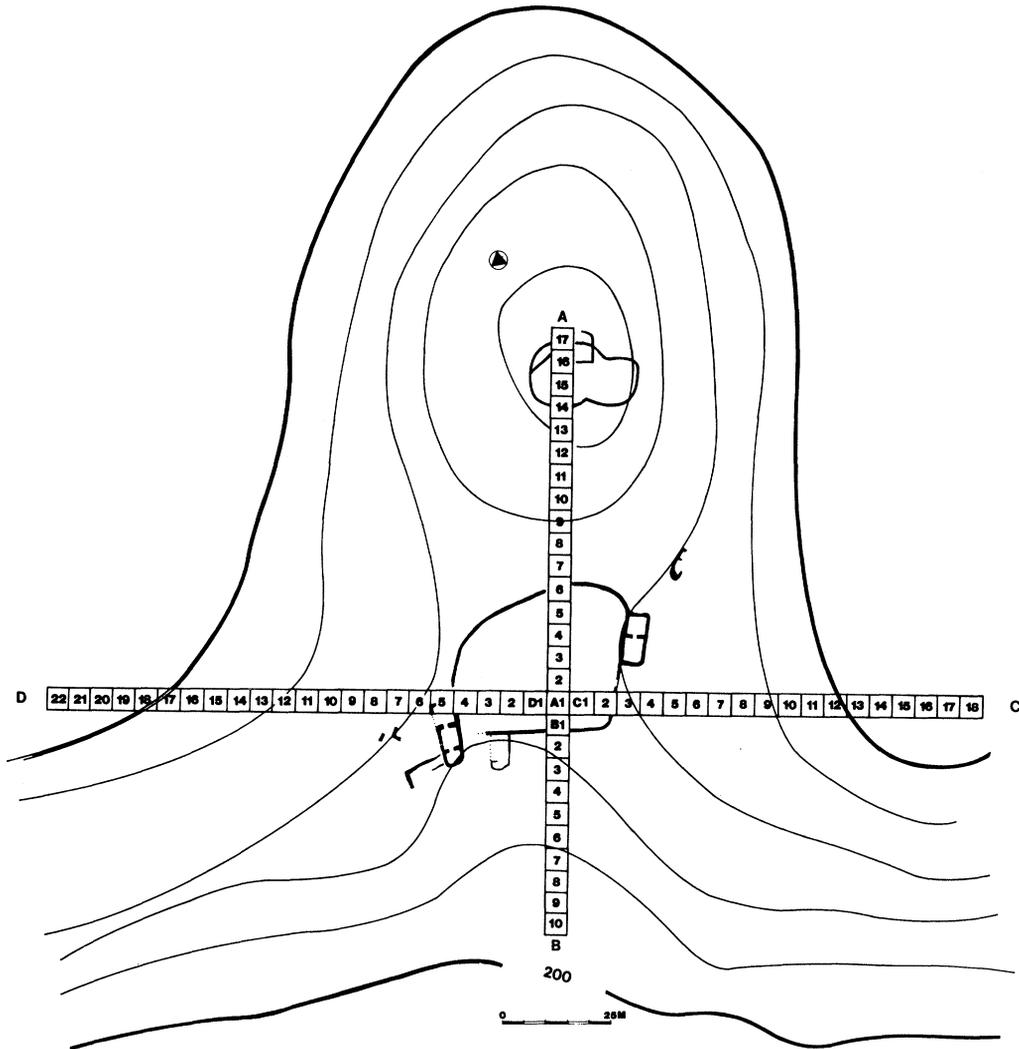


FIG. 7. Transects walked in Zone 4 near Agios Phanourios

### *Site Recording*

Locations classified as sites are recorded in detail. A team of three to four sets up an overall grid, or several transects divided into standard units (generally 5 by 5 meters),<sup>40</sup> or collects pottery according to natural divisions such as terraces (Fig. 7). Supplemental “grabs” or collections of diagnostic sherds are also taken (for example, in the quadrants of an axial grid) to insure a more complete record in terms of chronological phases and variety

<sup>40</sup> This is an optimum size for collection units at many small- to medium-sized sites within the Vrokastro region; it is small enough to be staked with colored flags rather than framed by string (the latter is a more time-consuming procedure).

of pottery shapes recovered. The collection procedure chosen depends on vegetation density, topography, site dimensions, and site disturbance.<sup>41</sup>

Artifacts from alternate units are collected, counted, weighed, briefly described, photographed, and, if possible, dated.<sup>42</sup> Vegetation and visibility, slope, and soil conditions are noted for every numbered unit/square within the grid from which pottery is collected; sherd densities can then be related to these factors. The geology, geomorphology, plant communities, crops cultivated, modern and ancient construction, water resources, and soil conditions of each site are also described on site-recording forms.<sup>43</sup>

The objectives of these site-recording procedures include establishing dimensions of the pottery distribution and collecting sufficient pottery to establish chronological phases.<sup>44</sup> Using an overall grid, it is possible, depending on site disturbance, to detect specific functional patterns (for example, the presence of amphoras and pithoi in one area may indicate storage) and also (though less probable) to separate areas belonging to different chronological periods within a larger, multi-period site.

#### *Synthesis of Data and Comparisons to Other Surveys*

Assessments of these data will be made in regard to the following factors: (1) amount or density of material for each chronological period; (2) site size for each chronological period; (3) site function; (4) environmental factors influencing site location; (5) social factors influencing site location; (6) overall site pattern per chronological period (nucleated/dispersed, inland/coastal).

The settlement systems of the Vrokastro region will be compared to those of other surveys in Crete. Differences in field and recording procedures, however, may permit only general comparisons with those surveys which were not conducted in a similar systematic fashion.<sup>45</sup> The process for comparing data will include (1) assessment of the intensity of the surveys (i.e., the number of people involved, area covered, and time spent in the field); (2) assessment of the different inherent biases or directions in other survey designs (for example, the likelihood of these surveys finding small- to medium-sized sites and whether the survey recovered data primarily from one period or from all periods); (3) assessment of the different recording systems and determination of what observations were consistently made. Points (1) and (2) may allow a correction factor to be calculated for site densities and

<sup>41</sup> For a lengthy discussion of the most efficient types of recording techniques, especially in conjunction with a large staff, see Bintliff and Snodgrass 1985, pp. 131–135 and Whallon 1979, pp. 288–399. See also Nance 1981.

<sup>42</sup> The broad chronological categories initially established during field collection must be refined by pottery specialists. In 1988 partial discard of undiagnostic pottery collected at sites was due to limited storage space; during the projected second year of site recording (1990), all artifacts can be retained in a new facility.

<sup>43</sup> Interviews with local inhabitants are also helpful in determining toponyms, ownership, land use, and the history of modern, Turkish, and earlier construction.

<sup>44</sup> A comparison of excavation results with intensive surface collections at the same sites suggests that these surface collections represent most periods of occupation: Whallon 1979, pp. 288–399; results cited by Van Andel and Runnels (1987b, p. 308).

<sup>45</sup> The Chania Survey (Moody 1987), Western Mesara Survey Project (Watrous, forthcoming in *Hesperia*), Kavousi Survey (Haggis and Nowicki, forthcoming in *Hesperia*), and the Sphakia Survey (Nixon, Moody, and Rackham 1988) will be comparable.

chronological period. Point (3) should indicate what types of data are directly comparable (artifacts, architecture, environment, etc.). In general, comparisons may be limited to the upper levels of settlement hierarchy.

## THE VROKASTRO LANDSCAPE TODAY

### *Climate*

The modern climate of the Vrokastro region is typically “Mediterranean” with dry, hot summers and warm, wet winters. Rainfall varies considerably from year to year (Fig. 8); the weather scheme includes droughts and occasional flash floods.<sup>46</sup> Such floods can have a severe, though usually short-term, impact on crops, landforms, and manmade features such as terraces. Localized flooding in 1986 deposited deep new sediments in some parts of the Istron River flood plain and valley (Fig. 3) but scoured other parts down to bedrock. Ancient walls and pottery previously buried were locally exposed. Although it is probably safe to say that similar sequences of erosion and deposition have been part of the local ecosystem for millennia, we cannot claim that they happen with any regularity.

Searches for suitable fossil-pollen sites within the survey area have thus far been disappointing. One site identified was cored, but preliminary analysis of the sediments found little pollen and that poorly preserved.<sup>47</sup> The past climate of the Vrokastro region must therefore be extrapolated from results of other pollen studies, taking into account local differences in the modern climate.

Recent studies from elsewhere in Crete and from other Mediterranean countries show that the climate as late as the Early Bronze Age was distinctly less arid than it is now; the deciduous trees of northern Europe then extended much farther into Greece, and some, such as the lime (*Tilia*), reached even Crete.<sup>48</sup>

Since the end of the Early Bronze Age there have been considerable, but lesser, shifts of climate, but it is not yet possible to give a detailed picture. Nevertheless, it seems likely that the Middle and Late Bronze Age climate of Crete was less evaporative than it is today, with cooler summers and warmer winters.<sup>49</sup> Such a climatic scheme may have existed in the Vrokastro region as well.

At present no published pollen diagrams from Crete cover the period from the end of the Late Bronze Age to the present.<sup>50</sup> It is therefore difficult to say more than that the

<sup>46</sup> The most recent flood occurred in 1986 and was witnessed by Moody and Rackham; previous heavy rain caused flooding in the 1940’s (observable in World War II German aerial photographs). An earlier flood in this century (1913) in Pacheia Ammos revealed a cemetery of Minoan pithos burials; it was mentioned by Seager (1916, p. 8).

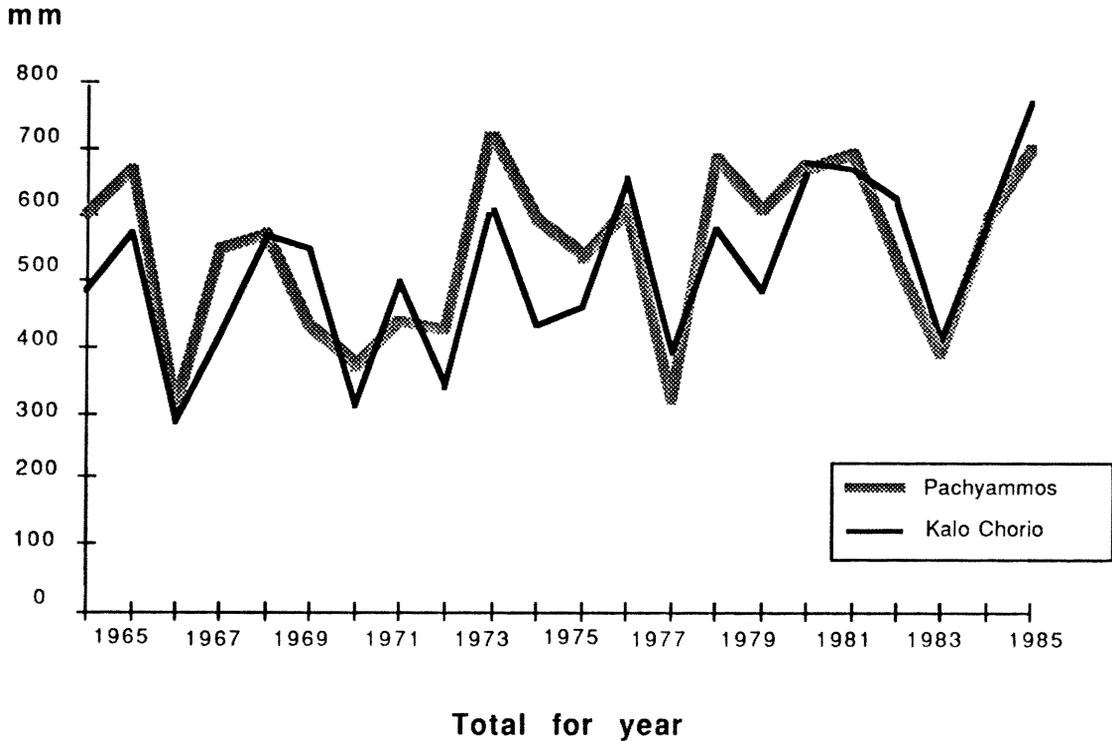
<sup>47</sup> This analysis was done by James Huber at the University of Minnesota Archaeometry Laboratory in Duluth, under the direction of Dr. George Rapp.

<sup>48</sup> For the evidence see Moody 1987, pp. 77–128, esp. pp. 93, 127; Bottema 1980; Bottema 1982.

<sup>49</sup> Moody 1987, pp. 77–128.

<sup>50</sup> Forthcoming analysis of a core from Kallikrati in western Crete, which dates from the Roman Empire to the Venetian period, will help fill this gap. This is one of five cores from Crete collected by Moody, Rackham, Atherden, Eliot Lax, and Costas Tsiavos in 1985. The identifications have been made by Jean Hall under the supervision of Atherden; funding for the analyses was provided by the European Economic Community Project “Crete and the Aegean Islands: Effects of Changing Climate on the Environment,” directed by A. T. Grove and Nikolas S. Margaritis.

### Rainfall in the Vrokastro Region 1964 to 1985\*



\* statistics are courtesy the Metrological Bureau of the Ministry of Agriculture, Herakleion. The year has been calculated from September to August, such that 1964 = September 1963 to August 1964

FIG. 8. Chart of rainfall

climate probably fluctuated but to a lesser degree than during the Bronze Age. There does seem to be a relationship between minor glacial advances in Europe and periods of extreme weather in the Aegean, but the details of this relationship and its historic and prehistoric ramifications require further study.<sup>51</sup>

#### *Geology and Geomorphology*

In the survey region, as in most of Crete, the mountains and the sea have been largely stable since the earliest phases of human settlement. The main topography was formed in the Pleistocene or earlier (six hundred thousand-plus years ago). During human history, soil has crept from one place to another; the Istron River valley, flood plain, and other areas

<sup>51</sup> Goudie 1977; Lamb 1982; Bottema 1980; Bottema 1982. The current research of Dr. Jean Grove (Geology Department, University of Cambridge) and several colleagues, who are compiling accounts of climatic phenomena from around the Mediterranean at times of glacial advance and retreat during the Holocene, will no doubt advance our understanding of this relationship.

have been subject to floods, and the coast has sunk slightly into the sea (see below). Important though these changes are locally, the present physical landscape would certainly be recognizable to an inhabitant from Neolithic times.

There are six broad geomorphic units and two main drainage systems in the survey area. The geomorphic units are the coast strip and promontories, the Istron River valley and flood plain, the Prina basin, the Meseleri basin, the Schinauria massif, and the hills and ridges south of Vrokastro (the Vrokastro basin). The drainage systems are the Istron River catchment (the survey area contains only part of this system) and the entire Xeropotamos River catchment. Parts of the Istron River contain water all year round, but the Xeropotamos, as its name implies, is usually dry. Only during the 1986 flood was water seen in this riverbed.

Six bedrocks dominate the area: crystalline limestones, granodiorites, marls, sandstones, greenstone conglomerates, and limestone breccio-conglomerates.<sup>52</sup> The crystalline limestones are of Upper Cretaceous date (about one hundred million years ago) and are considered part of a tectonic nappe, a vast plate of rock, hundreds of square kilometers in extent, that slid into place by the beginning of the Eocene (about fifty million years ago). Later in the Eocene, intrusions of granites and granodiorites caused these limestones to become locally domed and metamorphosed into medium-crystalline white marbles. There is no evidence that these marbles were ever quarried.

These hard-rock deposits were then overlain by conglomerates, marls, clays, and sandstones during the Mio-Pliocene (or Neogene Period, twenty-five to ten million years ago) submergence of the island. The contrasts in porosity and permeability of these deposits have given rise to numerous small springs and seeps throughout the study area. The clay beds, which occur in the Neogene series of marls, conglomerates, and sandstones, were exploited until recently by local potters, and the sandstones probably were used in building construction.<sup>53</sup>

The greenstone conglomerate, which forms the base of the Neogene series, includes pebbles of limestone, dolomites, phyllites, quartzites, cherts, and greenstone, transported by water and set in a marly cement. This is the most common formation in the survey area and is the only local source of phyllite, quartzite, and chert, stones that are often used to make lids and tools. The limestone conglomerates, which form the middle of the Neogene series, are mainly composed of limestone pebbles set in a marly cement, while the limestone breccio-conglomerates, which form the top of the series, are cemented with a reddish carbonate material.

With the reemergence of the island in the upper Pliocene (less than ten million years ago), the soft Neogene deposits began to erode. The flat-topped hills and ridges, which are a feature of the Vrokastro basin, are probably the remains of wave-cut terraces formed as the sea retreated. This rugged and dissected hinterland is largely composed of Neogene marls,

<sup>52</sup> See the Institute for Geologic and Mineralogical Research (IGME) maps, Agios Nikolaos Sheet (1987) and Hierapetra Sheet (1959), for detailed depictions.

<sup>53</sup> For local clay fabrics see: Matson 1984, pp. 53-54; Myer 1984. The place name "Pylos" also exists on the south side of the promontory Elias to Nisi. For the building stone see Hayden 1983b, p. 374.

sandstones, clays, and conglomerates and is the result of millennia of gullying. An important feature of the local Neogene layer is its strong cementation, which allows it to form the narrow, steep-sided ravines so characteristic of the study area. Slopes in this area average between 15 and 28 degrees.<sup>54</sup>

Millennia of erosion eventually reexposed the older, buried, hard limestones and igneous rocks. Exposed granodiorites weather rapidly and now form most of the passes through the marble mountains of the coast into the deeply dissected interior of the survey region. The product of this weathering process is a sandy sediment full of black and gold mica, white to pink angular feldspar, and milky quartz. This distinctive material has been used to temper local ceramics for millennia, giving it a characteristic "salt and pepper" look.<sup>55</sup> (The only other major Cretan localities for granodiorites and granites are small deposits in the southwestern Asterousia Mountains near Kaloi Limenes.)<sup>56</sup>

The hard Cretaceous limestones resist gully and sheet erosion but can dissolve to form karst hollows if not metamorphosed. The red sediments that fill these karst hollows are probably weathering products of the limestones *in situ* and are often cultivated. On the whole, however, karst is rare in the Vrokastro region. Most of the arable soils are found in the Istron River valley and floodplain and in the Meseleri and Prina basins, where they were deposited in the Pleistocene.

Many of the limestone cliffs that tower above the wider valleys and coast are the result of local faulting. Subsidence along the coast is also largely the result of local tectonism.<sup>57</sup> This is evidenced by walls of Middle or Late Minoan I date submerged to at least one meter immediately west of Priniatikos Pyrgos (PP 1). A number of Greco-Roman or Byzantine structures on the eastern side of the promontory are now located within the splash zone. Walls of probable Minoan date also extend into the sea in the interior bay of Elias to Nisi (EN 2). In the cliffs of the coastal promontories at least one submerged solution notch was observed *ca.* 1.80 m. below sea level.<sup>58</sup> Solution notches are formed in the littoral splash zone by boring animals like *Dendropoma*, which can dissolve the bedrock; these notches are therefore indicative of earlier sea levels.

