Bronze Age and Late Antique Exploitation of an Islet in the Saronic Gulf, Greece

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The examination of islets in the Gulf of Korinth and the Saronic Gulf has formed an important part of investigations in Greece by Ohio State University archaeologists since 1981. This work entails archaeological surface survey and topographic mapping of ancient and medieval remains. This information, supplemented by data from the southern Argolid and elsewhere in the Peloponnesos, has revealed a pattern of exploitation of marginal zones in the period from the 4th through the 7th centuries A.C., *and to some extent in the Late Bronze Age or Mycenaean period (1600–1200* B.C.*). Recent work has concentrated on the island of Evraionisos in the western Saronic Gulf. Surface ceramics indicate the presence of Mycenaean to Byzantine components on various parts of the island, with Late Roman material particularly abundant. Despite its lack of a natural source of drinking water, the island provided enough advantages to be used, at times heavily, from late prehistoric through early modern times. The pattern of exploitation and its implications for economic conditions in the Late Bronze Age and Late Antiquity are discussed.*

Introduction

In 1970, Sinclair Hood described as isles of refuge a number of small islands around the shores of the Peloponnesos and elsewhere in Greece. He surmised that the Late Roman materials on the islands dated in the 6th and 7th centuries A.C., when various Slavic groups descended on Greece and devastated the countryside and a number of cities; as a result, people fled to near-shore islands, which are generally inhospitable due to rough terrain and the lack of fresh water, to escape the ravages of the invaders. As evidence, Hood (1966, 1970) pointed out the small settlements on islets in the Bay of Itea on the north coast of the Gulf of Korinth, Rafti Island off the east coast of Attika, the islet of Pera in Perani Bay on the south coast of Salamis in the Saronic Gulf, and the south end of Sfakteria in the bay of Navarino in SW Greece (FIG. 1). He argued that these locations are inimical to human habitation, and so people would reside there only under duress: "But houses with stone foundations and tiled roofs and cisterns built or cut in rock . . . seem unlikely to reflect temporary occupation for the duration of a single raid. These houses and cisterns imply the establishment of permanent settlements on the islands, which suggests a continuous threat from the landward side. Such a threat would scarcely have been felt before . . . the mass penetration of Slavs from 578/9 onwards" (Hood 1970: 42). Other scholars have adopted this perspective in their discussions of events in the eastern Roman Empire (Hendy 1985: 79; Koder 1978; Rosser 1985).

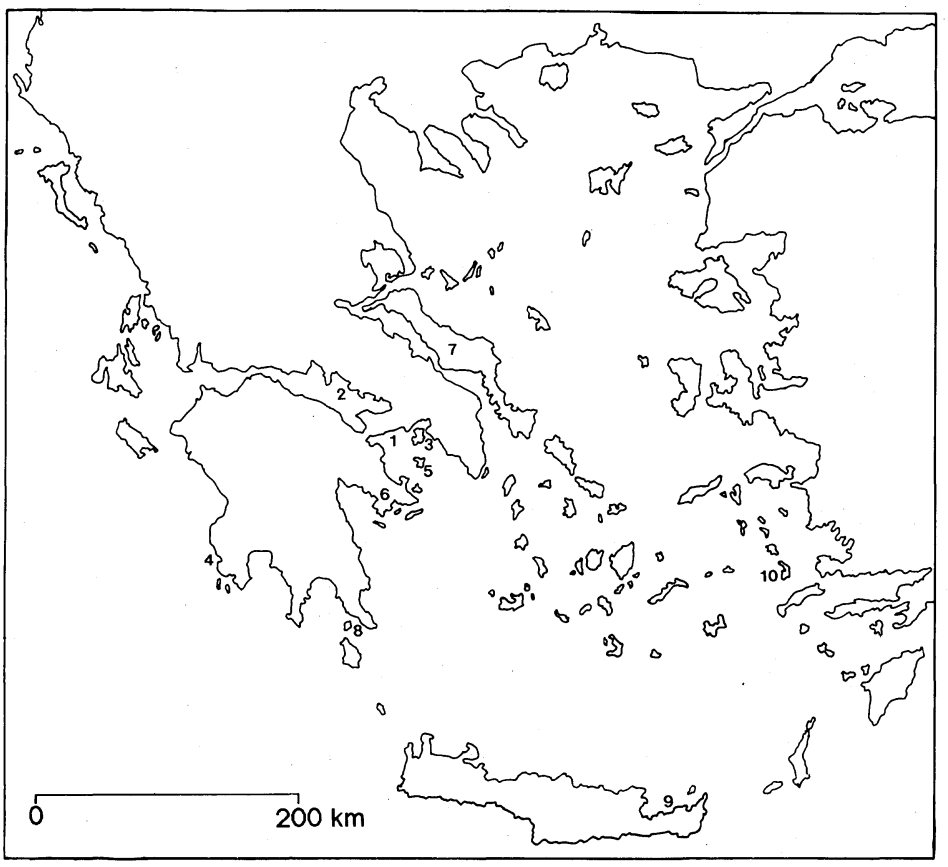
Some have reexamined this issue and offer different interpretations (Gregory 1984, 1986). The ceramic and architectural material that Hood dates to the late 6th century in fact falls into a broader range of the Late Roman and Early Byzantine periods (4th–7th centuries A.C.). The dates Hood himself assigned to the pottery from the islands he studied varied widely, from the "early-middle fifth century" (Hood 1970: 40, fn. 3) onward. Publication of important studies by John Hayes (1972, 1992) has helped to refine the chronology of pottery found on such islands and confirms that characteristic examples can be assigned to the entire period from the 4th or 5th to the mid or even late 7th centuries. In addition, the small settlements on these islands exhibit considerable refinements—buildings and cisterns are often large and well-

made, fine ceramic wares are not uncommon, and the remains present an image, not of refugee populations huddled in inhospitable quarters, but of systematic, planned, and even prosperous small communities that intentionally exploited, in some instances for the first time, significant ecological niches on islands within easy reach of the mainland. What is more, the nearness to the shore would have provided little security, and thus it is unlikely that people would have been safe simply because of the insular location. Some of the islets are no more than 300 m from shore and few have evidence of defensive walls.

Recent Fieldwork

Timothy Gregory of Ohio State University (OSU) initiated a re-examination of this issue by investigating several islands at the mouth of the Bay of Domvrena in the eastern Korinthian Gulf, near the Thisbe Basin of Boeotia (Gregory 1986). Fieldwork on two islands, Kouveli and Makronisos, between 1981 and 1984 revealed dense occupation beginning in the 3rd century A.C. and continuing into and beyond the period of the Slavic invasions that Hood proffers as the instigation for the island occupations. Kouveli (1 km NE–SW × 0.5 km NW–SE) has four Late Roman sites, one with at least 21 buildings, and another with a building 80 m long. There are 11 sites on Makronisos (2 km E–W × 0.5 km N–S); the largest, called Diporto by the research team, had at least 57 buildings, some quite elaborate in construction. At its height in the 5th–7th centuries, Makronisos evidently supported a three-tiered settlement system comprising the large community of Diporto, a village or villa complex at another site, and a number of isolated farmsteads (Gregory 1984). Gregory argues these islands were ports of trade in an extensive, long-distance commercial network that provided egress to the sea for southern Boeotia; the inhabitants probably served as merchants, sailors, etc., whose primary function was to supply and service larger commercial settlements on the mainland. The islands probably did house refugee communities at some point in the 6th to 8th centuries, but such dire conditions were not the catalysts for initial occupation.