All this suggests that relative sea level (determined by changes in the amount of water contained in the seas and oceans and by local movements of the crust of the earth) around the Bay of Mirabello was lower than it is today, at least during the Bronze Age and in the

<sup>54</sup> The average slope for the entire study region is 19.2 degrees with a standard deviation of 6.8 degrees.

<sup>55</sup> Petrographic analysis of some sherds from the Vrokastro region indicates that the majority contain a combination of crushed feldspar, quartz, hornblende, siltstone, and terra rossa; see Matson 1984 and Myer 1984. Feldspars, quartz, hornblende, and mica are the minerals that make up granodiorite rock, corresponding to Moody's preliminary identification with a 10-power hand lens. Granodiorite temper appears to have been used in the local pottery from Early Minoan to Greco-Roman times. More detailed petrographic studies of sherds in the study collection are planned.

<sup>56</sup> See the General Geological Map of Crete by N. Creutzburg *et al.*, Institute for Geologic and Mineralogical Research (IGME), Athens 1977.

<sup>57</sup> Flemming 1978a; Flemming 1978b.

<sup>58</sup> This is confirmed independently by Dr. Nikos Mourtzos, Department of Geology, University of Athens, who has just completed his doctoral dissertation on the Holocene coastal tectonics of eastern Crete. See also Moody 1987, pp. 22–26 and references there cited for a discussion concerning solution notches.

Greco-Roman period. The sea level in the Bronze Age could have been at least two meters lower than at present. It is not clear, however, if relative sea level has risen continuously or fluctuated since Minoan times.

Thus, as is usual in Crete, differential weathering and local tectonics were, and continue to be, important processes shaping the Vrokastro landscape during the Holocene (Recent Epoch of geologic time from 12,000 B.C.).

### *The Wild Vegetation*

The wild or non-cultivated vegetation is a mosaic of *maquis*, *garigue*, and *steppe* in varying proportions, with patches of woodland. *Maquis* (*macchia*) is a plant community consisting of shrubs, most of which are trees reduced by browsing to a shrubby form: prickly oak (*Quercus coccifera*), for example, can be anything from a large tree to a dwarf shrub depending on circumstances. *Garigue* (*gariga*, *phrygana*) consists of undershrubs, woody plants which never grow into trees and are usually gray green and aromatic: for example, Jerusalem sage (*Phlomis fruticosa*) and spiny broom (*Calicotome spinosa*). *Steppe* consists of herbaceous plants, including grasses such as *Hyparrhenia hirta*, legumes such as clovers and medicks, and bulbous or tuberous plants such as squill (*Urginea maritima*) and asphodel (*Asphodelus microcarpus*).<sup>59</sup>

Maquis, garigue, and steppe are the result of the combined influences on the natural vegetation of climate, environment, and activities such as browsing, burning, and wood-cutting. In general, the proportions of maquis, garigue, and steppe are determined more by environment, especially the amount of water available, than by land use. Water availability depends in turn on rainfall, water retention of the soil, and whether or not roots can penetrate. For example, in this area much of the marl, although it retains a great deal of moisture, is too well cemented for tree roots to penetrate. In its natural state it carries only the shallow-rooted garigue, but if broken up by terracing, plowing, bulldozing, or blasting, will sustain maquis and cultivated olives and vines. It is important to note that much vegetation apparently sparse above ground has roots filling all the space below ground.

Although browsing and burning are usually considered man-related activities, Cretan plants were exposed to these natural processes long before the island was settled.<sup>60</sup> Plants of the island have thus had ample time to adapt to these pressures, which they have done in a variety of ways. For example, the Cretan pine (*Pinus brutia*) is unpalatable to sheep and goats and can increase in the face of considerable browsing. It cannot exist in the form of maquis but readily forms new woodland through invasion by seed. It is killed by wood-cutting. The Cretan pine is well adapted to fire, and older pines usually survive fires which suppress competitors. It is a highly gregarious tree and, although previously restricted to certain parts of the island (notably the eastern Lasithi Mountains), pine has expanded into many new areas over the last 200 years.<sup>61</sup> The recent and dramatic increase in pine in eastern Crete, including parts of the Vrokastro region, is rapidly turning these areas into landscapes in which fires occur with increasing frequency.

<sup>59</sup> For further discussion see Rackham 1981 and Rackham 1983.

<sup>60</sup> Moody 1987, pp. 122–123, note 49.

<sup>61</sup> Rackham 1989a.

Prickly oak has also adapted to burning, browsing, and woodcutting, but in quite a different way: it sprouts. It is deep rooted and requires good root penetration. In the Vrokastro region it is common except near the sea and on the better-cemented marls.

Juniper (*Juniperus phoenicea*) is unpalatable to livestock except when very young. It does not burn easily, but if burned, is killed. Juniper is probably the most common tree in the study area and is slowly increasing. Although a conifer, it quickly sends up new shoots when it is cut (coppiced) to ground level, and most of the extensive juniper woods in the survey area show signs of regular woodcutting in the past. Even though it seldom grows more than four meters high, juniper is the preferred local building timber because of its rot resistance.

Olive (*Olea europaea*) exists in a cultivated and a wild form, which are closely interrelated. Wild olive is palatable and like prickly oak lives indefinitely in a bitten-down state. The tree is unexpectedly flammable but sprouts after a fire.

Lentisk (*Pistacia lentiscus*) is very unpalatable and recovers from burning and woodcutting, like prickly oak and olive, by sprouting. It is most common near the sea but extends throughout the study area. Only rarely does it grow into a tree.

Carob (*Ceratonia siliqua*) also recovers from browsing, burning, and woodcutting by sprouting. It is probably an ancient introduction from Palestine, cultivated for its edible seeds which until recently were an important and special article of commerce in the Mirabello area.<sup>62</sup> In the Vrokastro region it is common as a wild tree or a relic of former cultivation, especially near the sea and near fieldhouses of the Turkish and Venetian periods (see Cultivation, pp. 314–315 below).

Although no deciduous oaks grow in the study region today, it is possible that they did in the past. Their nearest present location is about fifteen kilometers east of Vrokastro. The absence of deciduous oaks from local steep cliffs, where they might have survived out of the reach of browsing animals, is not significant because they cannot get a “toehold” as shallowly rooted trees in such places. When browsing and woodcutting occur, deciduous oaks can only survive in more remote areas with good root penetration. Such places are rare in the Vrokastro region. Most locations with deep sediments (such as the Istron River valley and Meseleri and Prina basins) are not remote and have been intensively cultivated and browsed for centuries, perhaps millennia. Nevertheless, they provide possible past environments for deciduous oaks.

### *Browsing, Burning, and Herding*

Browsing animals, wild or domestic, discriminate between different types of vegetation. They prefer steppe and certain kinds of trees, such as prickly oak; they dislike most kinds of garigue. In general, when browsing is reduced below a certain level, shrubs grow into trees and maquis turns into woodland. Since populations of the indigenous Cretan mammals are likely to have fluctuated, changes in browsing pressure are likely to have occurred throughout the Holocene.<sup>63</sup>

<sup>62</sup> Spratt 1865, pp. 110–111.

<sup>63</sup> Moody 1987, p. 122; Sondaar 1971, p. 70.

Ex-cultivated land often goes through a browsing phase before it is recultivated or completely abandoned. In terraced areas this results in a characteristic gaping pattern caused by terrace walls that are breached by sheep and goat paths.<sup>64</sup> The widespread occurrence of this gaping pattern throughout most of the study area, along with the conversion of field-houses into animal folds and their later abandonment, suggests that both herding and browsing temporarily increased when grain cultivation declined in the 1950's and 1960's and then decreased.<sup>65</sup>

Recently encouraged by Common Market subsidies, herding has revived in places, notably the Vrokastro basin and Schinauria massif. At least four large herds of sheep and goats are based within the study area. Mean size is about 300, but one herd contains 1,500 animals. It can be estimated that about 2,300 animals browse the region in winter. In the summer, at least one herd moves to pastures high in the Lasithi Mountains to the west of the Vrokastro region. The study area also served as a route of passage for herds transhumed between the Lasithi Mountains and the Thripti Range to the east.<sup>66</sup>

Systematic burning and herding are related activities in Crete, and the Vrokastro area is no exception. Controlled burning is used by shepherds to improve pasturage. Burning kills unwanted undershrubs, like spiny broom, and promotes steppe and the palatable young shoots of prickly oak and other maquis. It results in a characteristic mottled pattern in the landscape that represents tracts of vegetation burned in different years.

Cliffs that are too steep for browsing animals often function as refuges (technically *refugia*) for palatable plants like prickly oak. Therefore, cliff refugia afford an insight into what the landscape might have been like without browsing or burning. Those in the study area are particularly rich in endemic plants (species peculiar to Crete). Some of these, such as *Ebenus cretica*, are very palatable and can escape browsing in this way. In contrast to western Crete, however, the woodland on cliffs here is not radically different from other woodland; only terebinth (*Pistacia terebinthus*) and ilex (*Quercus ilex*) are particularly trees of cliffs.

Exactly how these data relate to the distant past is difficult to say, but the relegation of at least some trees to cliff refugia (terebinth and ilex) suggests that herding, and by implication burning, have been part of the local economy for centuries, if not millennia.

### *Beekeeping*

Beekeeping is a lesser, though important, income-producing activity within the Vrokastro area today and probably has been for at least the last 200 years.<sup>67</sup> The local abundance

<sup>64</sup> Moody 1989.

<sup>65</sup> Browsing refers to the number of animals, while herding refers to the number of herds (which is usually directly related to the number of shepherds). The distinction is important because they fluctuate independently. For example, if herd size increased but the number of shepherds decreased, there would be more animals but fewer herds browsing an area. See Koster 1977, pp. 16–17. The interaction between land use and pastoralism is discussed in Koster 1977, pp. 63, 72–82, 166 and Hodkinson 1988.

<sup>66</sup> Today most of this is done by truck, though occasionally herds pass through on foot.

<sup>67</sup> Fragments of terracotta beehives have been found in inland areas which date to the Turkish and possibly Venetian periods; in 1987 there was an island-wide symposium on beekeeping in the village of Prina.

of undershrubs, such as *Cistus*, encouraged by browsing and burning, lends itself to this industry.<sup>68</sup> Pine-resin honey is also produced.

### *Woodcutting*

Woodcutting has now almost disappeared from the study area. Its occurrence in the past is evidenced by the characteristic forms of trees that have been coppiced (cut near the ground to yield successive crops of wood) or pollarded (similarly cut 3–4 meters above ground). These forms are especially common among juniper but also occur in lentisk and prickly oak. Coppice stools and pollards can live for many centuries and can reach several meters in girth.

As mentioned above, juniper is the most common building wood in the Vrokastro region. It is also an excellent fuel for lime and pottery kilns, cooking, and heating. Lentisk and prickly oak coppice easily and burn much more slowly than pine, hence their history of woodcutting. A few pollarded pines have been seen in the Prophitis Ilias area and the Xeropotamos ravine.

### *Cultivation*

Regionally, much of the cultivated land is on terraces which, as throughout Greece, are usually of unknown date. Terracing provides a flat work surface and reduces erosion; it has the further function, particularly on marls, of breaking up the bedrock and increasing root penetration.<sup>69</sup> New roads and unsupported terraces cut with a bulldozer are significant developments of the last decade. Besides having a significant, if local, impact on the preservation and discovery of archaeological sites, such modern terracing makes the landscape much more vulnerable to erosion.

Stone-walled terraces and *alonia* (threshing floors) are almost always associated with fieldhouses. Many of these houses date from the Late Venetian or Early Turkish period and are now primarily abandoned complexes.<sup>70</sup> Local sources report that at least since the 1940's they were used primarily in the summer, when the grain crop was cut, threshed, winnowed, and stored or sold. Wheat, barley, and oats are Middle Eastern plants and as a consequence grow well even in the drier parts of Crete, but they are deep rooted and need good root penetration that plowed earth on terraces can provide. All this indicates that these terraces were important for grain production in recent times and probably during the Turkish and Venetian periods, although cultivation of grain has now almost ceased.<sup>71</sup> This is corroborated by comparing modern photographs of the study area with those from the beginning of the century (photographs in the collection of the Archives of the University Museum).

Carob may have been an important crop in the Turkish period. Large old carobs (at least 150 years old) are found throughout the study area. They no doubt functioned as shade

<sup>68</sup> Moody 1987, pp. 48–49.

<sup>69</sup> Moody 1989.

<sup>70</sup> New cement fieldhouses are still being constructed, primarily to provide a shelter for those working nearby olive groves and a place to store tools.

<sup>71</sup> In Hall's time small terraces on the steep north face of Vrokastro were cultivated, possibly for cereals; olives and vines were cultivated near the mountain: Hall 1914, p. 81, and personal correspondence, May 9, 1910 and June 16, 1912 (with permission of the Archives of the University Museum).

trees for field workers and livestock, as well as important sources of fodder and famine food. Today, many of these trees are being uprooted and replaced with olives.

Almonds were also an important crop during the Turkish period, especially in the Vrokastro basin and Aphendi Christos Valley. The place name Amigdali has been used in the Vrokastro basin since Hall's time.<sup>72</sup> Recent disease and drought, however, have prompted local farmers to replace these trees with olives.

Old olive trees, some of which may date from Byzantine times, are generally found on rocky slopes near the four villages, although there are some in the Istron River flood plain and valley. New olives are being planted everywhere, even in the rugged upland area south of Vrokastro.

Vines are a crop needing much attention but have a high value in relation to the area of land utilized. They are deep rooted and were probably grown on the best-constructed terraces. Vine cultivation continues today in some upland areas of Schinauria and Mesa Kephala. Variations on the place name "Ampelos" (vine) are especially common around the Meseleri basin. Irrigated gardens are concentrated in the Istron River valley and floodplain and near springs. An open irrigation system made of cement and probably dating to the 1930's still functions in parts of the Istron River valley and floodplain. It is gradually being replaced by plastic piping. Bananas, tomatoes, and cucumbers are grown in a few plastic-covered greenhouses (*thermokipia*) constructed in the upper Istron River valley and floodplain.

#### *Ex-cultivation*

When land goes out of cultivation it passes through a steppe stage and is then invaded by undershrubs. Most trees (except pine and deciduous oak) do not grow easily from seed, and maquis takes many decades to get established. Many terrace walls and field boundaries, however, had trees and shrubs growing in them while the fields were in use. On abandonment, these trees grow into hedges which gradually expand to take over the fields. One example is the Tzamachi farmland (Fig. 3) that in the 1941 air photograph appears as a half-abandoned set of fields divided by hedges. The abandonment of the Tzamachi fields is part of an overall decline in agriculture which began in the Vrokastro area 80 to 100 years ago. Even with the recent increase in cultivation (marked by the olive boom), the present landscape of the Vrokastro area is probably more wooded than it has been since the Early Iron Age. The juniper thickets of Ioannimiti and the Xeropotamos basin and the young pinewoods of Prophitis Ilias and Tsigkouni, now choked with spiny broom and *Smilax*, are almost impossible to survey through, but they are encouraging examples of the resilience of the Cretan environment. Similar fluctuations in woodland and cultivation doubtless have occurred many times in the history of the region.

We learn from better-documented areas that the main human impact on the landscape of Greece, through cultivation, woodcutting, burning, and herding, may have taken place in prehistory and that the Greco-Roman landscape probably was more like that of today than that of the Neolithic.<sup>73</sup> Unless the settlement history of the Vrokastro region is unusual, we should infer that this is also true of the survey area.

<sup>72</sup> Hall 1914, p. 82.

<sup>73</sup> Rackham 1989b, p. 110.



FIG. 9. All Bronze Age sites

SETTLEMENT HISTORY AND THE ZONES (Figs. 9–13)<sup>74</sup>

Activity within the study area appears to have been heaviest in the Bronze Age (Fig. 9) and from the Byzantine through the Turkish period; it dropped to its lowest level from the

<sup>74</sup> At the time of submission of this article, a few transects remain to be walked, especially in the Meseleri Basin. Zone 10, a large and difficult area extending from the gorge at Prina to the eastern side of the survey area at Sopata, remains to be explored in an extensive manner. No more than fourteen sites have been recorded; “grabs” have been taken from about twenty sites, primarily in the coastal zone. A detailed study of site function and hierarchy cannot be attempted until each site is completely recorded and its data analyzed. Although the account presented below may contain some inaccuracies owing to the assumptions made and the incomplete nature of the project, we feel that the overall patterns are valid and will be sustained by further analyses. All but four of the sites identified are within the systematic sample, and these four have been eliminated from this statistical analysis. Because Zone 1 was sampled at 100 percent, the total number of sites

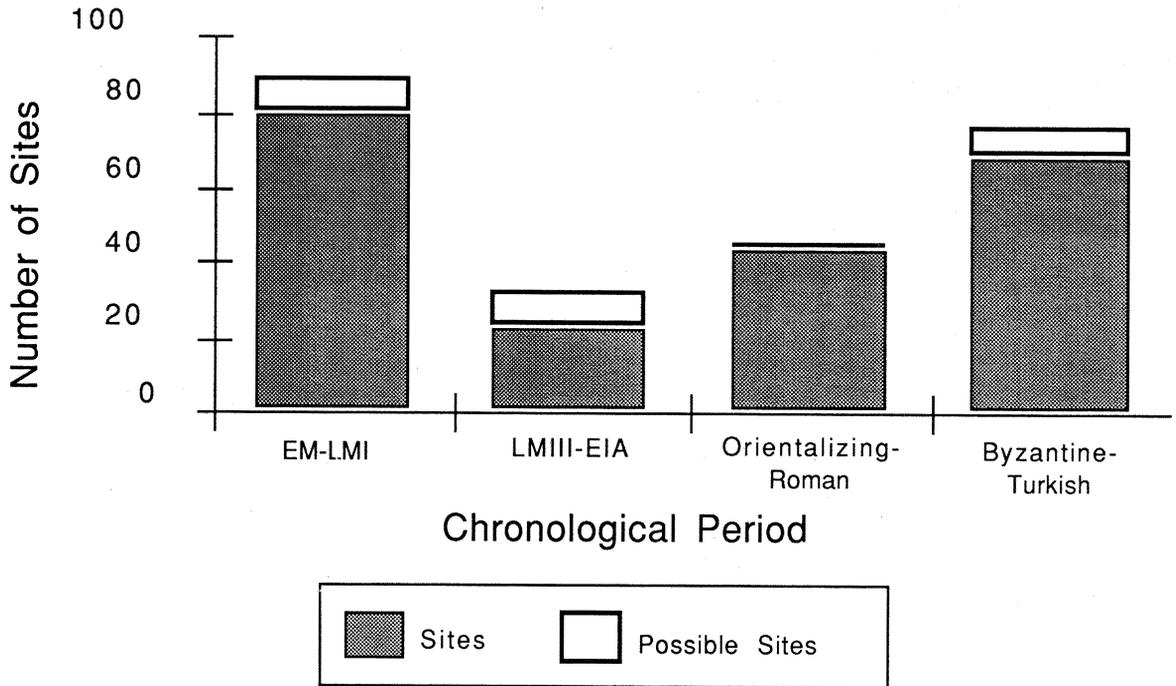


FIG. 10. Vrokastro region: Total site numbers by chronological period

LM III period through the Early Iron Age (Fig. 10; see also Figs. 17, 19, 22). This statement must be tempered with the observation that 2,000 years of Bronze Age and 1,000 years of the Byzantine through Turkish periods are being compared to roughly 400 years of Early Iron Age history.<sup>75</sup>

Overall activity is most significant (that is, site density is highest in relationship to size of area; Figs. 4, 11, 12) in Zones 2 (the Istron River valley), 9 (the Aphenidi Christos Valley), 8 (the Schinauria Koriphi area), and 4 (the area south of Vrokastro). All these areas contain numerous springs and arable land that continues to be cultivated today. Slopes in these four zones vary, but most range from 10 to 15 degrees, which is rather less than the average for the survey region.