Figure 1. Map of the Aegean showing sites and areas mentioned in the text: 1) Saronic Gulf, 2) Korinthian Gulf, 3) Salamis, 4) Sfakteria, 5) Aegina, 6) Southern Argolid, 7) Euboea, 8) Cape Malea, 9) Gulf of Mirabello, 10) Kalymnos.



Although not framed in such terms, Gregory's study has implications for world systems analysis (Wallerstein 1974) of the Roman economy. Woolf's (1990) excellent appraisal of the applicability of Wallerstein's ideas to the Roman economy deals with the importance and magnitude of long-distance trade in luxury items and the core/semi-periphery/periphery relationship. He is correct in criticizing Wallerstein's overemphasis on activities in core areas, as if peripheral zones were passive recipients who experienced unilateral exploitation (see also Hall 1986 and Kohl 1987 on this issue). In addition, Woolf argues that world systems analysis has the "potential for understanding the macro-scale structures and dynamics of the Roman empire and its neighbours" (Woolf 1990: 55). Gregory's (1984) work and the present report expand the database for world systems analysis by concentrating on the local micro-scale features of the economic system; if we are to understand interregional exchange, it is necessary to deal with the small nodes in the network as well as the major points of contact. This paper describes the results of a field investigation that provides a basis for an analysis of how local economies were incorporated into Bronze Age and Roman world systems. Because a critique of the world systems literature is beyond the scope of this paper, however, we will reserve that discussion for a future synthetic study.

The present study builds on Gregory's work by examining the use of islets in the Late Bronze Age as well as Late Antiquity. Evidence from throughout the Aegean indicates that considerable material prosperity characterized these two periods; such components are well-represented in material retrieved from archaeological surveys in various areas of Greece, including Messenia (McDonald and Rapp 1972), the southern Argolid (van Andel and Runnels 1987; Runnels and van Andel 1987; Jameson, van Andel, and Runnels in press), Boeotia (Bintliff and Snodgrass 1985), the Korinthia (Wright et al. 1990), and Melos (Cherry 1982). All these studies suggest large populations in those periods, a condition that probably placed stress on a variety of resources, including arable land and sufficient pasture or grazing land. As a consequence, people in these periods may have expanded into otherwise marginal zones whose exploitation was both a necessity and profitable under the prevailing conditions. The use of near-shore islands figures prominently in these settlement patterns. The Stanford University survey of the southern Argolid identified a large Late Roman complex on an island 250 m from the coast near the town of Porto Cheli (Jameson, van Andel, and Runnels in press). Such sites also appear near Euboea (Sampson 1984) and elsewhere in Greece. Mycenaean occupation of such islands is also attested by various surveys (Hope Simpson and Waterhouse 1961). For example, Hope Simpson and Dickinson (1979: 118–120, 152) note Bronze Age occupation of various small islands in southern Greece. Pavlopetri, near Cape Malea, has substantial amounts of Middle Bronze Age to early Late Bronze Age pottery in a settlement with 30 structures, and a number of Roman buildings, the use of which the investigators attributed directly to refugees from the Slavic invasions (Harding, Cadogan, and Howell 1969: 139–140); the islet of Cranae (300 × 100 m) near Gythion has Late Helladic III material; and Nisakouli, a circular islet (60 m diameter and 10 m elevation) in Methone Bay, has both Middle and Late Bronze Age pottery and a few Middle Bronze Age structures. Investigations on the islet (2 km long) of Pseira (Louse), located in the Gulf of Mirabello 2 km off the NE coast of Crete, have revealed the presence of a substantial Minoan (Cretan Bronze Age: 3rd to end of the 2nd millennium B.C.) settlement with at least 60 buildings, and Byzantine (6th century A.C.) occupation in the form of a church and several other structures over the Bronze Age community and three villas or farmsteads elsewhere on the island (Betancourt and Davaras 1988). Because of its proximity to Crete and dearth of arable land, the investigators suggest commerce and fishing contributed to the economic well-being of this "substantial and prosperous community" (Betancourt and Davaras 1988: 225). The small island of Mochlos (250 m N–S, 300 m E–W), which lies 170 m off the north shore of Crete east of the Bay of Mirabello, also contains significant Minoan, Late Roman, and Early Byzantine remains. The Mochlos Project is particularly interesting because it examines the relationship between sites on the islet and the neighboring coastal area (Soles and Davaras 1992); such research complements the work of OSU in the NE Peloponnesos.

The Evraionisos Study

In 1986, OSU shifted the focus of such investigations to the Saronic Gulf (FIG. 2), east of the Isthmus of Korinth, as part of a program of study (entitled the Korinthia Regional Research Consortium or KRRC) to examine regional land use in the area around the major site of Isthmia, home of a panhellenic sanctuary of Poseidon in Classical and Roman times (Broneer 1971, 1973), and of a military garrison in the Late Roman and Byzantine periods (Gregory 1993; Gregory and Kardulias 1990; Kardulias 1992a). This more recent work involved topographical and architectural research on the island of Evraionisos (FIG. 3). The island (FIG. 4A), 1 km long E–W and 400 m wide N–S, is a large limestone outcrop that lies ca. 12 km east of the ancient port of Kenchreai and 2.5 km from the north coast of the Korinthia in the Saronic Gulf. Of the many near-shore islands in the western part of the Gulf, it is one of the few

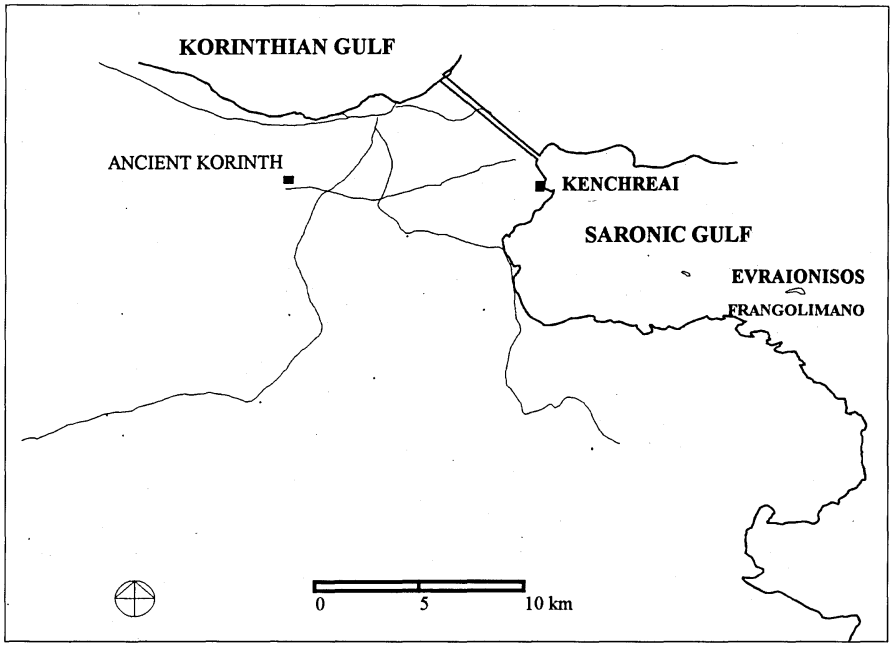
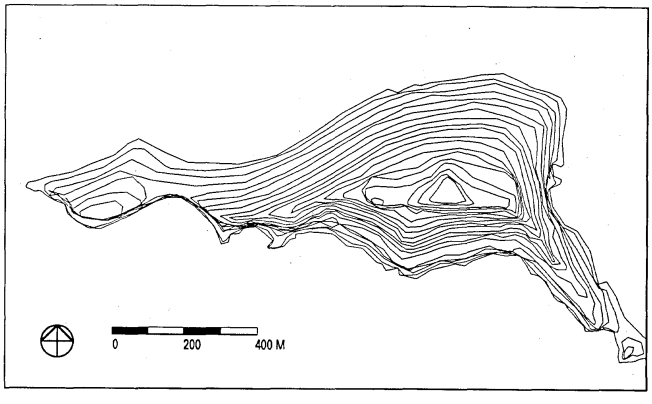