The preference for these four zones, 2, 9, 8, 4, is apparent even when sites are grouped by chronological period (Fig. 10). There are, however, some differences. Occupation within Zones 1 and 2 (the coastal area and Istron River valley) is more intensive during the Early Minoan through LM I periods than in the LM III period and subsequent Early Iron Age. By Greco-Roman times, occupation within this zone is again extensive. This suggests that there was a slight tendency for activity to avoid more accessible areas at the close of the

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recovered has been halved to make its sample size consistent with the other zones. Tombs and cemeteries have also been excluded. For this analysis all sites are assumed habitations of equal importance.

<sup>75</sup> If the frequency of sites is calculated for every 200 years within the same cultural periods, quite a different picture might emerge. Both reconstructions, however, present two extreme interpretations. The first method assumes all sites to be contemporary within a vast period of time, and the second method assumes few if any to be contemporary. The most effective approach might be to employ standard or uniform time periods.

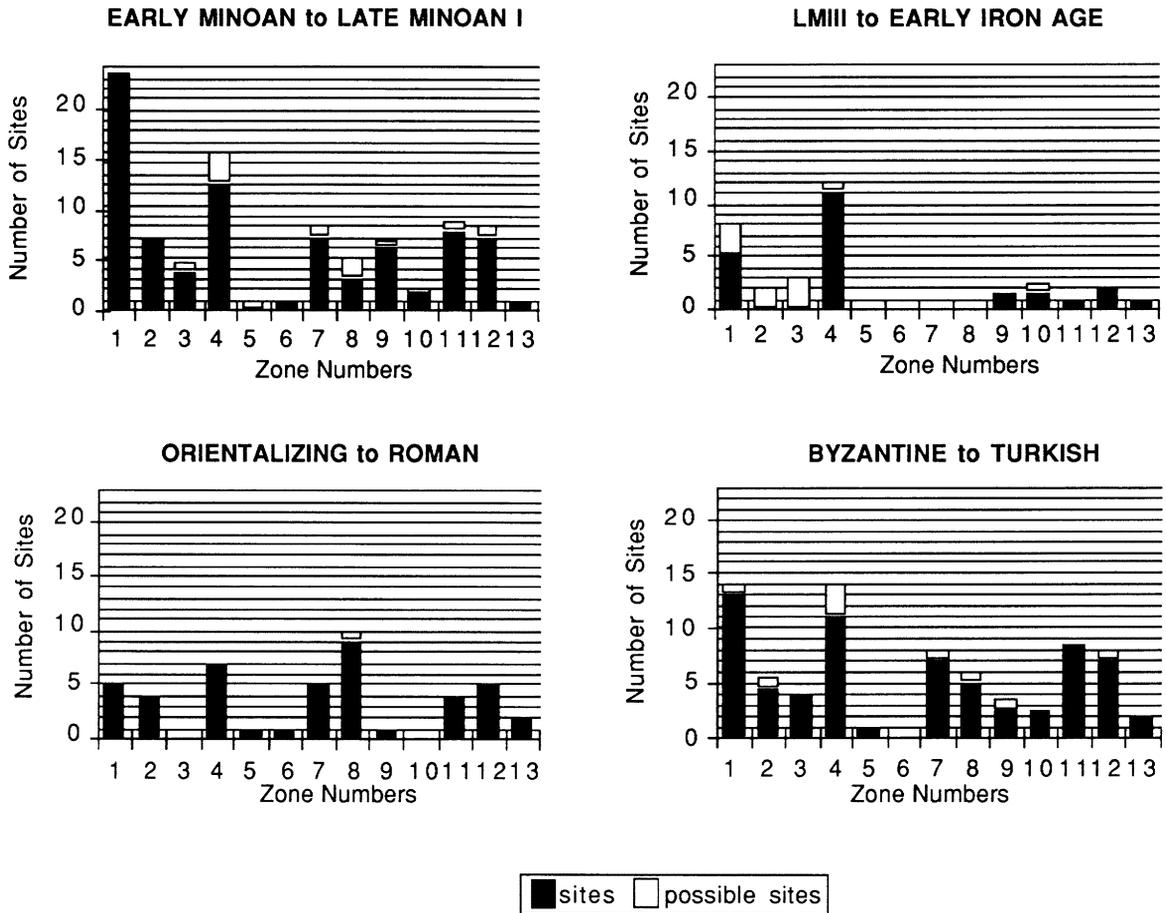


FIG. 11. Vrokastro region: Sites by zones and chronological periods

Bronze Age and during the Early Iron Age. Also interesting is the rise in occupation within Zones 8 and 13 (the Schinauria Koriphi plateau and Meseleri basin) from the Bronze Age and Early Iron Age to the Greco-Roman period. This may indicate the development of a second major center of activity near the southern limit of the survey area during the Greek historical period.<sup>76</sup> Also significant are the high levels of occupation for all periods within Zone 4, indicating that it is the most consistently exploited area in the study region.

The correspondence among the distributions of Bronze Age, Greco-Roman, and Byzantine through Turkish sites is also noteworthy. The Bronze Age is the high point of activity in all zones except for Zones 8 and 13, which reach their peaks in the Greco-Roman period (Figs. 11, 12).

A striking feature is the tendency for activity to be concentrated near but not always on the coast (Fig. 13). Most activity is between 0.5 and 1.75 km. from the coast. This pattern in

<sup>76</sup> This supports the view that inland valleys, protected by mountains, were frequent and favored locations for Classical and later sites: Van Effenterre and Bougrat 1969, p. 47.

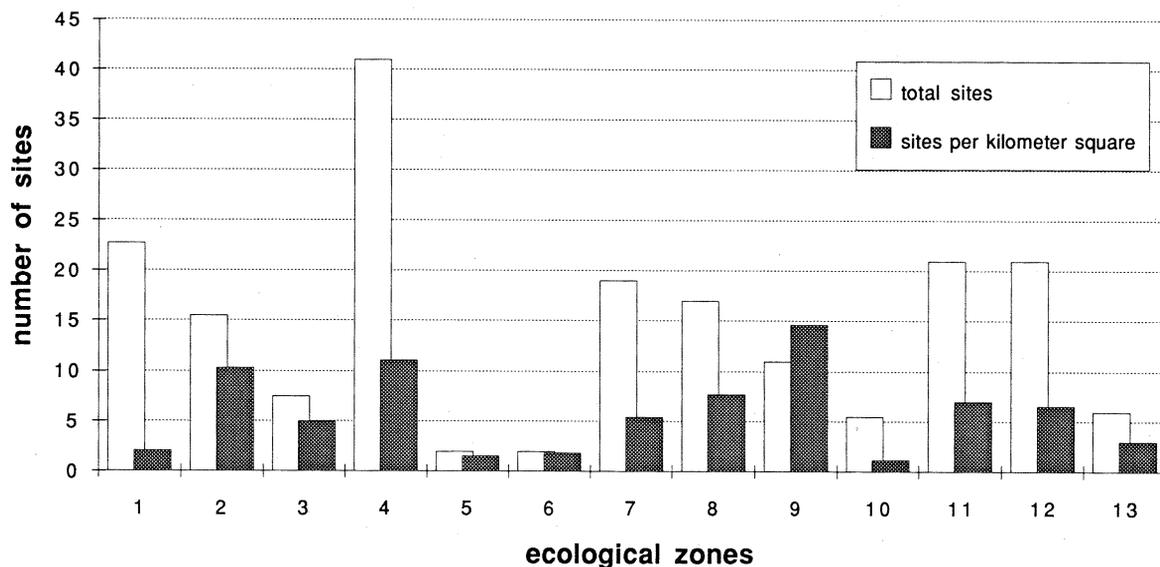


FIG. 12. Overall site numbers and densities by ecological zone

the Vrokastro region may be related to the difficult coastal topography and subsidence as well as to piracy or other human-related dangers.<sup>77</sup> Another pattern that seems to hold for most periods is the presence of two distinct regional centers of activity. One center is located on or near the coast and the other is well inland near the southern edge of the survey area. The position of their common boundary seems to vary, lying between 2 and 3 kilometers from the north coast. This pattern is least pronounced during the Bronze Age and most pronounced during the Early Iron Age and Orientalizing through Roman periods. This suggests that the Meseleri basin began to develop as a regional center at the close of the Early Iron Age.<sup>78</sup>

#### SETTLEMENT HISTORY AND THE MAJOR AND MINOR ROUTES (Fig. 14)

Two major cross-island routes that may have had an effect on site location have been identified within the study area: (1) an east–west route along the northern coast and foothills;<sup>79</sup> (2) a north–south route in the Istron River valley. This north–south route bifurcates at Kalo Chorio and Pyrgos, one branch leading south to Prina, Kalamauka, and the south coast, and the other extending southeast through the Prophitis Ilias and Meseleri Valleys, ending at the south-coast port of Hierapetra.<sup>80</sup> One minor route (3) extends from Kalo

<sup>77</sup> Abandonment of the north coast because of piracy is mentioned by Falkener (1854, p. 14), however. That occupation continued in this zone (Zone 1) is suggested by the presence of structures of the Turkish and earlier periods (at PP 1, IS 1, IM 1, etc.).

<sup>78</sup> The earliest material from SK 1, for example, is Late Geometric to Archaic in date (see the Catalogue below).

<sup>79</sup> Today the coastal road follows part of the older route; when Pendlebury crossed the area in the 1920's there was a paved road which ended at Kalo Chorio. The coastal route from that point east was simply a dirt path along cliff tops near the sea: Pendlebury 1948, pp. 21–22.

<sup>80</sup> This route to Hierapetra was used by the Roman army in a campaign of 67 B.C.: Sanders 1982, p. 4, fig. 1.

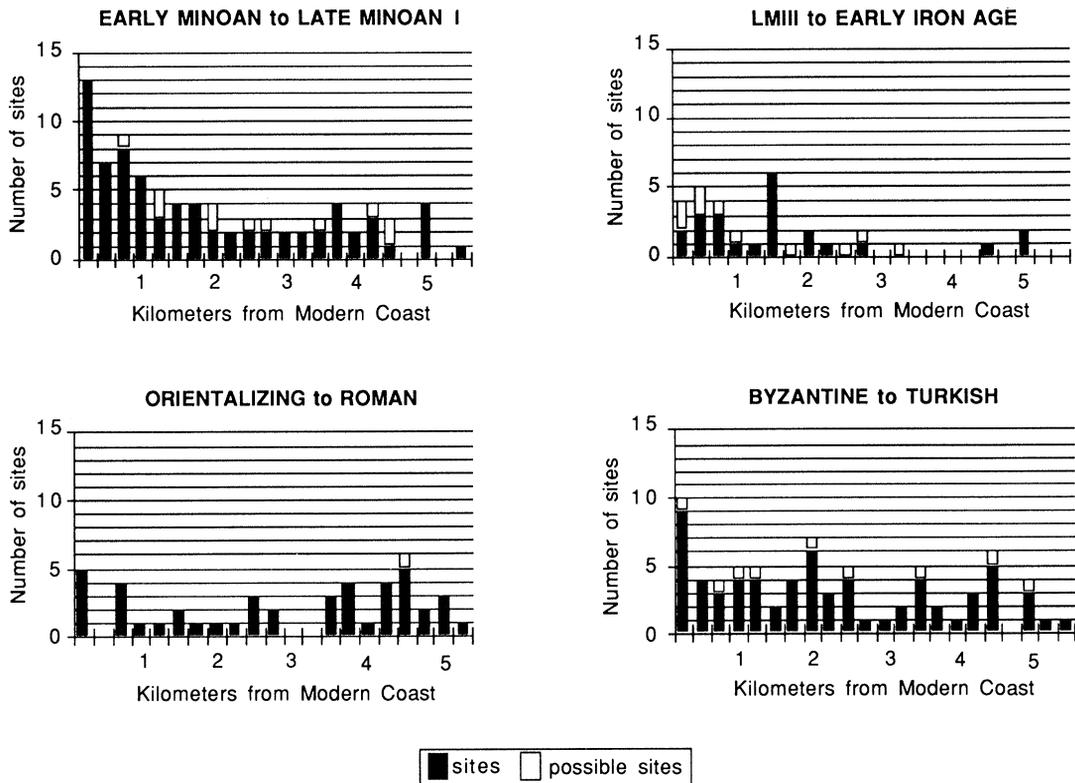


FIG. 13. Vrokastro region: Site distances from the coast

Chorio through the Apheni Christos Valley, across the Kolumbous range to Asari, then down into the Isthmus of Hierapetra, ending at Episkopi or Vasilike. Another (4) extends along the Xeropotamos basin through Pirovolos and Tzamachi to Asari and the Isthmus. All or parts of these routes are still in use today, and there is mounting evidence for their existence in the prehistoric period, indicated by settlement location (i.e., KK 1, KK 2, PN 3, PN 2; PI 2, PI 4, OL 1; KM 1, KM 2, PhR 1). They provided the means of access and interchange with the major markets and port towns on the northern and southern coasts and a link during some periods to politically powerful and potentially dangerous neighbors.

#### THE CHRONOLOGY OF SETTLEMENT HISTORY<sup>81</sup>

##### *The Bronze Age through the Early Iron Age*

##### Final Neolithic and Early Minoan I (Fig. 15)

There is little Neolithic activity in the study area; only three locations have been securely identified that have a few possible Final Neolithic sherds mixed with EM I and later material (IM 1, IM 3, KP 6). (There are three other locations [SK 8, KA 1, IM 2] from

<sup>81</sup> Because pottery analyses are incomplete and initial and terminal periods of occupation have not been established for each of the sites, chronological periods are presented as slightly overlapping.

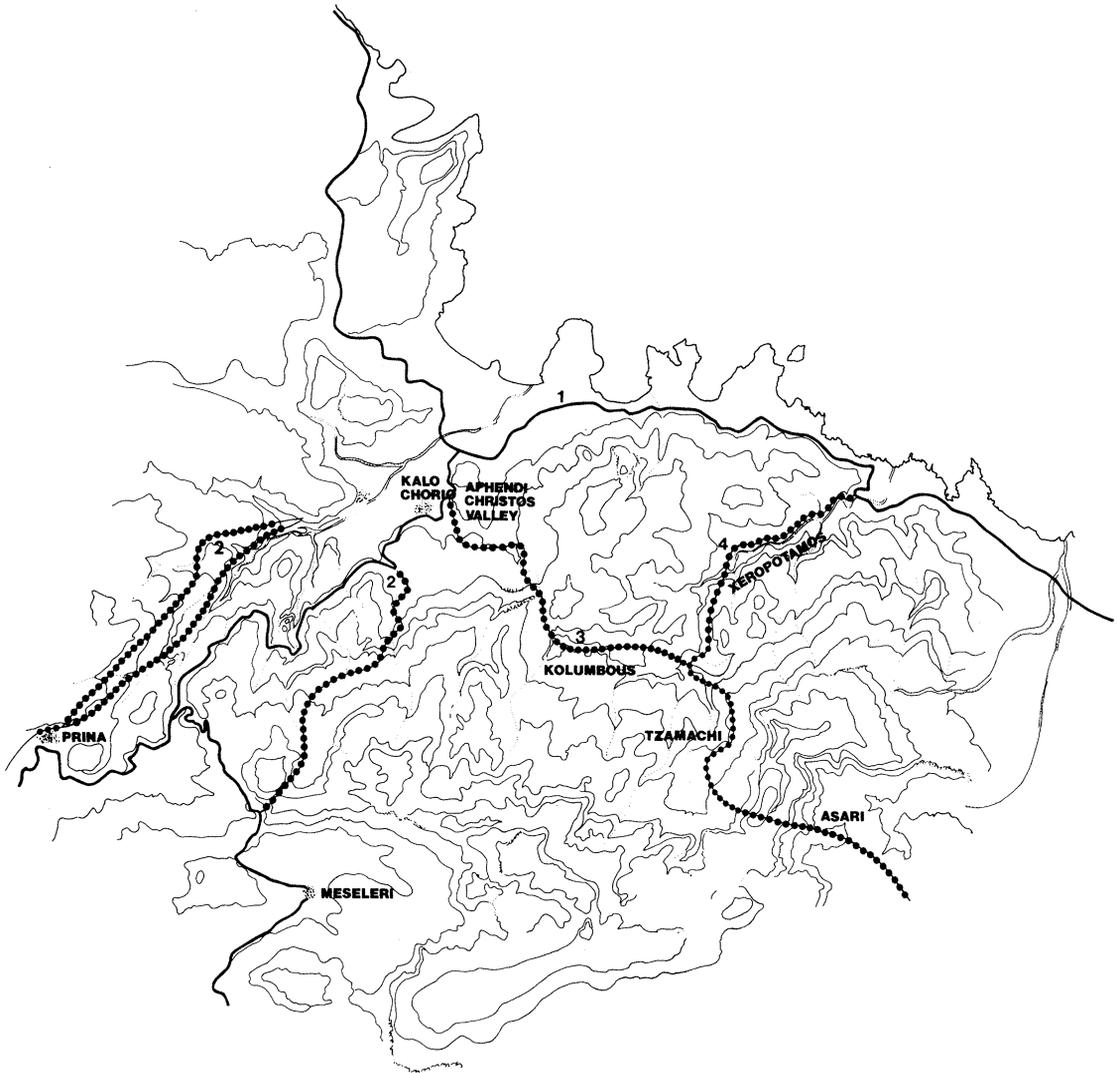


FIG. 14. Routes through the survey area

which pottery of this date may have been identified.) At two sites in the coastal area Ioannimiti (IM 1, 3) and on the west side and top of the hill called Vouno (Pl. 75:a) in the Koprane range (northwest of Vrokastro), handmade burnished basin rims were found which may belong to the Final Neolithic or Early Minoan I periods.<sup>82</sup> These coastal sites appear

<sup>82</sup> Found in close association with this material was one sherd (at IM 3) burnished in thin vertical bands, possibly dating to the EM I–IIA periods. For a general discussion of burnishing in the Final Neolithic and EM I periods, see Betancourt 1985, pp. 23–26, 29. Two sherds of Pyrgos Ware published as FN–EM I (found in a cave located northeast of Pacheia Ammos) in the collection of the University Museum, nos. 42-34-2-B and 42-34-2-A, are similar in surface color and treatment to the burnished sherd from Ioannimiti; see Betancourt 1983, p. 14.