Figure 2. Map of the Korinthia and western Saronic Gulf.

Figure 3. Maps of Evraionisos. A) contour map; B) map showing location of sites.

A



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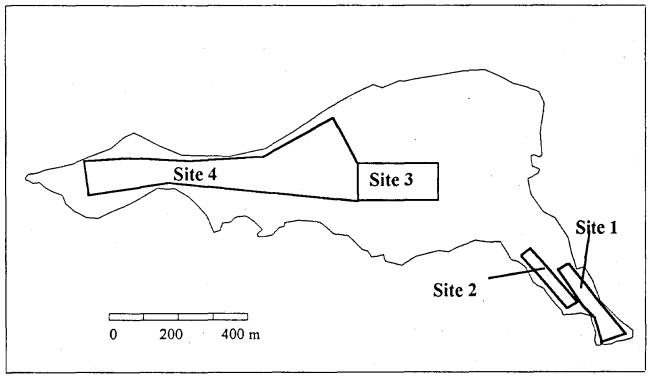

of a size sufficient to support a substantial number of inhabitants. The physical configuration of Evraionisos also conferred advantages. From east and west, the island appears as a high-backed ridge, with a steep drop to the sea on the south (facing the mainland) side and more gradual, but still pronounced slopes, on the other three sides rising up to an uneven summit in the south central section (FIG. 3A). The crest of this ridge is 79.72 m asl. That this was a strategically important vantage point is attested by the well-preserved, crenelated fortification wall which lies just north of the crest and is the island's most conspicuous archaeological feature (Wiseman [1978: 134] briefly reported this fortification in his regional overview of settlements in the Korinthia). From the crest one has a sweeping view of the western Saronic Gulf and some key approaches to the Isthmus of Korinth; in addition, the large island of Aegina is visible in the distance 33 km to the east, and ancient inhabitants of the island could have controlled sea communication to Kenchreai. The ridge terminates both to the east and west in low-lying saddle areas. The eastern saddle, about 55 m from the eastern tip of the island, is both lower and narrower than its counterpart to the west, with a minimum width of 22 m and an elevation just under 4 m. The western saddle lies approximately 225 m from the western tip of the island and has a minimum width of about 45 m and an elevation of just over 13 m (FIG. 4B).

Modern vegetation on Evraionisos is composed mostly of thick growths of scrub brush. The soil mantle is thin and, due to the extreme slope combined with strong winds

A

B

Figure 4. A) View of Evraionisos from Solygeias Beach, facing north. B) View of the west end of Evraionisos, facing east; Site 3 is on the high point in the center, background.

and heavy winter rains, highly susceptible to erosion. Most of the shoreline around the island is made of exposed bedrock up to about 7–10 m inland, owing, no doubt, to the rough waters of the Saronic Gulf. The entire western end of Evraionisos, for a distance of perhaps 100–125 m, is exposed bedrock. The shoreline all around is jagged and relatively precipitous; it offers no good natural ports, nor, even allowing for a reasonable change in the shoreline, does it appear to have done so in antiquity. Evidence from the ancient port of Kenchreai on the western shore of the Saronic Gulf ca. 12 km west of Evraionisos indicates there was shoreline change in Late Antiquity; major earthquakes in A.C. 365 and 375 caused a subsidence of 1.6 m (Scranton, Shaw, and Ibrahim 1978: 145; this is clearly not a eustatic change), but the waters around Evraionisos are very deep (>20 m; see U.S. Naval Oceanographic Office map in Scranton, Shaw, and Ibrahim 1978: fig. 2); hence even a drop of the shoreline would have had little effect on the ability to dock boats easily. Despite these topographic problems, the major drawback to occupation of the island is the lack of a fresh-water source; past inhabitants depended on cisterns, and perhaps on water transported from the mainland.

Field Methods

Initial reconnaissance on the island in 1986 and 1987 revealed the extent of the fortified area and the complex of buildings in the enclosed area. In addition, surface ceram-