FIG. 15. Final Neolithic–Early Minoan sites

to have been among the first settled;<sup>83</sup> this corresponds to Hall's discovery of Neolithic material in a coastal location just north of Gournia.<sup>84</sup>

#### Early Minoan—Middle Minoan II (Fig. 16)

Sites identified as Early and Middle Minoan are located primarily on hilltops and slopes between 100 and 200 meters in elevation (the altitude preferred for the majority of

<sup>83</sup> Moody (1987, p. 160) also reports Final Neolithic occupation of coastal sites on the west side of the Akrotiri.

<sup>84</sup> Hall 1912b, pp. 46–48. The pottery was recovered near a cave below a low cliff on the western slopes of Elatso Mouri *ca.* 200 m. north of Gournia. These sherds are published by Betancourt (1983, nos. 110–113, p. 46).

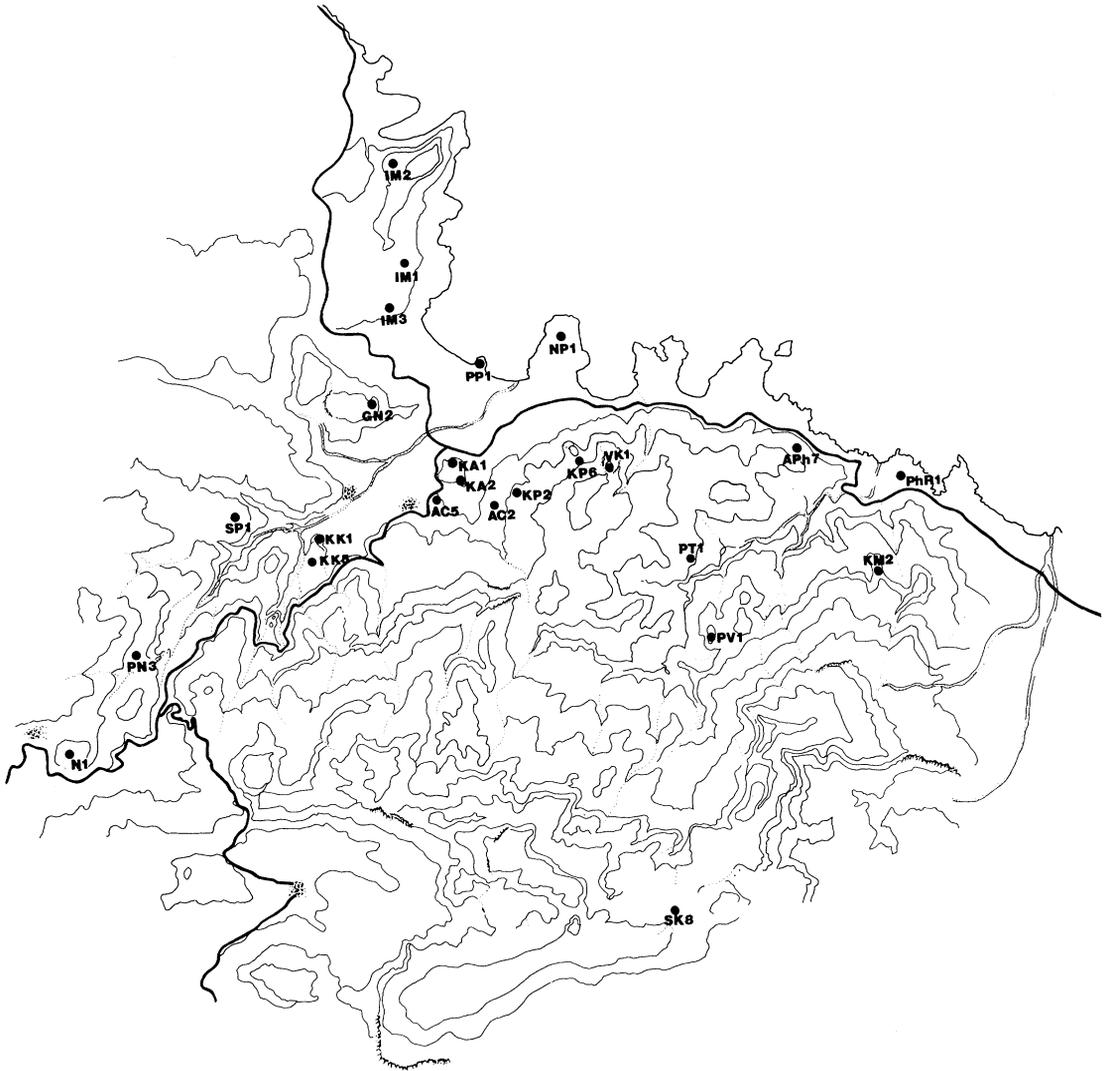


FIG. 16. Early Minoan–Middle Minoan II sites

regional Bronze Age sites is below 500 m., with a few exceptions, such as the inland site near the mountain of Stauromenos [SK 8], at the southeast corner of the survey region). Several sites are coastal, while others are set back slightly from the coast (for example, coastal: IM 3, PP 1, PhR 1; south of the coast: KA 1, 2, GN 2, KP 2). The Early and Middle Minoan pottery (and walls) on the slopes of Kato Arniko (cf. Fig. 3), for example, attest to the presence of a settlement on this low hill, located just northeast of Kalo Chorio.<sup>85</sup>

Almost directly north of this hill, the Early and Middle Minoan site identified by Hall on the promontory of Priniatikos Pyrgos (PP 1) may have been separated from the coast by

<sup>85</sup> Hall (1914, p. 85) excavated Early Minoan material in a cave (a burial?) on this hill. Faure (1956, p. 96) describes finding part of a skull in one cave and “lustrous” pottery.



and at least one structure have been identified on the coastal peak of Phrouzi (PhR 1; Fig. 3).<sup>88</sup> It is possible that these sites clustered on the west side of the Gournia plain were located near the intersection of the major (east–west) and minor (north–south) routes mentioned above.

### Middle Minoan III—Late Minoan I (Fig. 17)

During the Middle Minoan III and LM I period, activity expands inland but continues to be concentrated in four areas, the Istron River valley (Zone 2), the Xeropotamos basin (Zone 3), the Apheni Christos Valley (Zone 9), and the upland area south of Vrokastro (Zone 4), and to a lesser extent, on the Tzamachi terraces north of Schinauria (Zone 7).

Coastal activity in the Vrokastro region was most pronounced during the Bronze Age. It increased gradually throughout the period, reaching its peak in LM I. It is interesting to note, however, that in LM I the preference for locations within 0.25 km. of the coast drops significantly. This may be related to coastal subsidence (or other factors such as deposition).

There are several good-sized Minoan sites near the coast, where high-quality ceramics have been found. They include APh 1, GN 2, IS 1, KA 1, and PP 1. Many of the fine wares contain a few granodiorite inclusions, indicating that they were probably local products, given the restricted natural distribution of these igneous rocks.<sup>89</sup> These Minoan granodiorite wares have a fairly wide distribution in eastern Crete, suggesting that pottery production was a major industry in the Vrokastro-Gournia region during the Bronze Age.<sup>90</sup> Most of the coarse wares are also tempered with granodiorite and were therefore probably locally produced.

At many sites Middle and Late Minoan sherds are found together, frequently accompanied by foundation walls (GN 1, KM 1, KM 2, PP 1). Minoan sherds have been recovered from the Istron River valley, but the large LM I community that Hall suggested might be within the valley has not been located;<sup>91</sup> deep alluvium is an obstacle to identification of prehistoric sites here. One focus of Middle and Late Minoan I settlement in this area is the hill Kato Arniko and the Apheni Christos Valley. In the lower Istron River valley, directly south of Kalo Chorio and Pyrgos, the chapel hill of Agios Nikolaos (KK 1) produced pottery of many periods, including Middle Minoan and Late Minoan I.

The sites of KM 1 and KM 2, overlooking the western end of the Gournia plain, may have shared cultivation of the plain with Gournia and continued into the LM I period. One sherd of dark-on-light ware with disk-and-loop decoration (MM III–LM I) has been recovered from the eastern slopes of a ravine just west of KM 1 (Fig. 18:A).<sup>92</sup>

<sup>88</sup> One of two sites (KM 1, KM 2) that flanks a ravine feeding the Xeropotamos River has been reported as having LM III structures: Rutkowski and Nowicki 1986, p. 165.

<sup>89</sup> See note 55 above.

<sup>90</sup> The distinctiveness of granodiorite wares holds great potential for tracking aspects of the economy of the Vrokastro region through time. The work of Peter Day on the petrography of East Cretan coarse wares, when finished, will enhance our understanding of this interaction.

<sup>91</sup> Hall 1914, pp. 84–85. She suggested its location as northeast and under the village of Kalo Chorio; MM–LM I sherds were found here in deep alluvium between Kalo Chorio and the hill Kato Arniko, in her day and on transect in 1987, at KK 8 (see the Catalogue below).

<sup>92</sup> This motif (a solid disk with tangential lines) has been found on jars and a larnax from the Minoan cemetery excavated at nearby Pacheia Ammos: Seager 1916, pp. 27–28, pls. XI, XX:xxviii. For the chronology see Betancourt 1977, pp. 347–348 and Furumark 1942, p. 401, motif 66, arcade pattern: MM III.

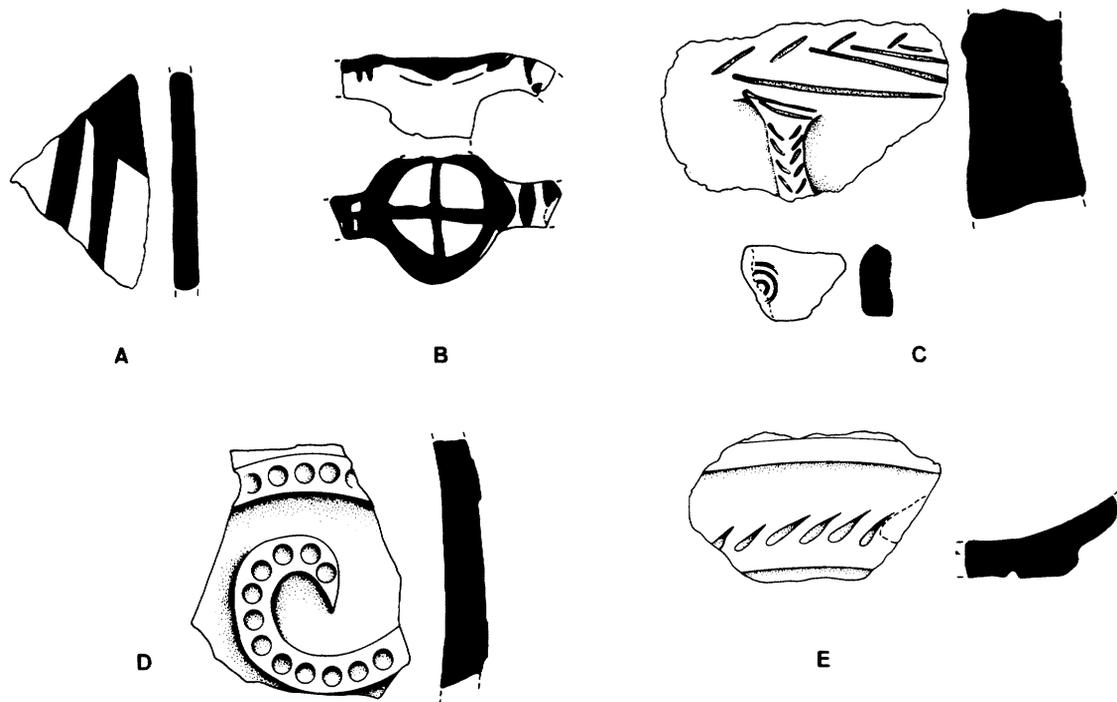


FIG. 18. A: MM III–LM I sherd from KM 1; B: Protogeometric sherd from APh 3; C: Rope-decorated pithos sherd from EN 2; D: Orientalizing/Archaic lotus relief decoration on sherd from SK 1; E: sherd with incised decoration from NP 1

Few if any Bronze Age sites within the Vrokastro region can rival in size the excavated portion of Gournia,<sup>93</sup> and there is no significant break in site distribution between the two areas. These observations suggest that Gournia may have functioned as the primary central place for the Vrokastro region through the LM IB period.

#### LM I/III—Early Iron Age (Fig. 19)

By Late Minoan III the area around Vrokastro has become one of the most important centers of activity; settlement within 0.5 km. of the coast declines but does not disappear altogether (Fig. 13). This trend appears to continue into the Early Iron Age. The abandonment of most coastal sites in LM III parallels a regional decrease in site numbers. Since it is not known if site size increased as numbers decreased, we cannot be certain that this change represents a decline in population. Nevertheless, it seems likely that there is a trend toward a more nucleated settlement pattern, similar to that documented for the Chania region in western Crete.<sup>94</sup>

<sup>93</sup> The size of the excavated area at Gournia is *ca.* 14,000 + sq. m. One possible exception may be KM 1, on the western side of the small plain west of Gournia, but more recording is necessary before this can be determined.

<sup>94</sup> Moody 1987, pp. 309–315.

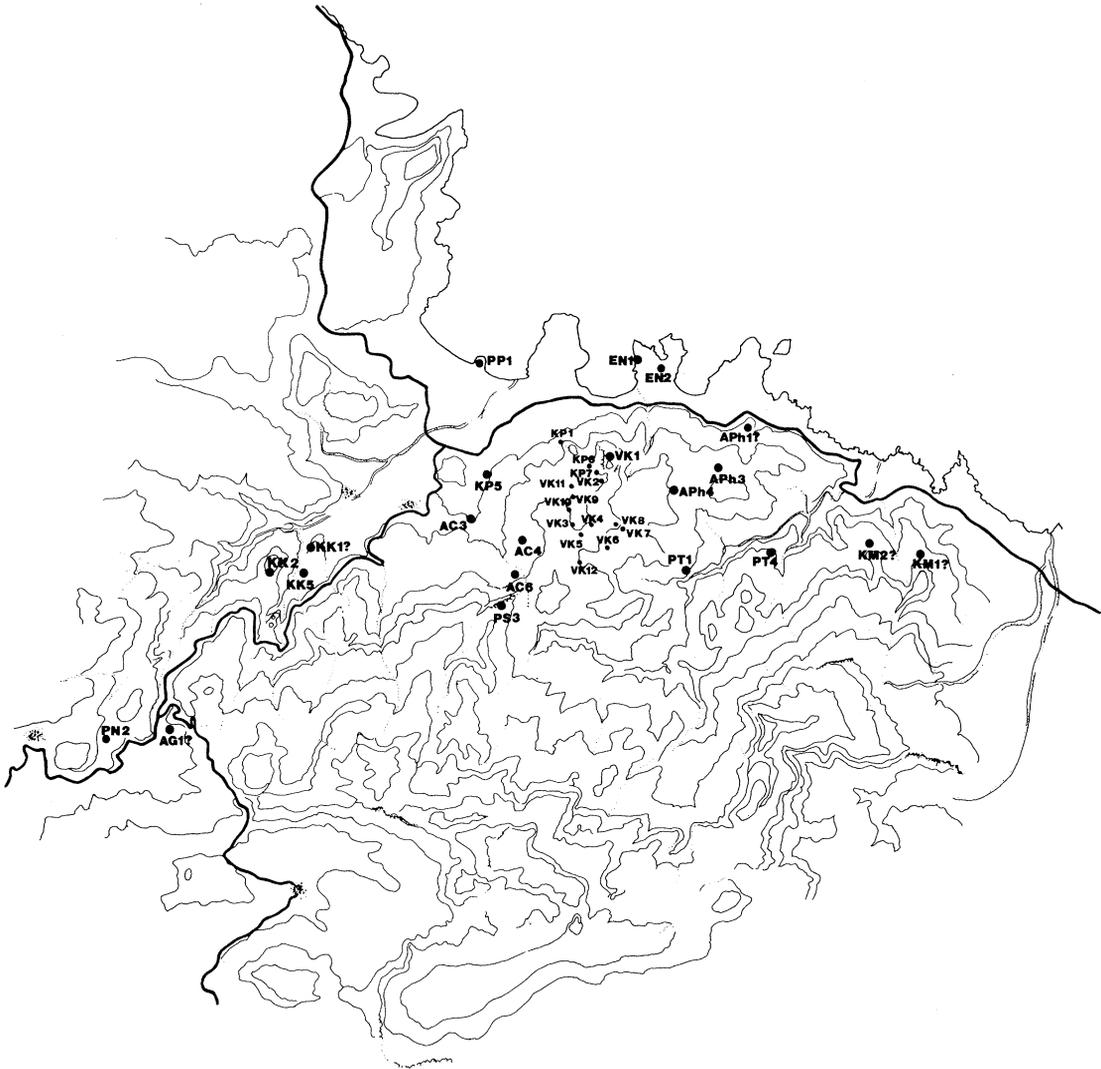


FIG. 19. Late Minoan I/III–Early Iron Age sites

It has occasionally been difficult to distinguish between the LM I and LM III periods, and these two periods occur together at some sites, for example the extensive Late Bronze Age site at Agios Phanourios (Aph 3) in the coastal foothills overlooking the Vronisi promontory (Pl. 78:c). Pottery of LM I and III and Protogeometric date is spread over a long hill slope, on the ridge above, and in fields below (Fig. 18:B). (Later material represents the Greco-Roman and Byzantine through Turkish periods.)<sup>95</sup> Remaining walls are massive

<sup>95</sup> There are two potential water sources for settlement here: a well located at midslope, still producing but not as much as in the late 19th and early 20th centuries, and a spring beside another site just south of Phanourios (PT 1). Today much of the area is planted in young olives, although threshing floors in a Venetian and Turkish village on the ridge top testify to previous cultivation of cereals.

and may be Bronze Age in date (Pl. 78:d). This settlement overlaps occupation of Vrokastro (VK 1), and only one hill and a deep ravine (Chauga) separate the two sites.<sup>96</sup>

The site of EN 2 in the cove of the promontory of Elias *to* Nisi, at the foot of Vrokastro, is one important exception to the general withdrawal from the coastal zone (Pl. 76:e; the APh 3 site is located a short distance from the promontory). Late Bronze and Early Iron Age pottery accompanies numerous walls which extend into the sea. Pithoi fragments are of Geometric, Orientalizing, or earlier date (Fig. 18:C) and are similar to pithoi from Vrokastro published by Hall.<sup>97</sup> The site is enclosed on its southern, landward side by a massive wall built on fill containing LM I and earlier sherds. Wall width varies from 1.50 m. on the east to 5 m. on the west, with cross walls visible through its thickness on the south side (Pl. 78:e).<sup>98</sup>

Another site (VK 7) in part contemporary with Vrokastro was found just east of a spring, 10-minutes walk to the south. Additional LM IIIB–IIIC pottery has been found on the peak and slopes of the highest hill (Xivouni; Pl. 78:f) in the lower Istron Valley, near the mouth of the Prina gorge (KK 2). At the south end of the gorge, in terraced olive groves north of Prina, Early Iron Age pottery has also been recovered (PN 2). These last two locations flank a route to the south coast, which extends through the modern village of Kalamauka (cf. Fig. 14).