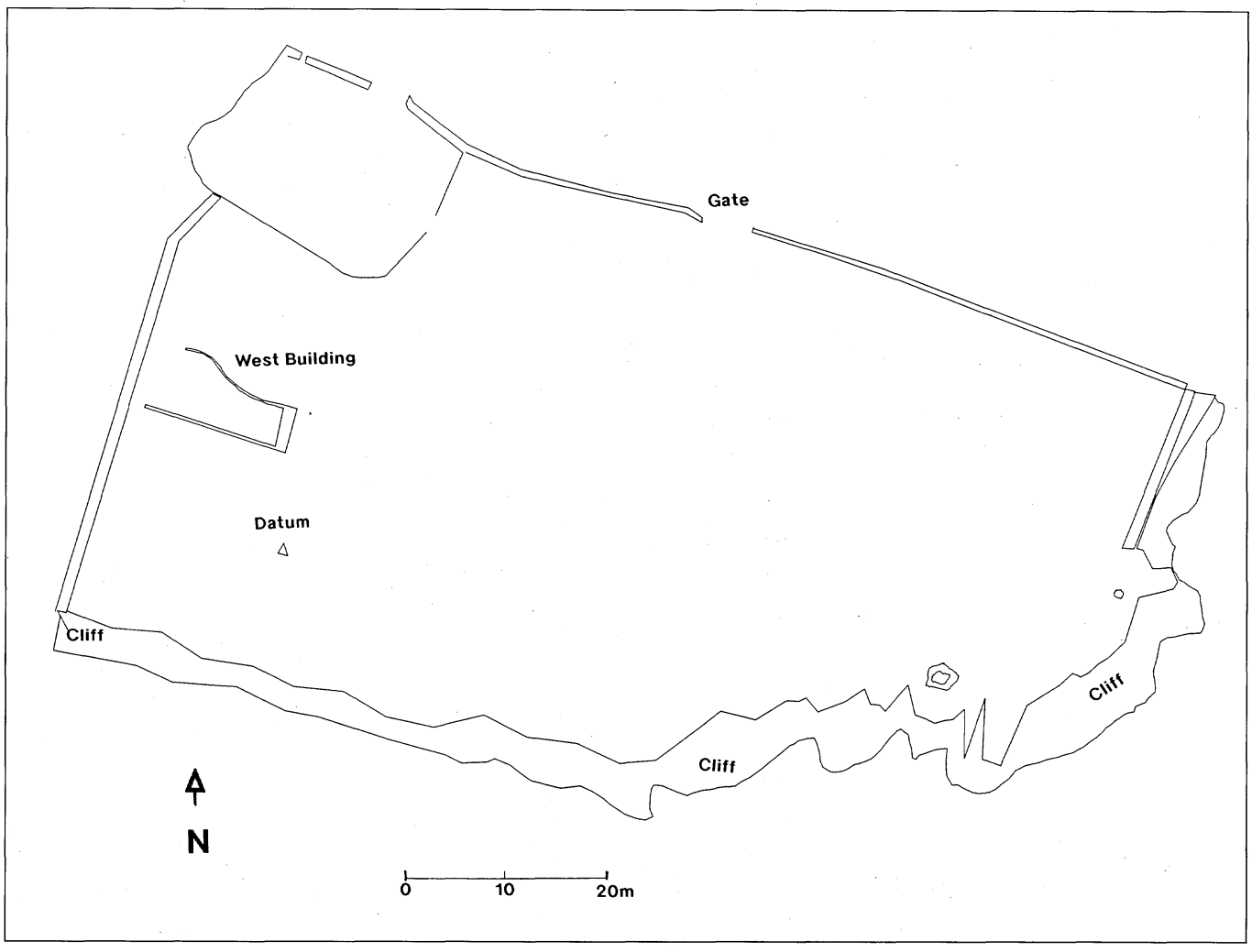

Figure 5. Plan of fortress, Site 3.

ics indicated the presence of Mycenaean through Byzantine components on various parts of the island. Late Roman material is particularly abundant. In July, 1988, a crew of six surveyors under the supervision of the two senior authors (Field Coordinator and Director, respectively, of the OSU Excavations at Isthmia) conducted an architectural and topographic study of the fortification and major interior structures that required two days (Kardulias and Gregory 1989; FIG. 5).

The second phase of the investigation involved an examination of the entire island to provide a more complete picture of occupation on Evraionisos over time. The goal was to determine the extent of exploitation of all sectors of the island because the fortress obviously did not exist in isolation. Data gathered in the course of two days of work in July, 1989, confirmed our earlier impression of extensive use of this small island, particularly in the Late Bronze Age and Late Roman period.

Systematic surface reconnaissance of Evraionisos in 1989 involved an initial pedestrian walkover by a team of six in two transects (one E–W and the other W–E). The fieldwalkers were spaced 10–15 m apart. The team walked the entire length of the island in order to identify the distribution of artifacts. This examination indicated a consistent moderate-to-dense distribution of artifacts over most of the island. We isolated four large sites from this reconnaissance. "Site" in this context is used as a term of convenience, and implies nothing more than an area of scatter that exhibits a density above a certain limit (cf. Dunnell and Dancey 1983: 271–274). The definition of a site is an issue with which all surveys must contend. An acceptable minimal definition suggests sites are "anomalously dense concentrations of artifacts with definable spatial limits" (Cherry, Davis, and Mantzourani in Wright

et al. 1990: 606). We concur in general with this definition, but we see the need for some modification. While Cherry and Davis (in Wright et al. 1990: 607) are certainly correct in their focus on the individual artifact as the indicator of human activity over a regional landscape, we would like to amend their statement by emphasizing the need to include archaeological features in that assessment. Whereas a variety of forces disperse artifacts over the terrain, features often represent permanent, in situ elements of the landscape and thus are better markers of cultural behavior. Thus, on Evraionisos, we identified sites by a combination of high surface artifact counts and the presence of structural features. The arbitrariness of these site identifications arises, in several instances, from the separation of sites on the basis of topographic features (e.g., a central ridge that separates two slopes) that naturally bounded our collection zones.

In addition to pottery, the survey team observed a number of millstones (the majority are saddle querns, with only two rotary quern fragments), five cisterns, fragments of stone foundations, walls in or near the entrances to a number of small caves, and a series of collapsed rubble features from retaining or terrace walls. As mentioned above, the predominant time periods represented are Late Bronze Age (Mycenaean) and Late Roman.

The second phase of the investigation involved a detailed reconnaissance of three of these sites, beginning with the delineation of a center, determined by high surface artifact density and proximity to in situ features (foundation cuttings in bedrock, walls of buildings, and cisterns). A 2 m × 2 m square was laid out and all artifacts within it were counted to determine the density of cultural material per sq m. Based on knowledge of mean scatter density from similar sites in the Korinthia (Gregory 1985: 421), 20% of the derived density number was taken as the fall-off threshold. For example, the figures from Site 1 are as follows:

Total number of artifacts in center: 106
Artifacts per sq m: 106/4 = 26.5
Limit of scatter (artifacts/sq m): 26.5 × 0.2 = 5.3

The last number became the delimiting figure for determining the boundaries of the site. The figure of 5.3 artifacts/sq m places the Evraionisos site-limit densities in the medium to high end of artifact distributions for other sites investigated by the OSU team. The locations and densities per sq m of these other locations are: Eastern Korinthia 0.35, Thisbe Plain 1.68, Kouveli Island 2.39, Kenchreai 7.90, and Akra Sofia Site 2 8.78 (Gregory 1985: 421); the Byzantine fortress at Isthmia yielded an average of 37.5 artifacts/sq m, but its military nature demanded much more crowded conditions than on other sites (Kardulias 1988, 1992a). Evraionisos Site 1 density is closest to that for Kenchreai, an ancient port city, and Akra Sofia, a rural Byzantine complex, and is more than double the amount recorded on Kouveli Island, which is the closest parallel to Evraionisos in terms of topographical setting and, presumably, function. These figures suggest a more intense level of use for Evraionisos compared to similar settings in the Korinthian Gulf.

After determination of the site-limit density, crew members walked in the four cardinal directions from the center; landmarks were sighted by Brunton compass to provide lines for field walkers. Each walker stopped at regular 10 m intervals and counted surface artifacts in a 1 m square; this procedure continued until the count dropped below the fall-off threshold, at which point an additional square was sampled 10 m further on to make certain the low count was not simply a brief gap in the distribution. Members then turned back toward the center and returned, in order to check the distribution. From the edge of the artifact scatter, a recording frame 4 m long and 1 m wide was positioned so that its length ran back along the transect line toward the center. All artifacts within the frame were identified and counted. In this way the boundaries of the scatter, and presumably of the habitation area, were obtained. To assist in chronological and functional analysis of the site, diagnostic sherds from each area were more closely examined and described in the field; we gave particular attention to the artifacts recorded in the 4 sq m frames at the site center and extremities because we could assess contemporaneity, and thus site unity, from these materials. That is, if the materials from the center and the edges did not match in terms of time period, we could assume that we had crossed some spatial threshold, and the site boundaries were redefined accordingly. The aim was not to produce a statistically sound sample, but to concentrate on those artifacts that were identifiable and representative of the site.