The location of these sites indicates that in addition to the Vrokastro area (Zone 4), two loci for settlement inland during the LM III—Early Iron Age are the western approach to the Vrokastro area (Zone 9) and the Prina area (Zone 12).

Ceramics continued to be produced locally, but to judge from the presence of non-local wares on Early Iron Age sites, pottery production may not have been so important an industry as it was in the Bronze Age.

A final assessment of the role of Vrokastro as it related to other contemporary sites near or within the Bay of Mirabello area cannot be given at this time. Rutkowski and Nowicki have suggested that the population of Gournia retreated from the exposed coast south to Asari at the close of the Bronze Age.<sup>99</sup> This site has a good spring, and its inland location provided protection and land for pasturage and cultivation. West of Vrokastro, Kritsa is another inland focus of activity; the nearest beach that its population might have utilized is at Agios Nikolaos (Kamara).<sup>100</sup> Vrokastro remains the most important settlement along the

<sup>96</sup> APh 4 and APh 6 may be considered an extension of APh 3; they are located on a slope above APh 3, and a ravine separates them (see the Catalogue below). From APh 4 and APh 6 there is visual communication with the peak of Vrokastro immediately west and with APh 3 to the east.

<sup>97</sup> Hall 1914, p. 91, fig. 48. For similar rope decoration on a Geometric pithos from rooms P and AA, Phaistos, see Levi 1962, pl. IΘ:3; also Rochetti 1974, p. 192, fig. 31. The Kastro at Kavousi also produced pithoi with spiral decoration (sometimes on raised clay bands) and similar rope or chevron decoration: Gesell, Day, and Coulson 1985, pls. 95:h; 96:b; 97:c, d; their chronology is discussed on pp. 350, 354–355. They are dated from the Protogeometric B through the Early Orientalizing periods. For incised concentric circles on Knossos pithoi, see Coldstream 1972, pls. 15:35; 17:48; 19:48–50; for concentric circles, see Coldstream and Sackett 1978, pl. 13:50.

<sup>98</sup> For other contemporary fortifications, see Hayden 1988.

<sup>99</sup> A Geometric community at Asari has been described by Rutkowski and Nowicki (1986, p. 166); Nowicki 1987, pp. 219, 225, 227.

<sup>100</sup> There is a Geometric settlement and earlier material near and on the hill Castello above Kritsa: Nowicki 1987, p. 222, fig. 8.

north coast between Agios Nikolaos and the Isthmus of Hierapetra, however, and appears to be a central place from the close of the Bronze Age to the end of the Geometric period. Its unique, naturally fortified location afforded its inhabitants the advantages of both a coastal and an inland site:<sup>101</sup> arable land (both upland and coastal), abundant water resources, and a coastal zone that could still be utilized, even if occupation (with the possible exception of EN 2) was not continuous.<sup>102</sup>

*Close of the Early Iron Age through Archaic* (Fig. 20)

A new element of site distribution at the inception of the Greek historical period is the appearance of a distinct cluster of sites in the southern area of the region<sup>103</sup> (SK 1, SK 2, KPh 3, PI 4), accompanied by the abandonment of Vrokastro after the Geometric period. The relationship (if any) between these two events cannot be determined, although several possibilities exist: (1) the southern sites simply represent an increase in the regional population, while the inhabitants of Vrokastro move down to the coast; (2) the southern sites were established by the Vrokastro population that may have been forced south by new colonists settling the coast; (3) the southern sites were established by the coastal town of Hierapytna as it colonized the fertile Meseleri Valley.<sup>104</sup>

These sites on the high ridge south of Schinauria Koriphi produce abundant architectural evidence (wall foundations) as well as pottery, including Orientalizing or Archaic pithoi with lotus patterns in relief (Fig. 18:D).<sup>105</sup> One feature noted at SK 2 and KPh 3 is the placement of a few rectangular buildings on raised platforms (Pl. 79:a). Sherds of Late Geometric and Orientalizing date also occur at VK 1, PN 2, and possibly APh 3 and NP 1.<sup>106</sup>

*Classical through Roman (Greco-Roman)*<sup>107</sup> (Fig. 21)

The areas of densest settlement during the Greco-Roman period include Zone 8, the Schinauria plateau, and Zone 13, the Meseleri Valley (Fig. 11), with the town of Oleros the probable focus of this activity.

<sup>101</sup> Nowicki 1987, pp. 217–222: Nowicki in his analysis of refuge settlements categorizes sites according to inland and coastal locations.

<sup>102</sup> One significant result of close examination of the coast is the discovery on most of the promontories of some pottery, especially pithoi fragments (PP 1, NP 1), belonging to the period between 1200 and 700 B.C. These sherds, along with the settlement in the cove of Elias to Nisi, indicate continued, though perhaps limited, use of the exposed coastal region (possibly for fishing, agriculture, or trade), even at the close of the Bronze Age.

<sup>103</sup> Sites identified earlier in this century in the Meseleri area include Myrtokoudia and Strabolimni; they have yet to be located. See Pendlebury 1939, pp. 296, 362, 376.

<sup>104</sup> Linkage between Oleros and Hierapytna is suggested by the presence of names of individuals in inscriptions found at Meseleri which also occur in inscriptions of Hierapytna: Halbherr 1890, cols. 641–642.

<sup>105</sup> For similar Orientalizing and Archaic examples, see Brock 1957, no. 16k, pp. 182–183; Savignoni 1901, pl. xiii, nos. 6, 7, 8.

<sup>106</sup> APh 3 was the location of Hall's dump during the Vrokastro excavation (1912), and some pottery of the Early Iron Age through Orientalizing periods which we have collected may well have been part of that dump; Hall, personal correspondence May 12, 1912 (with permission of the Archives of the University Museum).

<sup>107</sup> The term "Greco-Roman" covers the time span from the Classical to the beginning of the First Byzantine period, that is, A.D. 550.

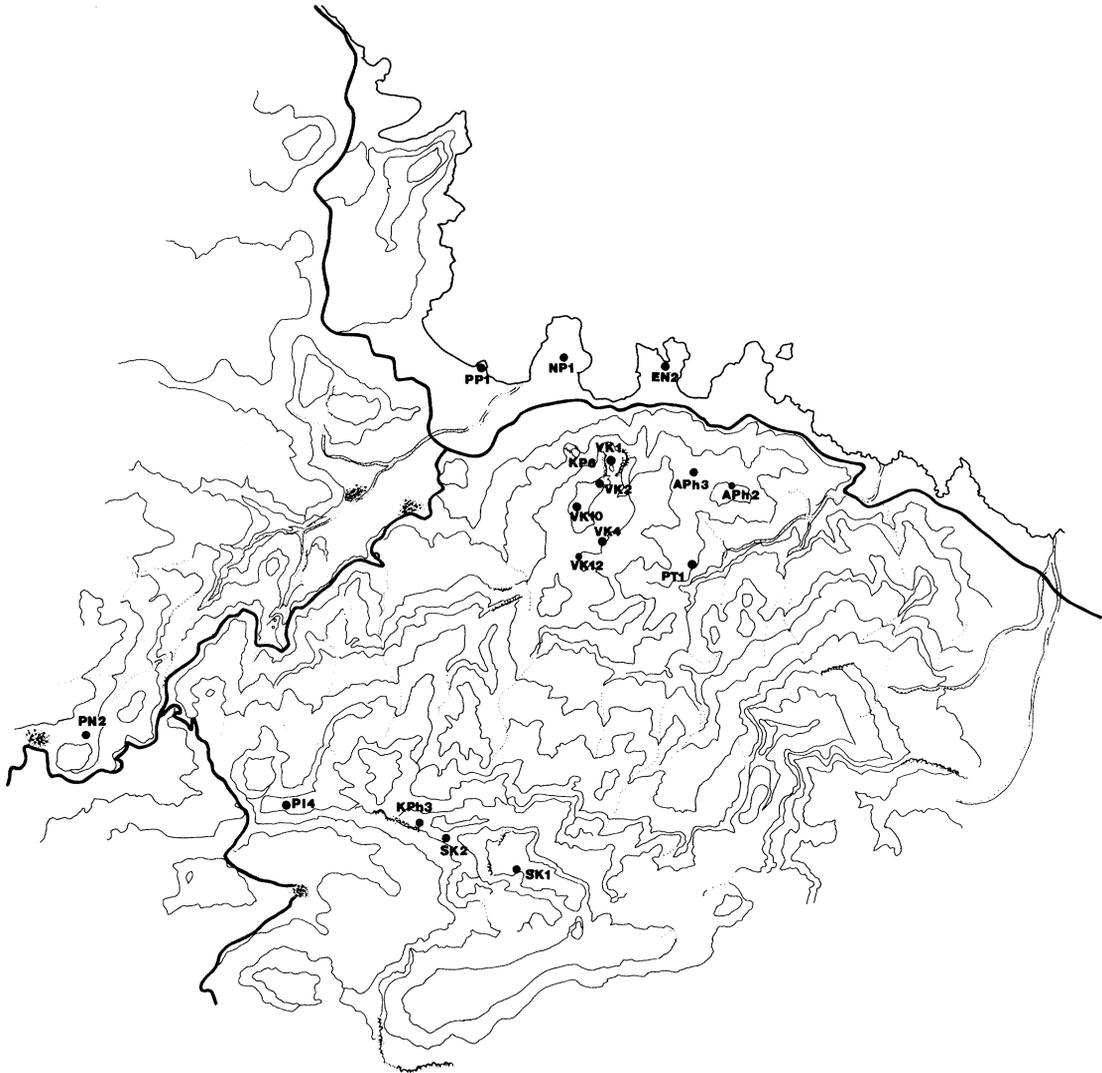


FIG. 20. Close of the Early Iron Age through Archaic period sites

During the Greco-Roman period coastal activity revived. A major settlement on the Nisi Pandeimon promontory (NP 1) may have been established as early as the Archaic period. It prospered through the Hellenistic period and seems to have declined during the Roman period. As mentioned above (p. 298), this may be the location of the ancient town of Istron.

Pottery and wall foundations are scattered across the promontory, and although some Roman pottery has been recovered from the site, more distinctive Roman red-slipped wares are present on Priniatikos Pyrgos, directly to the west.<sup>108</sup> Most characteristic of the site are

<sup>108</sup> Pendlebury, Money-Coutts, and Eccles 1932–1933, pp. 14–15; Sanders (1982, pp. 31, 142) describes pottery on the south slopes of the promontory as primarily Hellenistic and suggests that the decline of the

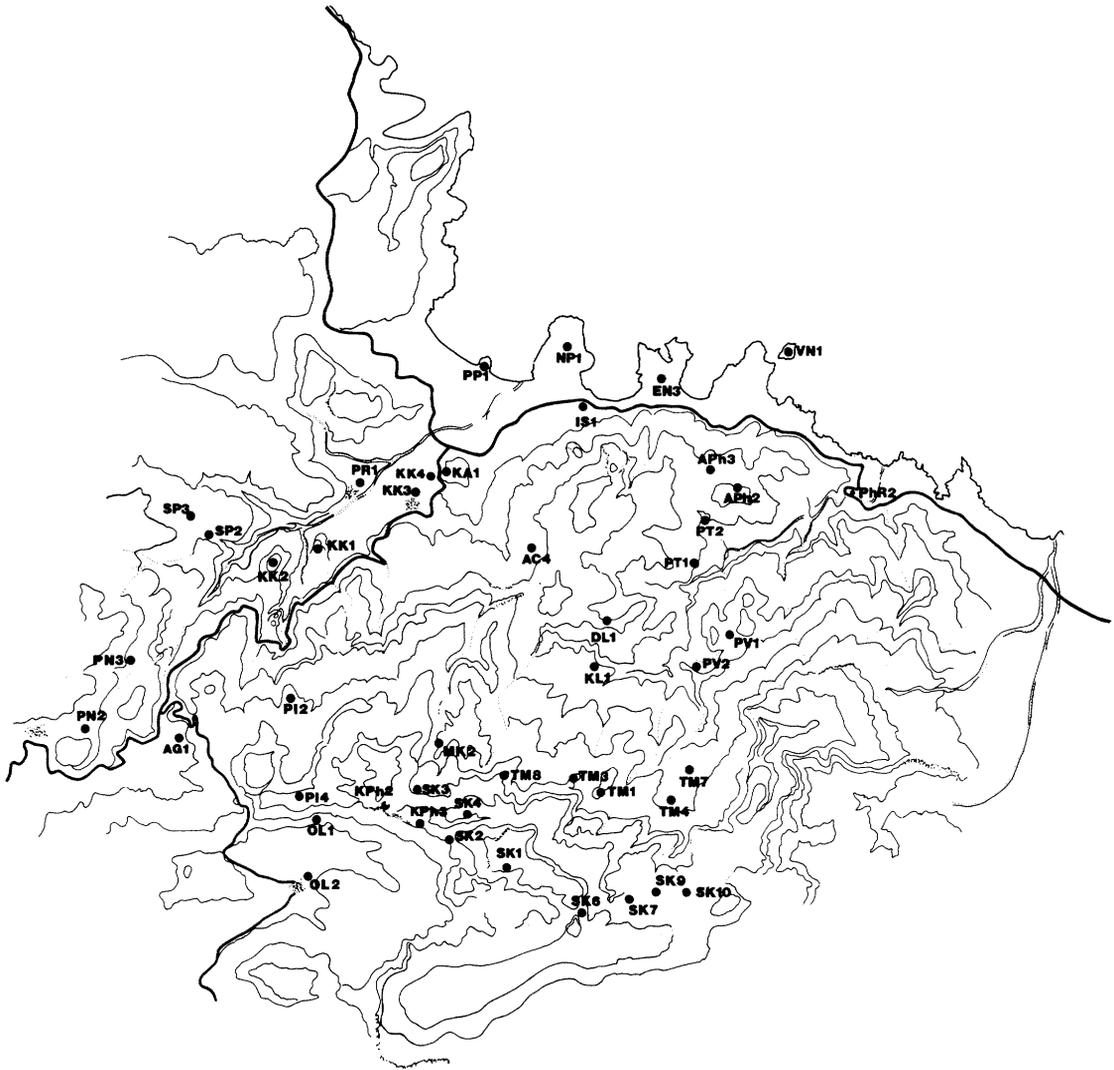


FIG. 21. Classical–Roman (Greco-Roman) sites

black-painted sherds, including raised bases, and an incised tear-shaped or wreath decoration on rims and bases of large jars and bowls (Fig. 18:E). This decoration is found within the survey area at sites near the Meseleri Valley and Prina (SK 1, PN 2).<sup>109</sup> On the south-eastern knob of the promontory large rooms can be discerned with walls composed of pieces of stone up to one meter in length, and on its southern slopes are foundation walls forming

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settlement may be related to the end of privateering in the Roman period, although elsewhere (p. 11) he suggests a take-over of the settlement by Hierapytna.

<sup>109</sup> This motif may ultimately be derived from a shallowly incised wreath decoration of the Late Geometric and Early Orientalizing periods; see Coldstream 1960, p. 170, pl. 47:d, nos. 117, 118. These are coarse ware bowls not later than the Early Orientalizing period. See also *Agora VIII*, no. 613, p. 102.

large rooms and corridors.<sup>110</sup> A long, thick wall on the southeastern side of the promontory appears in the water and may have been part of a harbor installation on the side most protected from wind and current.

A great deal of Greco-Roman activity also occurred in the upland area of the Schinauria massif (Zone 8). The Hellenistic and Roman town of Oleros is identified with the Meseleri Valley,<sup>111</sup> and it is possible that sites located on the Schinauria Koriphi ridge (SK 1, SK 2, KPh 3) were abandoned before the Roman period for settlement within this valley.<sup>112</sup> The dense pottery distribution extends across the northwest side of the valley from the base of the ridge south of the Prophitis Ilias Valley (PI 4; Pl. 79:b) to the village of Meseleri.<sup>113</sup> Rubble and ashlar blocks can be seen on the valley floor, built into terrace walls.<sup>114</sup> It may be speculated that, because of contemporaneity and proximity, the town of Istron was the port of this inland, upland town (although during some periods the port and city-state of Hierapytna may have exercised more than nominal control over the valley). Hellenistic Oleros disappears from the historical record along with Istron, although some Roman pottery from the valley floor suggests occupation continued or was renewed in the later period.<sup>115</sup>

The cemetery of Oleros appears to be located at PI 4. This is a long, gentle slope that extends from the ridge top, just south of the Prophitis Ilias Valley, to the floor of the Meseleri Valley. Tomb types identified include rock-cut cists (Pl. 79:c)<sup>116</sup> with cut ledges for placement of roofs and round-to-oval rock-cut chambers; one open and robbed tomb of this second type appears to have a dromos.<sup>117</sup> Figurine fragments and fine ware of primarily Hellenistic date have been collected from the cemetery area.

Sites cluster during this period between 0 and 2.5 km. from the coast, and between 3.5 and 5 km. (Fig. 13). This may represent the separate territories of Istron and Oleros. Willetts suggests that “at an early period” both Istron and Oleros were subject to the large and powerful city-state of Lato.<sup>118</sup> The separate listing of Istron in the Eumenes Treaty does suggest that it was an independent town, at least in the early 2nd century B.C.<sup>119</sup> Istron is not

<sup>110</sup> Mariani (1895, col. 281, note 3, and col. 282) also saw marble architectural elements built into a wall on or near the promontory. Spratt saw several large blocks carved with a lozenge pattern (ceiling coffers) on this coastal promontory, half buried in sand: Spratt 1865, p. 139. One coffer has been set up near the chapel on the west side of the promontory, and the lozenge pattern may be of Byzantine date, according to George Harrison.

<sup>111</sup> For a description of the location and date of Oleros based on surface finds, see Sanders 1982, pp. 11, 138–139 and note 22.

<sup>112</sup> Sanders (1982, p. 31) mentions the tendency in the Roman period for settlements to spread down a hillside or to abandon the hill site altogether for lower ground.

<sup>113</sup> Sanders 1982, p. 139.

<sup>114</sup> Mariani (1895, col. 319) found the remains of a building he described as a temple, located on a terrace on the north side of the valley, and accompanied by a hearth and numerous animal bones (this structure, if still extant, has yet to be identified). For a discussion of inscriptions related to Oleros and the cult of Athena Oleria, see Halbherr 1890, cols. 639–642.

<sup>115</sup> Sanders 1982, p. 18.

<sup>116</sup> This is a common type of tomb for the Classical and Hellenistic periods: Kurtz and Boardman 1971, pp. 163–165.

<sup>117</sup> The oval tombs are cut directly into the earth and bedrock of the ridge and probably had corbeled roofs; since this is an earlier tomb type in Crete, these examples may indicate use of this area for burial as early as the 7th or 6th century B.C.: Kurtz and Boardman 1971, p. 193.

<sup>118</sup> See Willetts 1955, pp. 142, 144.