In July, 1992, we spent one day investigating specific elements of several sites. One team of three searched for and recorded the location and size of millstones and andesite cobbles on Sites 1, 2, and 3. Both finished millstones and unworked cobbles appeared as isolates on the ground and built into terrace or retaining walls. The team moved E–W across the island and reached the western end of the fortress (Site 3). Although we had noted the presence of andesite cobbles and querns on Site 4 in 1989, we were unable to record such artifacts in detail in 1992, and so millstones from that site are not included in the analysis below. A second team of three fieldworkers measured and prepared preliminary sketches of the walls of several build-

ings and three cisterns on the SE slope of the island. The team measured angles with a Brunton compass and distances with 30-m and 3-m tapes. This investigation gathered data to answer particular questions about site use on Evraionisos.

Results of the Reconnaissance

In five days of fieldwork (two in both 1988 and 1989 and one in 1992) we identified four sites on Evraionisos (FIG. 3B). Because of the short period available for fieldwork on the island, we had time to investigate only three of the sites in any detail and thus the analysis will encompass only data from these locations. The three sites reported in detail below are those with the densest concentrations of both artifacts and features and cover a broad chronological span. Therefore, the three locations offer substantial data about exploitation of Evraionisos through time.

Site 1

The field investigations revealed that Site 1, on the north slope at the east end of the island, was over 200 m long. A dense concentration of both rooftiles and foundation cuttings in the bedrock in a saddle near the east end of the site demonstrates the existence of at least one substantial structure near the area where boats probably docked in antiquity. The foundation cuttings consist of a rectangular area (4 m N–S × 2.3 m E–W) let into the bedrock to a depth of 0.2 m. In addition, smaller cuttings branch off the east and west sides of the rectangle and may have been the foundation for an E–W crosswall. The structure represented by the cuttings may have been a residence or storage facility; a number of amphorae body sherds and handles were present in and around the area defined by the cuttings.

The small eminence at the east end of the island above the saddle contains a complex of at least three buildings, all preserved only as stone alignments on the ground surface. The structures each have at least two rooms. The walls are made of irregular limestone rubble cemented with mud mortar. Two of the structures are outlined by low piles of rubble collapse. The third has a clearly defined wall on the west side of the low hill, with stone rubble spilled down the slope to the west. Scattered around the remains are some Late Roman combed and spirally-grooved amphora body sherds.

The slope just west of the landing area in the saddle is covered by rubble retaining walls that may be ancient in origin; the walls are built of uncut and roughly-cut, dry-laid local limestone and are preserved to various heights not exceeding 0.35 m. Further to the west, four terraced levels lead up from the shoreline and run roughly E–W for approximately 150 m; N–S return walls were noted at a point where the degree of slope increases significantly (FIG. 6A). The retaining walls here exhibit more careful construction but are also without mortar. They are preserved to a maximum height of 0.75 m. On the upper two levels remains of N–S cross walls were observed. These are of the same construction as the more substantial terrace walls and seem to define a series of small, and at least partially enclosed, spaces. From the density of roof tile fragments in the area, these enclosures were presumably rooms. Just west of the mid-point of the saddle a series of several rock-cut steps terminates in a level area between the highest terrace wall and the crest of the ridge. A leveled path, or road, continues from the top of the steps in the general direction of the fortress, but its course is lost at the western edge of the scatter.

Occupying the top of the ridge are the remains of a relatively large building whose north and east walls are preserved to a height of two courses; the south and west walls are even more incompletely preserved. The construction is of well dressed, relatively thin blocks of stone laid without mortar. Preliminary examination of this building suggested it was a church, but an apse can be traced only with some imagination, and the axis of the building is not aligned toward the east, as it should be in a church. In any case, this building is considerably larger than any of the others in the site and suggests significant social, political, and/or economic stratification in this community. Around this structure, the character of the surface scatter changed. In addition to the coarse ware and tile fragments, the immediate area of this building contained the only Late Roman fine wares in Site 1 (FIG. 6B). Also in the building were three displaced, rectangular, cut-stone flooring slabs, additional indicators of the substantial nature of this structure (FIG. 6C). The size, careful construction, location, and contents of this building suggest affluence and attention to detail that would be out of place in a refugee community.

Although the ceramics in the area of this site are almost exclusively Late Roman (wheel-ridged and combed wares are abundant: see FIG. 6C), there is also an uncommonly high number of andesite saddle querns, mostly of an ovate grinding-slab form common in the Bronze Age (Runnels 1981). In fact, finished millstones and unmodified andesite cobbles appear in substantial numbers on the island. Site 1 has 24 millstones and 36 unworked pieces, Site 2 has six millstones and six unworked nodules, and Site 3 has eight millstones and nine unworked pieces. The implications of these objects for local trade systems are discussed below. Another prehistoric artifact found in Site 1 is a small

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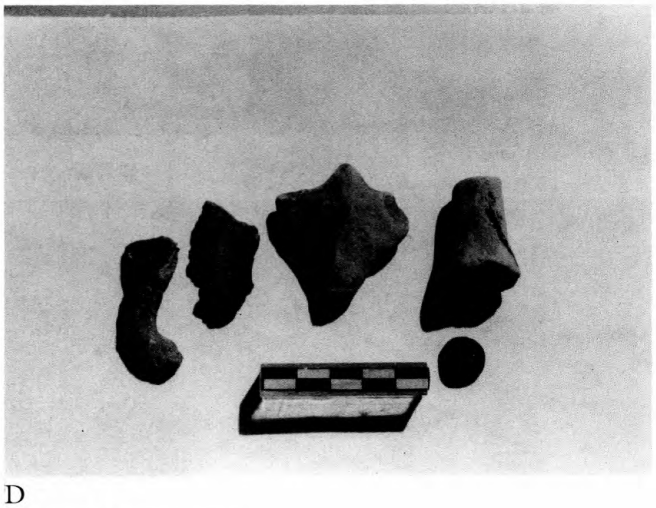

D

Figure 6. A) View of terrace/retaining walls in Site 1, NE part of island, facing west. B) Roman ceramics from Site 1. Top left to right: plate rim; vessel stopper. Bottom left to right: basin rim; Group N (7th century A.C.) handle; strap handle. C) Artifacts from large structure in Site 1. In center, a rectangular stone floor slab on which rest two Late Roman (4th–7th century A.C.) combed ware sherds; above the stone slab is an andesite cobble; the other artifacts include broken rooftiles (large angular pieces) and sherds from amphorae and small vessels. D) Prehistoric artifacts from Sites 1 and 2 (left to right): lead fragment; bronze fragment; *Psi* figurine; base of a second figurine; steatite button/bead. The steatite artifact is from Site 1, and the other pieces are from Site 2.

steatite bead (FIG. 6D). The piece is conical with a hole drilled through the center, a form that belongs to the early Mycenaean period (Furumark 1941: 89). Iakovidis (1977) has suggested these artifacts served as "buttons" or weights for garments.

Site 2

Site 2 is located on a series of terraces on the steep south slope (varying between 36° and 42°) at the east end of the island. The slope is terraced, with the terrace walls of the same construction as in Site 1. We observed no cross walls on the terraces, which suggests they served only as retaining features. The site lies below the large building and roughly parallel to the western portion of Site 1; the two sites are separated for most of their length by a sheer cliff face. The two areas were designated separate sites for convenience of investigation rather than chronological or structural reasons; presumably people occupied the two slopes at the same time.

The long cliff face that forms the northern limit of Site

2 contains a series of approximately 30 caves that were used in antiquity (FIG. 7A); most of these would have been reached easily from the terraced area, and only four are difficult of access. Most of the caves are rather small, with low, narrow entrances that require one to crouch low to gain entrance, and have a depth of only 2 or 3 m. Several

Figure 7. A) View of caves in Site 2, on SE side of the island, facing SW. B) Mycenaean pottery from Site 2. Base of low bowl (LH III C) and other fragments. C) (facing page) View of Cistern 1 in Site 2, facing north. D) Cistern 2 in Site 2. View of outer and inner chambers, facing NW.

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B

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C

of the caves, however, are more substantial: width at the mouth up to 3 m, a height of 2 m or more, and a chamber depth of 4–5 m. These larger caves also have evidence of walls that blocked off the mouth and formed sizable compartments outside the naturally enclosed spaces. Thus, during the period of occupation, the caves were incorporated into structures with more than one room and artificially-built outer faces, and provided a much different appearance from that seen today. Small level areas, supported by retaining walls, are located immediately outside most of the caves where various domestic and social activities could have taken place. Another possibility is that the exterior walls represent corral enclosures for sheep and goats penned in the caves. That many of the caves served as housing for people is suggested by the proximity of three cisterns as well as the nature of the surface artifacts.

The artifact scatter of Site 2 begins near the east face of a precipitous outcropping of rock just west of the southern end of the eastern saddle and continues west until the southern slope becomes a sheer scarp from the waterline up to the crest of the ridge. The scatter in this site continues up from the lower terrace and into the caves; cooking ware sherds were especially common in the caves and near their mouths. Substantial numbers of Late Roman fineware fragments appear just outside several of the caves and in the area below the large building of Site 1; some of this material, at least, represents spill from the area of that structure. The majority of the artifacts from Site 2 are similar to those from Site 1, rooftiles representing the most common ceramic type. One important difference is the presence on the slopes below the caves of fragments of ceramic beehives, which indicates apiary activity on the island. Another difference is the presence of some Mycenaean ceramics. The small number (20) of Mycenaean sherds represents most of a low bowl, the base of another, the torso of a ceramic *psi* figurine, the base of a second figurine, and assorted other fragments (FIGS. 6D, 7B). The nearly complete bowl, with a straight rim, upswung handle, and thick black line starting at the base and spiralling along the interior to the lip, can be assigned to the Late Helladic III C phase (1200–1100 B.C.; FIG. 7B; see form 284 in Furumark 1941: 49). The *psi* figurine, so-called because of its similarity to the Greek letter ψ, dates to either Late Helladic III B or C (1340–1100 B.C.; French 1971: 109, 133–134; Biers 1987: 86). A small, amorphous piece of bronze observed among the sherds suggests that residents may have melted down metal objects or blanks on the island to manufacture small implements, but the single piece provides only a hint of such activity; in addition, it is difficult to assign the metal unequivocally to Bronze Age activity since its presence among the Mycenaean sherds may be fortuitous.

Site 2 also contains three large cisterns. In each case the residents expanded a natural depression in the bedrock down or back into the slope; then they built up the cisterns with walls of stone and ceramics (mostly rooftiles) set in a hard lime mortar. The cisterns were fed by channels that presumably collected water from farther up the slope, perhaps from the roofs of buildings, and there was a settling basin just before the water spilled into the reservoir. The inside surface of both chambers was lined with a waterproof cement to seal the cavities. In each instance, the large inner chamber acted as the major storage facility; not only are these chambers capacious, they are also covered to reduce loss of water from evaporation. Capacities of the cisterns (FIGS. 7C, 7D) are: Cistern 1: outer chamber: 1.55 cu m, inner chamber: 6.72 cu m (total: 8.27 cu m); Cistern 2: outer chamber: 5.47 cu m, inner chamber: 4.62 cu m (total: 10.09 cu m); Cistern 3: outer chamber: 2.97 cu m, inner chamber: 24.18 cu m (total: 27.15 cu m). Total water storage capacity of the three reservoirs is 45.51 cu m (45,510 liters).

The Late Roman component on this site was determined by three traits: 1) characteristic pottery, 2) the three well-built cisterns whose style of construction (cemented stone and tiles) is common in the Late Roman period, and 3) a 6th-century bronze coin found on a path below a complex of four caves. The surface material at the west end of the site is predominantly prehistoric (Mycenaean). One factor that may have contributed to the use of the caves is their southern exposure; with the maximum winter light and solar heat such an orientation provides, year-round occupation may have been made more comfortable in those periods for which we have the best evidence. Use of this principle of natural heating has been demonstrated at other ancient Greek sites such as Olynthus (Dinsmoor 1950: 252).

Site 3

Site 3 (FIG. 5) occupies primarily the area on the interior of the fortification walls at the island's highest point, but the artifact scatter does extend beyond the enceinte for approximately 6 m on the northern side. The terrain inside the fort slopes down from south to north. The defensive wall exhibits a combination of architectural styles. The longest and best preserved section runs E–W at the north end of the enclosure, which is downslope and faces the open sea toward the north. It is a crenelated wall (FIG. 8) built of local limestone slabs and ceramic fragments set in mortar with most of the merlons preserved. Maximum preserved height of the wall is 3.5 m on the interior, and