<sup>119</sup> Sanders 1982, p. 11; *CIG* II xiv, 3, no. 3048; see notes 22 and 23 above.

mentioned in a later treaty (*ca.* 113–110 B.C.), suggesting that the town was either subject to Lato or no longer in existence.<sup>120</sup>

Since the Vrokastro region lies between the rival city-states of Lato and Hierapytna, its Greco-Roman history must be integrally tied to theirs. One key to understanding this period is to place Istron and Oleros within the framework of territorial disputes between these two powerful and better-documented city-states. Another factor to be investigated is the possibility that the Hellenistic and Roman periods produced two distinct types of settlement patterns within the Vrokastro region, as has been suggested for other areas of Crete.<sup>121</sup>

During the Roman period, activity seems to have shifted west from Nisi Pandeimon to the Istron River valley and floodplain and south to Prophitis Ilias (PP 1, KK 3, KK 4, PR 1, PI 2). This is attested within the upper Istron Valley by pottery, architectural remains<sup>122</sup> (Pl. 79:d), and the discovery of Greco-Roman tombstones.<sup>123</sup> Architectural elements found north of Pyrgos have been related to a suggested temple or villa.<sup>124</sup>

These sites cluster along the main route from the northwest coast to Hierapytna (see pp. 318–320 above and Fig. 14). The emphasis placed on this route, as suggested by the change in settlement pattern, may reflect the increased power and prominence enjoyed by Hierapytna during Roman times.

There is little if any evidence for withdrawal from the coast zone before the First Byzantine period; in this, the study region corresponds to other areas of the island.

Ceramics continued to be produced locally, although there is evidence for some imported Roman wares at Priniatikos Pyrgos.<sup>125</sup> Roof tiles tempered with granodiorite are especially common, and their production may have been an important local industry.

#### *Early Byzantine through Turkish (A.D. 550–1898) (Fig. 22)*

The First Byzantine period is represented by several sites. Materials dating to the Arab Occupation and the Second Byzantine period are rare, but these periods are exceedingly difficult to recognize.<sup>126</sup> The Late Venetian and Turkish periods are well represented.

Included within this time-frame are the monastery of Panagia Phaneromeni on Mount Sopata (SO 2), seasonally occupied fieldhouses, *metochia* (small villages or groups of fieldhouses), *mandria* (sheepfolds), and Byzantine and Venetian chapels. Most of these small villages and many isolated fieldhouses are no longer inhabited (the majority were probably occupied only seasonally) and are archaeological sites.

<sup>120</sup> Van Effenterre and Bougrat 1969; Faure 1967; and notes 23 and 25 above. Sanders (1982, pp. 11, 31, 142) speculates about the decline of Nisi Pandeimon but also states (p. 18) that occupation of the site of Nisi/Istron continues with the Roman material from Priniatikos Pyrgos.

<sup>121</sup> According to Sanders (1982, p. 30), the pattern for the Hellenistic period is more nucleated, with expansion of small sites occurring in early Roman times in response to a safer, more controlled rural environment.

<sup>122</sup> See note 27 above and PR 1 in the Catalogue below.

<sup>123</sup> Boyd (1904, p. 15) described the tombstones as inscribed in “Roman-Greek characters.”

<sup>124</sup> Epigraphical evidence related to a temple of Ares and Aphrodite near Pyrgos is discussed by Halbherr (1890, cols. 641–644). See also Halbherr 1893, p. 13.

<sup>125</sup> George Harrison has made these observations.

<sup>126</sup> Occupation during the Arab period is suggested by an Arab coin found at Meseleri, the farthest point east where coinage of this period has been recovered: Christides 1984, map I, p. 96.

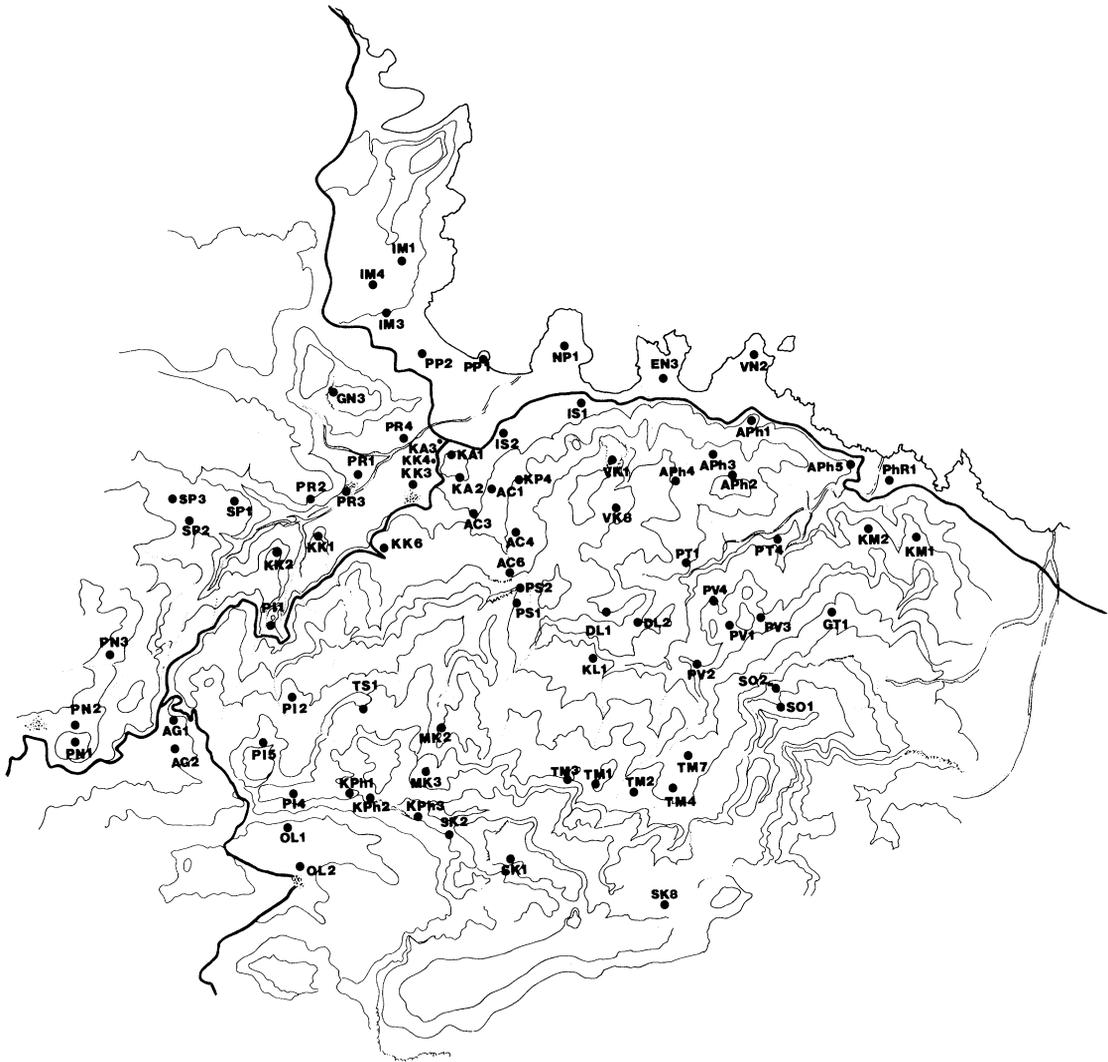


FIG. 22. Byzantine-Turkish sites

As in the Bronze Age, activity concentrates in the valleys (Zones 2, 9, 11) and the area south of Vrokaastro (Zone 4). In contrast to the Bronze Age, however, there is more activity in the upland areas of Zones 7 and 8 (Figs. 11, 22).

The Greco-Roman revival of coastal activity continues in the Byzantine and later Turkish period.<sup>127</sup> Except for this and a slight peak in Zone 4, activity seems to be more evenly distributed throughout the study area than in earlier periods.

Four villages within or on the fringes of the study area (Kalo Chorio, KK 3; Meseleri, OL 2; Pyrgos, PR 3; Prina, PN 1) were established at least by the Early Venetian period, as was Asari, just outside the study region. Sherds of 13th- to 15th-century Sgraffito Ware

<sup>127</sup> Sanders (1982, p. 31) suggests that the coastal areas of Crete were not abandoned before the First Byzantine period.

have been observed at all locations.<sup>128</sup> These villages were primarily Christian during the Turkish period;<sup>129</sup> the Byzantine churches within Meseleri indicate that it may be the oldest village in the area.

The presence of the Monastery of Panagia Phaneromeni, founded before the 12th century, must have had a profound influence on the history of the study area.<sup>130</sup> The monastery owned at least 10,000 stremmata of land (about 2,500 acres). Locations of landholdings within the region are unknown; local sources report that the monastery sold a number of its properties in the 1940's and 1950's, including the metochia at Sphakolaggado (KM 2) and Stibataki (KM 1). Today the monastery (now reduced to one nun and an abbot) rents browsing rights to local shepherds.

The nature of the relationship between the monastery and the metochia scattered throughout the study area, especially in the Xeropotamos River catchment, is still unknown. The majority of these fieldhouses seem to date from the Late Venetian period (*ca.* A.D. 1600) to this century, that is, considerably later than the foundation of the monastery. A few may have been established earlier (Second Byzantine or Early Venetian), and these are usually associated with a nearby chapel (APh 2, PI 2).

The identification of granodiorite temper in ceramics dating from the 18th to the early 20th century indicates that some pottery continued to be produced locally. Local sources confirm that ceramics were produced in the Kalo Chorio area until just before World War II.

#### THE VROKASTRO LANDSCAPE: TENTATIVE CONCLUSIONS

Except for the Early Iron Age and perhaps the Second Byzantine Period, when the monastery may have affected local history, the pattern of settlement we are uncovering within the Vrokastro region seems to correspond to that established elsewhere within Crete. It is possible that during the Minoan Palace Period most of the area formed part of the prosperous, primarily rural hinterland of the nearby town of Gournia, in other words, an "intermediate" cultural zone. Gournia, although an important local central place, never ranked as a major Bronze Age center on an island-wide scale. As part of the territory of a minor center, one might think that the Vrokastro region would not have been affected as it was by major events occurring elsewhere in the island. The overall changes which occurred in local settlement patterns were concurrent with and mirrored those taking place in the Chania area and other major centers.<sup>131</sup> Activity gradually increased throughout the Bronze Age to culminate in the LM I period; during LM III the absolute numbers of sites decreased and the nucleation of settlement began.

Habitation numbers in the survey region appear to have increased slightly in the Early Iron Age, suggesting that it was one of several prosperous contemporary centers in the general area. Since Gournia no longer functioned as a minor central place after LM I, the

<sup>128</sup> Margrete Hahn has made these observations.

<sup>129</sup> Spanakis (1976, p. 298) relates the number of Christian households in the village of Oleros for the years 1583, 1832, and 1881. During the Venetian period the river Istron served as an administrative boundary for the eastern third of the island: Spanakis 1958, pp. 326, 328–329, 333.

<sup>130</sup> For a summary of its history and archival evidence see Psilakis 1988, pp. 190–195, esp. p. 194 and references cited.

<sup>131</sup> Moody 1987, pp. 294–315; Moody and Lukermann 1985, pp. 62–65.

regional focus of power eventually shifted west to Vrokastro (VK 1) or perhaps was split between Vrokastro (VK 1) and Asari, site of another Geometric community. The transformation of the Vrokastro region from a rural hinterland supporting many small communities to a prominent independent center in the Early Iron Age is remarkable and raises two key questions: Why did it rise? and where did it fit into the island-wide picture? Were, for example, Vrokastro and Kavousi centers of equal stature? We do not have the answers to these questions yet, although suggestions about the unique, advantageous topographical situation of Vrokastro have been offered above.

During the first centuries of the Greco-Roman period the regional focus shifted from Vrokastro to Oleros (OL 1, the SK and PI sites) and Istron (NP 1, PP 1, KK 3). These two towns, however, were minor places when considered from an island-wide perspective. Although Istron and Oleros may have been autonomous centers from time to time, they were dominated by their more powerful neighbors, Lato and Hierapytna. In short, the Vrokastro region no longer influenced events in the neighboring areas, as it may have done during the Early Iron Age; it was instead influenced by them. This state of affairs seems to have continued to the present day.

The fortunes of the study area, from the end of the Roman period to the present, seem to reflect those of the island as a whole. Site numbers increased through the First Byzantine period, the end of which was marked by the Saracen conquest in A.D. 824. The years of the Arab Occupation (A.D. 824–961) are elusive, but this is true throughout Crete. The apparent paucity of material dating to the Second Byzantine period is a little surprising, although again this is a period whose secular material culture is not well known. Only one event can be fairly securely dated to these centuries: the founding of the Monastery of Panagia Phaneromeni. This seems to have been the most important regional event of the last millennium, and it became a focus for political and cultural (and probably economic) activities within the area, even during later Venetian and Turkish periods.

Since, for the most part, the settlement history of the Vrokastro region seems to have paralleled that documented in other parts of Crete, the landscape history also may have followed suit. It has been suggested and attempts have been made to prove that the primary human impact on the landscape in the Aegean occurred during the Bronze Age, and that the Greco-Roman landscape may have looked a good deal like the modern one.<sup>132</sup> This observation may be significant for understanding the regional ecology and could form the basis for construction of models that will provide an ecological framework for regional settlement.

It would seem that with the exception of the Early Iron Age, the Vrokastro area functioned as an intermediate cultural zone. Although the region remained primarily rural, outside events appear to have had an impact on its settlement history. If its history is generally representative of rural Crete and many other areas in the Mediterranean, then the idea that rural areas preserved the status quo in times of change must be questioned. One point not contested, however, is that the successful exploitation of these rural landscapes sustained and contributed to the development of urban life. Careful investigation of rural areas will form the basis for understanding this fundamental relationship between town and country.

<sup>132</sup> Rackham 1989b, p. 110.

## CATALOG

*Abbreviations.* FN: Final Neolithic; BA: Bronze Age; EIA: Early Iron Age; M: Minoan; PG: Protogeometric; Cl: Classical; H: Hellenistic; G: Greek; R: Roman; Byz: Byzantine; V: Venetian; T: Turkish. E: Early; M: Middle; L: Late. The site name or toponym and identification are followed by the distance from the coast and by the zone. The date and description are followed by the date of discovery and recording and any bibliography.

- AC 1**                      Apheni Christos: rock shelter  
1.19 km. Zone 9
- EM (just south of new house construction at end of the ridge).  
1987, 1988
- VT  
A rock shelter used as sheepfold with V to modern pottery on the east side of the Apheni Christos Valley.  
1986, 1987
- AC 2**                      Apheni Christos: northeast terraces  
1.35 km. Zone 9
- EM? MM-LM I  
This site is just south of **AC 1** and has been recently bulldozed; it is located on four broad terraces on the east side of the Apheni Christos Valley. MM-LM I pottery was found, including painted jars, tripod legs, handmade cooking ware (some burnished ware, possibly EM). There are no structure walls visible; sherds have fallen out of bulldozed terrace walls.  
1987
- AC 3**                      Apheni Christos: chapel  
1.5 km. Zone 9
- LM Later  
LM and later pottery near the Apheni Christos chapel on the southwest side of the valley.  
1986, 1987
- AC 4**                      Apheni Christos: spring  
1.63 km. Zone 9
- BA EIA G-R VT  
A scatter of Minoan, EIA, G-R, and VT pottery near a spring above the Apheni Christos Valley; the site is near a dirt road which leads from the valley to fields south of Vrokastro.  
1986, 1988
- AC 5**                      Apheni Christos: southwest ridge  
1.69 km. Zone 9
- EM? BA  
A thin scatter of pottery on the northeast end of a ridge southeast of Kalo Chorío, overlooking the Apheni Christos Valley. Primarily BA, possibly
- AC 6**                      Apheni Christos: cliffs  
1.85 km. Zone 9
- BA EIA Later  
Scatter of BA (LM III?), EIA, and later pottery. Possibly walls under (north of) the central Pesa cliffs flanking the south side of the Apheni Christos Valley.  
1988
- AG 1**                      Agios Georgios: north-northeast slopes  
4.5 km. Zone 12
- G-R VT  
Sherds and walls of G-R and later date.  
1987
- AG 2**                      Agios Georgios: basin  
4.88 km. Zone 12
- BA G-R VT  
A site located on a ridge in the middle of the pass area between Prina and Meseleri. BA, G-R, and later pottery was found with structure walls near the ruins of the church of Agios Ioannis (Byz?).  
1987
- Aph 1**                      Agios Phanourios: highway  
0.38 km. Zone 1
- M-LM I EIA? Byz1 VT  
A Minoan (including LM I) site above the coastal highway with a few walls. A building on the north side of the site is probably B/V.  
1986, 1988
- Aph 2**                      Agios Phanourios: metochi  
0.75 km. Zone 4
- BA? EIA-Orientalizing G-R Byz1 VT  
A metochi with some EIA, G-R, and Byz through T pottery located in a saddle between hills that extends to the west along a ridge above **Aph 3**. Wall foundations in the saddle have exterior faces

- of large, upright blocks similar to some foundations at **SK 1, 2**.  
1986, 1988
- Aph 3** Agios Phanourios: chapel and terraces to the east and southeast  
0.625 km. Zone 4  
MM LM I LM III PG–Orientalizing  
G-R VT  
A large, important LM–EIA settlement just twenty minutes walk east of Vrokastro. The massive walls (Pl. 78:d) may be BA in date (Fig. 18:B), although there is historical pottery here as well (Cl/H, some R). The settlement could overlap occupation of Vrokastro in the LM III period. Probable site of Hall's camp in 1912.  
1986, 1987, 1988  
Hall's personal correspondence, 1912, The University Museum Archives.
- Aph 4** Agios Phanourios: upper terraces  
0.69 km. Zone 4  
LM VT  
More massive walls on hills just south of the Phanourios chapel and west of a ravine that separates this site from **Aph 3**. Pottery appears to be LM I–III. The walls form a series of large rectangular structures on terraces and are similar in size to **Aph 3**.  
1987, 1988
- Aph 5** Agios Phanourios: coastal slopes east  
0.19 km. Zone 1  
BA T  
Minoan and later pottery around a fieldhouse at the east end of the Phanourios ridge overlooking the Phrouzi coastal basin to the east.  
1987, 1988
- Aph 6** Agios Phanourios: upper terraces  
0.69 km. Zone 4  
BA Later  
Knoll west of **Aph 4** has a pottery scatter, BA and later.  
1988
- Aph 7** Agios Phanourios: coastal slopes center  
0.15 km. Zone 1  
EM MM  
A scatter of handmade pottery, possibly EM and
- MM I, in a bulldozed area above the coastal highway.  
1987
- DL 1** Duo Laggadia: metochi  
2.13 km. Zone 4  
BA G-R VT  
A site along a ridge that overlooks the Xeropotamos basin to the south with Minoan, G-R, and VT pottery. There are fragmentary walls at the north end of a bulldozed plateau northwest of a metochi consisting of three fieldhouses.  
1988
- DL 2** Duo Laggadia: saddle  
2.3 km. Zone 4  
BA Later  
At the head of a deep ravine that runs north is a low saddle with a small distribution of Minoan and later pottery.  
1988
- EN 1** Elias to Nisi: west  
0 km. Zone 1  
LM I–III  
LM I–III pottery and very fragmentary structure walls were located on the west side of the west prong of this promontory. Farther south, near a two-room sheepfold, are faint traces of more walls.  
1986, 1988
- EN 2** Elias to Nisi: central bay  
0 km. Zone 1  
LM I LM III EIA  
A Late Bronze and possibly EIA settlement in the cove with some extant walls extending into the water. Foundations of an isolated structure are located on the highest point of the eastern prong. On the slope above the cove, an aloni was located, and a limekiln exists in the cove. Above the slope, a thick and possibly contemporary wall encloses the cove, extending from eastern cliffs of the promontory to the west side, where it disappears (Pl. 78:e). There are associated structure walls built up against the enclosure on its western side, and structure walls near it over the eastern cliffs. MM/LM I sherds were found falling out of fill under the wall (Fig. 18:C). A simple break may provide the only gate.  
1986, 1988

- EN 3** Elias to Nisi: south (Pylos)  
0.05 km. Zone 1  
MM LM I G-R VT  
The olive fields (Pylos) south of this enclosure wall have a light-to-moderate distribution of Minoan, G-R, and VT pottery.  
1986, 1988
- GN 1** Ginara: river scarp  
1.25 km. Zone 2  
MM LM I  
A MM-LM I stratum was located in the north side or scarp of a branch of the Istron River as it turns west, south of Ginara. Widening of a dirt road immediately above and north of the river stratum revealed fine and coarse BA pottery. A few traces of massive walls and corners existed above this area of road, on the southeast side of Ginara, indicating the location of the site. They have been bulldozed. Farther north on this hill slope, near an electrical pylon, the top of a structure wall and corner can be seen embedded in a road.  
1987, 1988
- GN 2** Ginara: northeast slopes  
0.6 km. Zone 2  
EM MM LM I  
EM sherds and obsidian flakes (the largest number found in the survey area) were located on the north side of the summit of Ginara and on the north slope of the hill. Just west of a quarry on the north face of the hill, a few small rooms are located on terraces, accompanied by possible LM I pottery. BA sherds are also loosely imbedded in a bulldozed scarp near an electrical pylon on the mid-summit of Ginara. There is a Minoan structure and pottery scatter located near a modern villa just west of the summit of Ginara, above a lime kiln.  
1987
- GN 3** Ginara: metochi  
1.18 km. Zone 11  
LV/T  
Remains of a metochi on the southwest edge of Ginara, above a cliff; the pottery is LV to T.  
1987
- GT 1** Gaitani: fieldhouse  
1.1 km. Zone 3
- BA? VT**  
A few sherds of possible BA date and V or T house walls just east of a shepherd's house, north of a dirt road to the monastery.  
1987, 1988
- IM 1** Ioannimiti: Stomeion  
0 km. Zone 1  
FN EM LM I Byz1 VT  
An area called Stomeion produced a thin, wide spread of pottery: a final Neolithic prong handle was found, possibly EM I-IIa pattern burnish and later Minoan, B, V, and T pottery. Many Venetian through Turkish and possibly Byzantine walls enclose small, abandoned fields; stone possibly has been robbed from earlier structures for these field walls, and a few scattered, small rectangular building foundations (Venetian or earlier) exist in juniper thickets, as well as a small limekiln. These may be part of an extended settlement. In fields and on a low hill just north of a V/T fieldhouse and aloni MM and LM I pottery was found.  
1986, 1987, 1988
- IM 2** Ioannimiti: Vathi  
0.33 km. Zone 1  
FN? EM  
An area called Vathi near and northeast of Ioannimiti produced Minoan (FN[?] and EM) pottery.  
1987, 1988.
- IM 3** Ioannimiti: Karavostasi  
0.13 km. Zone 1  
FN EM BA T  
On the slopes of Karavostasi just west of large stone apothekes (storage rooms), EM I, possibly FN, and later Minoan pottery has been found along with structural foundations which may be Minoan. Turkish pottery was also recovered.  
1986, 1987, 1988
- IM 4** Ioannimiti: metochi  
0.43 km. Zone 1  
VT mostly T  
A few fieldhouses on a hill southwest of Karavostasi, now mostly destroyed by new villa construction.  
1986, 1988

- IS 1** Istron: Kavos Taverna  
0.18 km. Zone 1  
MM LM I H VT  
MM, LM I, H, and T sherds on six ascending olive terraces south of the coastal highway and behind a small market; much of the Minoan fine ware has been bulldozed to the surface, although BA coarse ware was found on the surface. Large terrace walls look similar to those on **NP 1** and may be H. A new scarp resulting from recent widening of the national highway (1986) on its south side revealed G-R sherds at a level *ca.* 0.75 m. below the present surface, with claw-chiseled marl blocks projecting out of the scarp and a possible built drain (Pl. 79:e, f). Almost directly opposite, north of the highway, a massive, north-south double wall can be traced above the beach. Smaller contiguous walls extend east-west, and associated pottery is H and BA. These large walls may indicate that part of the settlement on **NP 1** extended around the southeastern beach and south across the present highway. Just east of **IS 1**, south of Kavos restaurant, there is a scatter of Cl/H and EIA pottery. Northwest of **IS 1** and across the highway there is an abandoned T fieldhouse.  
1986, 1987, 1988
- IS 2** Istron: west  
0.5 km. Zone 1  
MM LM I T  
MM and LM I and later (T) pottery scatter in the fields south of the road as well as in the road scarp, north of an abandoned building.  
1986, 1988
- KA 1** Kato Arniko: hilltop, north, east,  
and west slopes  
0.95 km. Zone 11  
EM MM LM I G-R  
EM, MM, and some LM I pottery with a few possible walls preserved, especially on the northeast side. Associated pottery in bulldozed scarps on the northeast slopes is BA. On the northwest side there are also traces of a few large walls just above the asphalt road to Kalo Chorio; pottery in and above the road scarp is MM-LM I, and farther south, G-R. Early Minoan pottery was found in a cave (a burial?) cleared by Hall (a series of small caves extends east-west across the north face of the hill). A depression between Kato Arniko on the west and a hill forming part of Kopranes on the east contains EM-LM I and later pottery.  
1986, 1987  
Hall 1914, p. 85; Faure 1956, p. 96.
- KA 2** Kato Arniko: south and southeast slopes  
1.18 km. Zones 9, 11  
EM VT  
A continuation(?) of the EM site on the east, southeast, and south sides of Kato Arniko; traces of earlier walls remain near alonia on the south side of the hill; V? and T sherds and obsidian blades have also been found here. A small limekiln is located just west of this area.  
1986, 1987
- KA 3** Kato Arniko: highway  
0.75 km. Zone 2  
BA G-R VT  
Disturbed area of BA and G-R and later pottery, roof tiles, and massive walls on the north and south sides of the coastal highway just west and northwest of the hill Kato Arniko (the remains of a chimney mill are located on the north side of the highway).  
1987
- KK 1** Kalo Chorio: Agios Nikolaos,  
lower Istron Valley  
2.38 km. Zone 2  
EM? MM LM EIA? G-R Byz1 VT  
The chapel of Agios Nikolaos and cemetery, on a low hill in the center of the lower Istron Valley. Bulldozing on the north and east sides outside the cemetery walls has revealed Minoan pottery (MM, LM), marl blocks, and ground-stone tools. Later pottery includes EIA?, as well as G-R, and B through T. Obsidian has also been found. BA pottery is densest on the north and northwest side of the cemetery, but the spread continues far to the southeast (almost to **KK 5**). G-R pottery is located on the lower north and southwest slopes of this hill.  
1987, 1988
- KK 2** Kalo Chorio: Xivouni, lower Istron Valley  
2.58 km. Zone 11  
LM I? LM III H T  
The hill of Xivouni (Pl. 78:f), southwest of the Agios Nikolaos cemetery, with BA sherds (LM I?/III) on the north and northeast slopes (and some H and T; a fieldhouse is located on the southwest side of the hill). Possible BA walls exist

on the south side of the summit above a bulldozed terrace, on the northeastern slope, and project out of bulldozed scarps on the east side. This is an important, though much damaged, LM III site. A scatter of pottery extends from this site west to the Prina gorge.

1987, 1988

**KK 3** Kalo Chorio: village  
1.5 km. Zone 2

BA R Byz VT

An area of dense pottery with some BA, R, and Byz through T in fields just north of the village of Kalo Chorio. Just south of this area is a ruined chimney mill and chapel.

1987, 1988

**KK 4** Kalo Chorio: village  
1.25 km. Zone 2

G-R Later

Walls and possibly water channels associated with R and later pottery just north of a banana greenhouse, north of the village of Kalo Chorio, this may be linked to **KK 3**.

1987, 1988

**KK 5** Kalo Chorio: lower Istron Valley  
2.6 km. Zone 2

EM? MM LM I LM III

On the east side of the lower Istron Valley, southeast of the church of Agios Nikolaos and below the road to Prina and Meseleri, LM pottery and walls(?), possibly linked to **KK 1** and more certainly to **KK 2** (Xivouni), to the west.

1988

**KK 6** Kalo Chorio: metochi  
1.88 km. Zone 11

BA VT

BA and some VT pottery accompanied by structure walls and terraces, especially coming down southwest-facing slopes. The recent pottery is associated with a ruined fieldhouse complex.

1988

**KK 7** Kalo Chorio: east  
1.8 km. Zone 11

BA

A small scatter of Minoan pottery, possibly walls, on a long ridge west and above the Aphenidi Christos Valley.

1988

**KK 8** Kalo Chorio: Aphenidi Christos  
bridge and torrent  
1.25 km. Zones 2/9

MM–LM I

There is a scatter of MM–LM sherds between the hill Kato Arniko and Kalo Chorio, on the west side of a torrent bed that cuts through the Istron Valley on its east side. This is an area Hall identified with a possible LM I town, based on finds reported to her.

1987

Hall 1914, pp. 84–85.

**KL 1** Kolumbous: fieldhouse  
2.5 km. Zone 5

BA? G-R VT

In the Xeropotamos Valley, G-R and later pottery was found near a fieldhouse complex; possibly some BA in a very disturbed area.

1988

**KM 1** Kendromouri: metochi Stibataki  
0.5 km. Zone 3

MM LM I LMIII/EIA? VT

A Late V to T metochi (Nikoli Stibataki) north of a dirt road that leads to the Panagia Phaneromeni monastery, near the west end of the Gournia plain. The metochi consists of two structures. MM–LM I (Fig. 18:A) and possibly some EIA pottery has been identified, north and northeast of the metochi, and ascending a hill to the south. More BA pottery was found extending into a ravine west of the site from a rock shelter located in a saddle just north of the metochi hill. This appears to be one of the largest Minoan sites within the study area.

1987, 1988

**KM 2** Kendromouri: metochi Sphakolaggado  
0.88 km. Zone 3

MM LM I EIA? VT

A second MM–LM site is located under and north of a LV to T metochi (Sphakolaggado), north of the road which leads to the monastery. This is on the west side of the ravine west of **KM 1** and may form one settlement with it. There are considerable BA wall foundations, especially just north of the village.

1987

**KM 3** Kendromouri: saddle  
0.75 km. Zone 3

- LM  
This site in a saddle north of **KM 2** produced fine ware, probably LM.  
1987, 1988
- KM 4** Kendromouri: highway  
0.5 km. Zones 1/3
- LM  
A thin scatter of Minoan between **KM 3** and the coastal highway, probably linked to **KM 3**.  
1988
- KP 1** Koprane: Vouno  
0.5 km. Zone 1
- LM I EIA  
An area at the north base of the hill Vouno, northwest of Vrokastro, with LM I and some EIA pottery. Hall excavated an LM I house north of the Koprane graves; this may be the site of that excavation.  
1986, 1988  
Hall 1914, p. 84.
- KP 2** Koprane: limekiln  
1 km. Zone 1
- EM MM?  
A small area of EM II-III pottery, bulldozed, near the top and on the west side of a ravine, just south of a large limekiln. Pottery consists primarily of fine ware including Vasilike. A small amount of EM to MM pottery was found in a scarp on the north side of a small olive grove, above a dirt road, south and above **KP 2**.  
1986, 1987
- KP 4** Koprane: terrace  
0.9 km. Zone 1
- LM VT  
A site below and north of **KP 2** with LM pottery (and some VT) and robbed walls. On the north side of this site is a small area of LM I, seen in the scarp cut for a new house (this was **KP 3**, later incorporated in **KP 1**). Part of this site extends to the east side of the ravine below the limekiln (**KP 2**).  
1986, 1988
- KP 5** Koprane: rock shelter and terrace  
0.9 km. Zone 1
- LM I? LM III  
There is a dense, limited distribution of LM
- pottery in front (west) of a small cave, along with small rooms just before the cave entrance. Part of a larnax has been recovered from this area. Sherds have washed down slope from this location and the eastern slopes of Kato Arniko to fill a small pass between the two hills.  
1986, 1987, 1988
- KP 6** Koprane: Vouno, south, east, and west slopes  
0.55 km. Zone 1
- FN-EM I LM III EIA  
The area south, east, and west of the Vouno peak produced LM III and EIA fine-ware pottery on the east side (possibly from a tomb) and hand-made, burnished pottery (FN or EM) on the west side near the peak.  
1986, 1987
- KP 7** Koprane: Vouno cemetery  
0.65 km. Zone 10
- LM III EIA  
Part of the Vrokastro cemetery excavated by Hall in 1912. She found three tombs with corbeled vaults (numbers V-VII), one bone enclosure (VII), and possibly five more (VIII-XII), although only VII is specifically located on Koprane. The location is just south of a goat path (northwest-southeast), which extends from the coastal highway up to the Vrokastro peak.  
1986, 1987, 1988  
Hall 1914, pp. 84, 149-154, 163-169.
- KPh 1** Khoraphia: fieldhouse  
4.45 km. Zone 8
- VT  
A fieldhouse with a small VT scatter.  
1987
- KPh 2** Khoraphia: fieldhouse  
4.3 km. Zone 8
- G-R? VT  
A fieldhouse and possibly some ancient structure walls with pottery, G-R? and VT.  
1987
- KPh 3** Khoraphia: east  
4.35 km. Zone 8
- G-R Byz?  
Walls and pottery of Archaic and later date and much architectural evidence, with walls preserved

- to the fourth course. It may be a part of **SK 2**, a short distance east on the Schinauria cliff edge.  
1988
- MK 1** Mesa Kephala: northeast  
3 km. Zone 7  
BA  
Light distribution of Minoan material including two obsidian fragments.  
1988
- MK 2** Mesa Kephala: ravine  
3.35 km. Zone 7  
BA G-R? VT  
BA and possibly G-R with VT pottery associated with a rock shelter, now used as sheepfold.  
1988
- MK 3** Mesa Kephala: fieldhouse  
3.45 km. Zone 7  
VT  
Two or more fieldhouses on Mesa Kephala hill, T or earlier; little associated pottery.  
1987, 1988
- NP 1** Nisi Pandeileimon: promontory  
0 km. Zone 1  
BA Archaic Cl-H T  
Some BA pottery, possibly EM/MM (worn handmade sherds with green cores), was located in gridding this site, as well as sherds possibly as early as the 7th century B.C. through the H period. Structure walls are located on terraces on the northwest side, and immediately above sea level there is an enclosure wall *ca.* 1.50 m. thick. Larger structures occur in the north central area (recently damaged by clearing) and on the southwest knob. The largest structures may have been placed on the southern slopes, and room walls and corridors here extend roughly east-west. Walls extend into the water on the southeast side (part of a harbor installation?). Minoan and possibly later pottery was found on a cliff above a beach, associated with walls protruding from this cliff, just east of the promontory. There is also a small distribution of EIA and later pottery on the north side of the coastal road directly below Vrokastro, south of this beach.  
1986, 1988  
Hall 1914, p. 85; see notes 22, 110, 119, 120 above.
- OL 1** Oleros: north slopes and valley floor  
4.88 km. Zone 13  
BA G-R Byz VT  
This site produced a few BA sherds, but it is primarily G-R and later and extends across the north side of the valley, with pottery distribution particularly heavy just southeast of the cemetery at **PI 4**. There are abundant architectural remains.  
1988
- OL 2** Oleros: village  
5.13 km. Zone 13  
G-R Byz? VT  
This area is located just east of Meseleri and contains G-R and later pottery, as well as many worked stones (column drums, bases, querns, cut blocks, etc.) built into terraces and fieldhouses.  
1988
- PI 1** Prophitis Ilias: Peristeries  
3.13 km. Zone 10  
LM VT  
Peristeries ridge just north of the highway to Prina with LM pottery beside the middle aloni. The fieldhouses are LV to T.  
1987
- PI 2** Prophitis Ilias: chapel hill, olive grove to south  
3.8 km. Zone 12  
MM-LM I R Byz1 VT  
The chapel hill in the Prophitis Ilias Valley. It was the site of a Minoan settlement with some fine ware recovered and rope-decorated pithoi. There is overlying occupation of the R, Byz, and later periods which extends into olive groves south of the hill. Walls and foundations are preserved on the south slopes, some possibly BA. A calderimi (cobble road), now replaced by a bulldozed dirt road, linked Kalo Chorio to this valley. The route extends to Meseleri and from there to the south coast at Hierapetra.  
1987, 1988
- PI 3** Prophitis Ilias: aloni  
4.13 km. Zone 12  
MM-LM I  
A small area of BA pottery with accompanying structure (possibly just one room). This is near an aloni.  
1987

- PI 4**                      Prophitis Ilias: cemetery  
4.5 km.    Zone 12
- Archaic-H    VT  
A ridge located just south of Prophitis Ilias Valley, overlooking the Meseleri Valley to the south. Pottery is Archaic at the earliest, H, and VT. This later pottery is associated with fieldhouses on the ridge. The earlier material comes from a large cemetery that extends from the ridge top to the valley floor. Tombs include oval to round, rock-cut types, possibly with corbeled roofs, and rectangular cists (Pl. 79:c). Figurine fragments and black-painted fine wares were recovered.  
1987, 1988
- PI 5**                      Prophitis Ilias: Phrangiadouli  
4.25 km.    Zone 12
- BA    VT  
Small area of Minoan pottery on the top and west slopes of the hill just south of the Prophitis Ilias chapel, between two fieldhouses of the Turkish period.  
1987
- PN 1**                      Prina: Stauromenos chapel  
5.3 km.    Zone 12
- MM    LM I?    VT  
MM pottery (tripod legs, fine painted ware, cup rims) and later pottery were recovered from the top of the chapel hill of Stauromenos, in the village of Prina.  
1986, 1987
- PN 2**                      Prina: Stauromenos slopes and fields  
to north, northwest  
5 km.    Zone 12
- LM    EIA-Orientalizing    G-R    VT  
A spread of EIA through Orientalizing with some Greco-Roman and later pottery begins on the north slope of Stauromenos hill and continues northeast into the saddle. A few pieces of Minoan pottery were recovered. Pottery includes bases with tear-drop shaped incisions (similar decoration occurs on sherds from **SK 1**, **NP 1**). Painted motifs include compass-drawn circles with a fill of dots (Orientalizing).  
1986, 1987
- PN 3**                      Prina: gorge  
4.25 km.    Zone 12
- EM?    BA    G-R    Later
- On the west side of the gorge fieldhouses and Minoan and later pottery occur in an area with good visibility to the coast. The pottery is scattered primarily between two paths but extends over the higher path almost up to the modern road linking Prina to Krousta. Some walls visible in recently bulldozed scarps.  
1987
- PP 1**                      Priniatikos Pyrgos: promontory  
0 km.    Zone 1
- EM    MM    LM I    LM III    EIA    Cl    H  
R    Byz1    VT  
A small excavation was conducted here by Hall in 1912. Pottery includes EM I (Agios Onouphrios) through LM I, possibly a few pieces of LM III and EIA, some H, much R, Byz-V, T, also much slag, and a few obsidian blades and pieces of worked stone. There are walls on the northeast side of the promontory similar in size and construction to those on Nisi Pandeimon, accompanied by G-R and later pottery. There may be traces of a possible cistern (plaster lined) near the water on the west side, and protruding from the scarp on the west side, Minoan rubble walls with mud plaster or brick or both extend several meters into the sea.  
1986, 1987, 1988
- PP 2**                      Priniatikos Pyrgos: chapel? Agrokipio  
0.25 km.    Zone 1
- VT  
Ruined structure, possibly a chapel.  
1986
- PR 1**                      Pyrgos: Marmara, Anousa, or Helleniko  
1.25 km.    Zone 2
- G-R    Byz1    VT  
A site between the spring of Pyrgos, on the north side of the village, and an old mill farther north. Marble coffer fragments, large chisel-worked blocks, and Corinthian and Ionic capitals (Pl. 79:d) of the 1st through 3rd centuries after Christ can be found in the area, all located near a rectangular cement foundation (a church or temple?), ca. 5 by 11 m. (southern extent not determined). Fragments of marble architectural elements have been built into the mill. Pottery is G-R, Byz, and V to modern and extends south to the northern edge of the village of Pyrgos.  
1987, 1988  
See note 27 above.