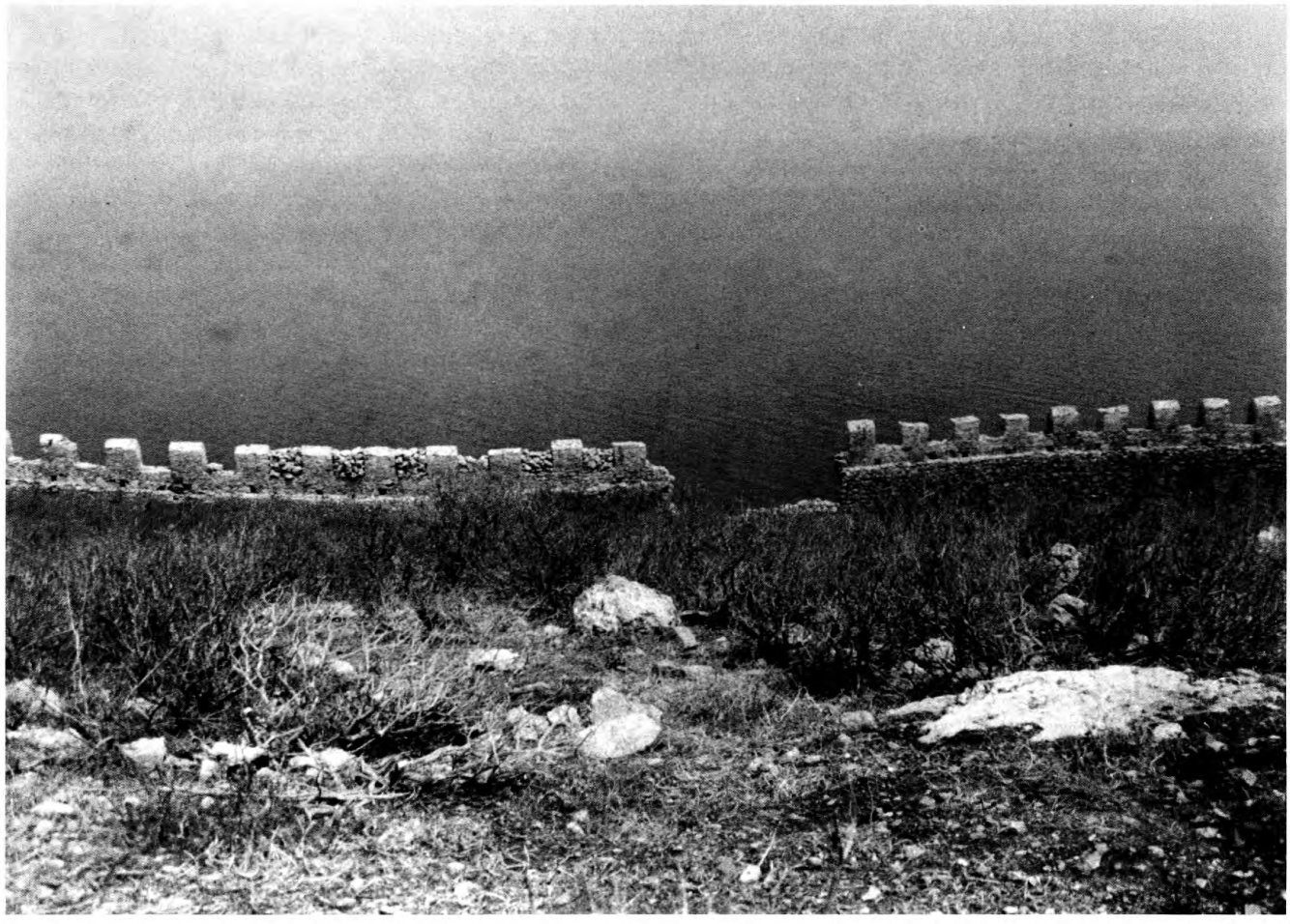


Figure 8. View of crenelated wall at Site 3, looking northward from interior of the fortification to the Saronic Gulf.

4 m on the exterior. A narrow ledge (0.21 m) on the interior, 1.7 m from the ground, served as a walking/fighting platform for the defenders. On the east side of the fortress there are cuttings in bedrock that may be foundations for a tower. At approximately the midpoint of the wall there is a gate which preserves at both ends the remnants of an arch that we reconstruct as having reached a height of 4 m. This entrance was fairly elaborate, with stone blocks and tiles combined to provide an aesthetic facade. The architectural features of this wall indicate a construction date in the 17th–18th centuries A.C.

The east and west walls of the fort are of rubble construction with a maximum preserved height of 1 m and width of 1.5 m. At the NW end of the circuit, the west rubble wall turns east and runs along the north side of the fortifications for 10 m before joining the crenelated wall. This suggests the rubble wall may be older, perhaps Late Roman, with the well-built masonry added to the existing structure to accommodate use of firearms and to present a more formidable defense against attack from the north and the open Saronic Gulf (FIG. 8). There is also some evidence that at least part of the fortifications date to the Mycenaean period. Stroud (1971: 243) notes that, in contrast to the superstructure, some of the stones in the lower courses of the north face are polygonal and much larger; he recorded several Mycenaean (Late Helladic III C) sherds in the soil between several of these stones and other, similar sherds on the ground nearby.

The interior of the fort has three long terrace walls, which provided level areas on the sloping ground, and at least four large structures with rubble walls that have collapsed. The remains of several cisterns reflect the constant problem of procuring sufficient water. The south end of the enclosure is not fortified because there is a vertical drop of 30 m to a steep slope below.

Pottery scattered around the interior of the enclosure bears out the impression of multiple periods of use. A large proportion of the ceramics dates to the Late Roman period

(4th–7th centuries A.C.), and we presume that the rubble wall dates back that far. Brick and tile fragments were especially numerous. Coarse wares in the scatter included combed and spirally grooved sherds (from amphorae and other large vessels) and cooking and beehive wares. Several sherds of Roman fine redwares were also present. A rotary hopper quern found in the SW corner of the enclosure is also Roman in date (typology and chronology of similar material are discussed by Runnels [1981, 1990]). The evidence suggests that the summit was initially fortified in the Mycenaean period, with major renovations to the defenses in the Late Roman era and in Early Modern times.

Site 4

Site 4 lies on the north slope of the island with material spread unevenly from the area just below the fortress all the way to the west end, a distance of about 500 m. The densest concentration is near a saddle at the narrowest point on the island. Site 4 contains a number of simple stone wall foundations that incorporate projecting bedrock, several cisterns cut down into the limestone bedrock, an array of Mycenaean coarse wares, and andesite millstones. Unlike the other sites, Site 4 had no Roman period ceramics. As mentioned above, time constraints precluded a detailed examination of this site, and thus it is not included in the discussion below.

Discussion

Use of the Island through Time

Although materials from other periods exist, it is clear that the island witnessed more intense habitation during the late prehistoric (Late Bronze Age or Mycenaean), Late Roman, and Early Modern (17th–18th centuries) periods. The architectural style of the crenelated wall suggests construction during the Ottoman period but the lack of diagnostic artifacts from that phase in the fortress makes that interpretation problematic. There may have been a small occasional or semi-permanent garrison in the fortress. Because of the mixed nature of surface artifacts inside the fort, it is difficult to estimate accurately the number of occupants during the period when the crenelated wall was in use. At least two modes of site use seem possible. First, there may have been a small occasional or semi-permanent garrison that occupied the heights for extended periods of time whenever there was a major threat to the security of the neighboring mainland. The presence of the Venetians and various pirates in the region may have evinced such a response. Alternatively, the defenders may have used the fort only when such an attack was imminent. Since the mainland is so near, defenders could have withdrawn to Evraionisos at virtually a moment's notice; thus, the fort would have been unoccupied at most times. Whatever the specific pattern of use may have been, the paucity of Early Modern (Ottoman) material in the fort suggests that occupation was low-level, sporadic, or both at the time the crenelated wall was constructed and used.