- PR 2** Pyrgos: south  
1.9 km. Zone 11  
BA VT  
A small and light scatter of Minoan fine ware and later pottery near an electrical pylon on the south side of Pyrgos hill.  
1987
- PR 3** Pyrgos: village  
1.63 km. Zones 2/11  
BA VT  
A Turkish and earlier community located just south of and upslope from the modern village of Pyrgos. Pottery extends west on this level to the north slopes of Pyrgos hill, terraced with large walls. Some BA sherds were found here.  
1987, 1989
- PR 4** Pyrgos: Agia Paraskevi  
0.88 km. Zone 2  
VT  
Two ruined Turkish fieldhouses flanking the east side of Ginara, on the Istron Valley floor. The church to the north is Agia Paraskevi, near a large limekiln.  
1987
- PhR 1** Phrouzi: hill  
0.13 km. Zone 1  
EM MM? VT  
There is an EM-MM structure on this coastal peak (with some obsidian). More structure walls are visible on the west side of the hill with BA pottery. A ruined Turkish fieldhouse complex exists just west of the peak.  
1986, 1988
- PhR 2** Phrouzi: river terrace  
0.25 km. Zone 1  
BA Later  
The valley or fan of the Xeropotamos River to the west of the peak contains BA (possibly MM-LM I) and later pottery.  
1986, 1987, 1988
- PhR 3** Phrouzi: highway  
0.44 km. Zone 1  
MM LM I  
A small area of MM-LM I pottery just south of the coastal highway; this may be part of **KM 1**.  
1986, 1988
- PS 1** Pesa: pass  
2 km. Zone 4  
BA? VT  
A small area of VT and a few possible BA sherds at the top of a pass linking the Aphenidi Christos Valley to the fields south of Vrokastro; nearby there are traces of a small paved area (possible calderimi) and a small oval room with tumble.  
1986, 1988
- PS 2** Pesa: cave  
2.15 km. Zones 9/10  
BA VT  
In the Pesa pass is a cave on the southwest side of a dirt road leading from the Aphenidi Christos Valley to the fields south of Vrokastro. It contains Minoan to VT pottery and some walls and has been used as a sheepfold.  
1988
- PS 3** Pesa: cave  
2.05 km. Zones 9/10  
LM EIA  
A cave on the north-facing cliffs over the Aphenidi Christos Valley contains LM and EIA pottery and structure walls extending to the exterior.  
1988
- PT 1** Potamoi: Vrysidea  
1.28 km. Zone 4  
EM MM LM EIA? Archaic? VT  
EM-MM, LM, and EIA?, Archaic? and VT pottery (and a modern fieldhouse) on a hill with a perennial spring beside the Xeropotamos River. A few walls are preserved on terraces cut for structures on the north side of the hill under a cliff. South, east, and west sides have been bulldozed, with some structure walls still extant in new scarps.  
1986, 1987
- PT 2** Potamoi: limekiln  
1 km. Zone 4  
BA Later  
BA and later pottery is exposed near a limekiln to the east of the footpath from Vrysidea to Phanourios.  
1988
- PT 3** Potamoi: south-facing slopes  
1.2 km. Zone 4  
BA?

- A few possible BA sherds in a small scatter on the south-facing slopes at the east end of the Potamoi ridge.  
1988
- PT 4** Potamoi: cliffs  
1.63 km. Zone 3
- LM III? EIA? T  
Sherds of LM III? and possibly EIA date and walls near a fieldhouse of the Turkish period.  
1988
- PV 1** Pirovolos: metochi  
2 km. Zone 4
- BA MM LM R Byz VT  
Minoan, R, and Byz-T pottery on and east of a bulldozed flat hilltop extending north from a LV-T metochi with alonia and a cistern (3 structures).  
1986, 1988
- PV 2** Pirovolos: south  
2.35 km. Zone 4
- G-R Byz1  
G-R to Byz pottery on abandoned terraces, north-east of a footpath from Tzamachi to Kolombous.  
1988
- PV 3** Pirovolos: east  
1.88 km. Zone 4
- BA Byz1 VT  
BA and Byz-T pottery north of a path from Pirovolos to the monastery.  
1988
- PV 4** Pirovolos: northwest  
1.95 km. Zone 4
- BA Byz?  
Primarily BA and possibly Byz pottery on the north edge of the Pirovolos ridge overlooking Xeropotamos River valley. Possibly walls.  
1988
- SK1** Schinauria Koriphi: Georgiakis or Myrthia  
4.5 km. Zone 8
- Orientalizing/Archaic Cl Byz? VT  
The toponym is Georgiakis or Myrthia. The site extends across two saddles or ridges between three knolls and is, at the earliest, Orientalizing/Archaic-Cl, with some Byz? and VT. Rooms are placed against a long, wide rubble wall which extends the length of one ridge. Black-painted
- sherds, raised bases, and pieces with tear-drop incisions were recovered (for the same motif, see **PN 2, NP 1** [Fig. 18:E]). There is a spring directly to the east.  
1986, 1987
- SK 2** Schinauria Koriphi: fen  
4.25 km. Zone 8
- Orientalizing/Archaic Cl Byz? T  
A site of date similar to **SK 1**, with a large rectangular structure placed on a raised platform (Pl. 79:a) and underlying curved walls (an apsidal structure?). The possible water source is a dried-up fen.  
1986, 1988
- SK 3** Schinauria Koriphi: Mesa Kephala  
4.13 km. Zone 8
- BA? G-R  
This is a small scatter of G-R with a few possible BA sherds. No walls were noted.  
1988
- SK 4** Schinauria Koriphi: knoll  
4.05 km. Zone 8
- G-R  
A light distribution of G-R pottery and accompanying walls.  
1988
- SK 5** Schinauria Koriphi: Mesa Kephala  
3.88 km. Zone 8
- BA  
BA pottery was found amid terrace walls overlooking the Mesa Kephala basin.  
1988
- SK 6** Schinauria Koriphi: hilltop  
4.68 km. Zone 8
- G  
A site with large wall foundations; some sherds are G.  
1988
- SK 7** Schinauria Koriphi: Stauromenos  
spring west  
4.75 km. Zone 8
- R  
Dense R pottery associated with walls; possibly rooms preserved, just west of a spring.  
1988

- SK 8** Schinauria Koriphi: Stauromenos chapel and saddle  
4.88 km. Zone 8  
FN/EM? BA VT  
Traces of a curved wall associated with BA pottery; sherds are visible in bulldozed piles at the north edge of a small basin north of the Stauromenos chapel.  
1988
- SK 9** Schinauria Koriphi: Stauromenos spring north  
4.5 km. Zone 8  
BA? G-R  
G-R pottery, possibly some BA, found with walls.  
1988
- SK 10** Schinauria Koriphi: Stauromenos spring north  
4.35 km. Zone 8  
G-R  
G-R pottery and possibly walls.  
1988
- SO 1** Sopata: Palaiaphrama  
2.5 km. Zone 7  
VT  
Metochi Palaiaphrama, with VT sherds. A large T mandra also is located on Mount Sopata.  
1987
- SO 2** Sopata: Monastery  
2.25 km. Zone 10  
Byz VT  
Monastery of Panagia Phaneromeni, founded before the 13th century.  
1986, 1987, 1988  
Psilakis 1988, pp. 190-195.
- SP 1** Spilia: Kalives  
2.68 km. Zone 11  
EM MM LM I R-Byz  
On the northeastern summit of the hill Kalives, EM-MM and LM I pottery was found near a terrace wall. Sherds include fine painted ware but are primarily coarse wares (e.g., rope-decorated pithoi and tripod legs). To the south is a large area of LR and Byz pottery.  
1987, 1988
- SP 2** Spilia: fieldhouse southwest  
2.88 km. Zone 11
- BA T**  
South side of Kalives: Minoan and T pottery south of a fieldhouse; large terrace(?) walls. This area is just west of the mouth of the Prina gorge.  
1988
- SP 3** Spilia: road-cut  
3.52 km. Zone 11  
R Byz1  
Southwest of the hill Spilia in a road-cut is a dense scatter of red-slipped sherds. Some walls are possibly preserved.  
1988
- TM 1** Tzamachi: spring  
3.7 km. Zone 7  
MM LM I G-R T  
Minoan (MM/LM I) pottery, structural foundations, and Cl/H and possibly R pottery located in an area northeast of a dried-up spring within this T metochi, which is composed of widely dispersed fieldhouses and threshing floors.  
1986, 1987
- TM 2** Tzamachi: well  
3.75 km. Zone 7  
LM I  
Small LM I settlement just east of **TM 1**; fine ware includes conical cups. This may form one site with **TM 1**.  
1987
- TM 3** Tzamachi: west  
3.58 km. Zone 7  
BA G-R  
Moderate scatter of G-R and BA around an abandoned fieldhouse complex with some possibly ancient walls.  
1987
- TM 4** Tzamachi: metochi, southeast terraces  
3.5 km. Zone 7  
G-R VT  
A scatter of Greco-Roman and later pottery.  
1988
- TM 7** Tzamachi: metochi  
3.35 km. Zone 7  
BA G-R VT  
BA, G-R, and VT sherds on the west side of the Tzamachi area containing scattered fieldhouses.

- (This site has been merged with **TM 5** [Minoan and later pottery mixed in terraced fields] and **TM 6** [primarily VT and some G pottery in terraces north of a group of ruined fieldhouses, below a spring].)  
1988
- TM 8** Tzamachi: west  
3.65 km. Zone 6  
MM LM G-R  
Minoan and G-R pottery on a bulldozed terrace southwest and above **TM 1**, with walls, possible tombs (small, oval-shaped areas outlined in small stones, similar to **PI 4**).  
1987
- TM 9** Tzamachi: east  
3.45 km. Zone 7  
BA? Later?  
A light scatter of BA? and possibly later pottery northeast of the pass between Tzamachi and Asari, on the southwest side of a new road.  
1987
- TS 1** Tsigkouni: fieldhouse  
3.25 km. Zone 7  
BA T  
A small Minoan scatter and T structure and sherds.  
1987
- VK 1** Vrokastro: peak  
0.58 km. Zone 4  
MM LM IIIC EIA Early Orientalizing T  
MM I-III pottery; settlement of LM IIIC, EIA to early 7th century, on the Vrokastro peak and north slope, extending into fields to the southwest. Light scatter of T pottery on the peak.  
1986, 1987, 1988  
See note 1 above.
- VK 2** Vrokastro: Karakovilia  
0.78 km. Zone 4  
EIA  
Area of ossuaries, built tombs, and possibly house walls on the eastern part of the ridge immediately southwest of the Vrokastro peak. (**VK 11** has been merged with **VK 2**: this is an area with more walls and tombs near pottery and possible figurine fragments.)  
1987
- VK 3** Vrokastro: Mazichortia  
1.35 km. Zone 4  
EIA  
Recently bulldozed EIA structure (or tomb?) at the end of a field south of a shepherd's house.  
1986, 1988
- VK 4** Vrokastro: Mazichortia  
1.3 km. Zone 4  
EIA  
Geometric bone enclosure in the field called Mazichortia, south of a shepherd's house.  
1986
- VK 5** Vrokastro: Aphendi Christos pass  
1.45 km. Zone 4  
LM III EIA  
In the Vrokastro pass, walls and pottery are exposed in the road scarp on the east side in an area linking the Aphendi Christos Valley and Mazichortia.  
1988
- VK 6** Vrokastro: Kavousanida southwest  
1.75 km. Zone 4  
MM LM I  
A site located on a long slope immediately west and south of the Kavousanida spring, of MM-LM I date.  
1988
- VK 7** Vrokastro: Kavousanida northeast  
1.5 km. Zone 4  
LM I-III EIA  
A settlement of LM I-III and later date with large structure walls, just northeast of the spring and east of the T metochi of Kavousanida. This settlement may continue under the village. The site is five to ten minutes walk from the peak of Vrokastro.  
1988
- VK 8** Vrokastro: Kavousanida metochi  
1.6 km. Zone 4  
VT  
A large metochi (primarily Turkish period and some Venetian) south of the Vrokastro peak, above and north of a perennial spring that must have served the Vrokastro population as well as this village. It is one of the largest metochia (6 + houses) in the area.  
1986, 1987, 1988

- VK 9** Vrokastro: Mazichortia  
1.13 km. Zone 4  
A Geometric bone enclosure found in walking a transect at Amigdali.  
1986  
EIA  
Corbel-vaulted tomb northwest of the shepherd's house in the middle of a long ridge that extends southwest from Vrokastro.  
1988
- VN 1** Vrionisi: island  
0 km. Zone 1  
R  
Roman inscriptions in the cliffs of this island.  
Boyd 1904, p. 15; Chapouthier 1935, pp. 376–381; Pendlebury 1939, p. 365; Halbherr 1890, pp. 13–14.
- VK 10** Vrokastro: Mazichortia  
1.38 km. Zone 4  
EIA  
Tumble and possible backfill from excavated Geometric bone enclosures (or less probably houses) on a knob of this same ridge, west-northwest of the shepherd's house.  
1986, 1988
- VN 2** Vrionisi: promontory  
0.08 km. Zone 1  
BA VT  
Small disturbed area of BA and V to modern pottery, possibly walls.  
1987
- VK 12** Vrokastro: Amigdali  
1.78 km. Zone 4  
EIA

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BARBARA J. HAYDEN

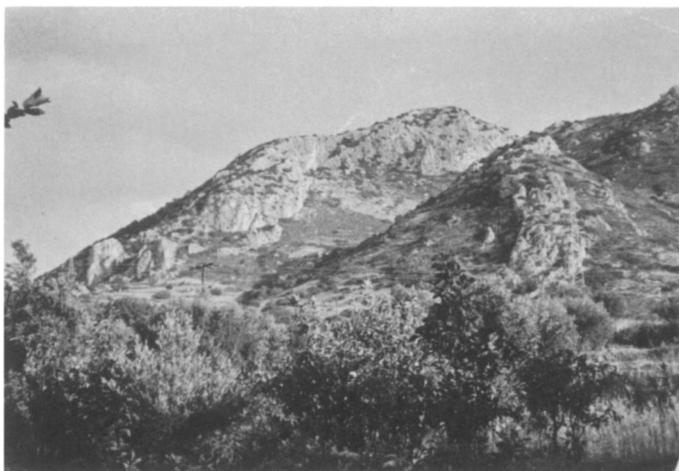
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OLIVER RACKHAM

CAMBRIDGE UNIVERSITY  
Corpus Christi College  
Cambridge, England



a. Vrokastro and the hill Vouno in the foreground, from the north coast



b. The Istron River valley and flood plain from the south with Kalo Chorio in the foreground



c. The Meseleri Valley from the west



d. The mountain of Stauromenos from the west



e. The gorge north of Prina from the north



f. The Xeropotamos River basin

PLATE 76



a. The Kolumbous range and area south of Vrokastro, from the north



b. The mountain of Schinauria Koriphi from the south



c. The promontory of Priniatikos Pyrgos from Vrokastro



d. The promontory of Nisi Pandeimon from Vrokastro



e. The promontory of Elias to Nisi from Vrokastro



f. The promontory of Vrionisi from Vrokastro (to right)



a. The Kolumbous mid-range, Zone 5



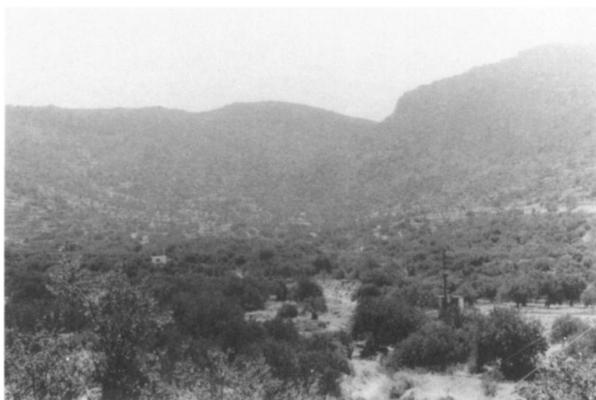
b. Kolumbous steep upper slopes, Zone 6



c. Part of the Tzamachi terrace from the east, Zone 7



d. Part of the Schinauria plateau from the west,  
Zone 8



e. The Apheni Christos Valley from the north,  
Zone 9



f. Steep upper slopes, Zone 10

PLATE 78



a. Slopes enclosing upper and lower Istron Valley, Zone 11



b. Prina-Meseleri pass, Zone 12



c. Site of APh 3 from the west



d. Large wall at APh 3



e. Wall enclosing EN 2 from the south



f. Hill of Xivouni from the east



b. Prophitis Ilias Valley from the south



a. Building foundation at SK 2



c. Cist tomb at PI 4



d. Marble capital from Marmara, PR 1



e. Claw-chiseled marl block from road scarp at IS 1



f. Marl blocks in scarp (drain?) at IS 1