The amount of Bronze Age and Late Roman ceramics, though, points to times of much more intense occupation. The Late Roman material is widespread, from the east end, which provides the best area for securing a boat (on the south or landward side), to the slopes leading up to the fort. The wide distribution on the island's surface of both Bronze Age and Late Roman artifacts (i.e., not confined only, or even predominantly, to the fortress) indicates that occupation was not exclusively defensive in those periods and perhaps was more substantial, both in number of residents and seasons of residence, than at any other time. There is an abundance of Late Roman material at Site 1 at the east end of the island. In addition, on the north slope of Site 1 there are a number of terrace walls, many of which probably served primarily as retaining walls for houses. The ancient inhabitants also may have used some of these walls to retain soil for agriculture, while the scrub vegetation could have supported small herds of goats and sheep, as on Evraionisos and other islands in the area today.

We should emphasize our belief that Sites 1 and 2 constituted one community, certainly in the Late Roman period, but perhaps also in the Late Bronze Age. The differences in features and surface artifacts on the two slopes may reflect functional variation in a single settlement. For example, in the Mycenaean period, Site 1 was the focus of millstone processing, while Site 2 has evidence for ritual and domestic activity in the form of the figurines and saddle querns in or near several caves, respectively. During Late Roman times Site 1 residents constructed a number of houses on the north slope; farming or gardening may also have taken place on some of the terraces. People occupied caves in Site 2, but the south slope also witnessed beekeeping, and perhaps the maintenance of livestock. One could argue that Site 1 was the residential quarter and Site 2 the economic zone of a single settlement rather than two contemporary neighborhoods occupied by different people. The placement of the three cisterns in Site 2 raises the question of why the water reservoirs were not close to the major residential sector. Two factors help make sense of this arrangement. First, Site 2 may have been occupied somewhat earlier, and thus cisterns were built initially on the south slope. Second, and more likely, the cistern locations may reflect the topographic difference between the two sites, i.e., the north

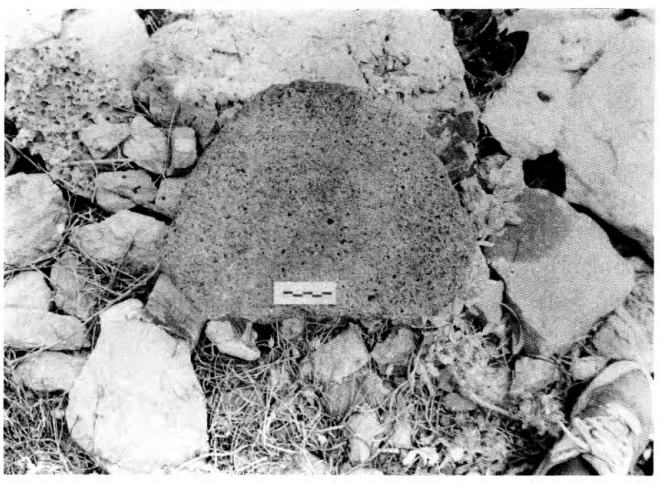
slope simply lacks the natural catch basins provided by the cavities in the limestone bedrock on the south side of the ridge.

The ancient community at Sites 1 and 2, however, was probably not self-sustaining, and ties to the neighboring mainland would have been critical to its survival. Even Hood notes "life on these off-shore islands must have been impossible unless the mainland opposite was normally available for pasturage and cultivation" (Hood 1970: 43). We suggest that the sites on Evraionisos were part of an integrated settlement system in which people exploited marginal ecological niches, in addition to areas better suited to agriculture and pastoralism on the mainland; but what would spur such expansion? A number of studies suggest that population growth may have been the catalyst. For the southern Argolid, van Andel and Runnels (1987: 173, 175) correlate a rise in the number of sites with a population increase during the Late Bronze Age and the Late Roman period, but they do note that the equation between numbers of sites and population size is not a simple one. If the Late Roman and Mycenaean periods witnessed significant population increases, people in those times would have adopted dispersed settlement patterns to exploit available land for agricultural and pastoral activities. Evraionisos seems to be a node in this process of settlement expansion. The marginal nature of the island relates to its lack of fresh water sources and the steepness of the terrain. The austere nature of the existence indicated by these remains suggests the possibility of an ascetic or monastic community in the Late Roman period, but no direct proof (e.g., a chapel) is present. As an analogy, on Pseira, Betancourt and Davaras (1988: 224) identified as a monastery the Byzantine (6th century A.C.) church and associated buildings erected over the Bronze Age remains. Whatever the specifics, the construction and maintenance of cisterns and terrace walls on Evraionisos would have reflected an efficient expenditure of time only when more accessible locations on the mainland were nearing saturated use. In times of enhanced economic activity, e.g., the Late Bronze Age and Late Roman period, people sought out unused niches, such as Evraionisos; its proximity to the mainland probably outweighed its lack of water as a determining factor in attracting residents. One might still object that the reason the island was inhabited was not because the mainland was saturated but because it was occupied by an invader and thus unavailable to the people who fled to Evraionisos. While we must admit that such a scenario is possible, it seems most unlikely for reasons that have been sketched out above: life on the island would be impossible without continual contact with the mainland, and the physical structure of the settlement has all the marks of permanence and stability rather than haste. In Late Roman times the island may have had an important military component but it seems likely these activities would have been directed against an enemy who controlled the sea (such as the Arabs) rather than one who came by land (such as the Slavs).

Evraionisos and the Bronze Age Millstone Trade

The abundance of andesite saddle querns (FIG. 9) and unworked pieces on the island may reveal some details of the Bronze Age trade system. The material is Saronic in origin (see Runnels 1981 for petrology, typology, and chronology), but there are no sources on Evraionisos. Comparison with an adjacent area is instructive. The Stanford Southern Argolid Survey identified 22 prehistoric sites with a total of 101 querns; the large Bronze Age complex of survey site F32 had 44 pieces and no other site had more than 11, while most sites (n = 19) had between one and four reciprocal millstones (Kardulias and Runnels in press). Of the 44 querns at F32, 33 are made of imported (Saronic Gulf) andesite. F32 probably served as a major processing and distribution point for millstones in the southern Argolid; the site was also a major node in the exchange of Melian obsidian (van Andel and Runnels 1987: 90–93; Kardulias 1992b: 435). Other large Bronze Age sites, clearly residential in nature, in the southern Argolid have relatively small numbers of millstones. Since the number of such pieces on Evraionisos is quite large (38 millstones, 51 unworked nodules) compared to most Bronze Age sites in the neighboring Argolid, we conjecture that the tools were not all intended to be used by island residents. Instead, Evraionisos may have served as a

Figure 9. Bronze Age saddle quern millstone in Site 1.



convenient stopping place or way station for people carrying such stones from islands like Aegina to the eastern part of the Isthmus. Evraionisos may have served as a minor distribution point in this trade, similar to the positions Makronisos and Kouveli held in Late Roman times in the Korinthian Gulf (Gregory 1984).

Runnels (1985) has demonstrated the operation of a millstone trade in the Saronic Gulf during the Bronze Age. His analysis, which focused on the eastern part of the Gulf and the Argolid peninsula, identified Aegina as a major source of andesite for the manufacture of querns, which are found throughout the region. He proposes that both finished millstones and unworked nodules traveled in Bronze Age ships as ballast; sailors unloaded the stones at various stops on their routes. Runnels explains the dropoff in millstone frequency with distance from source as a function of economic efficiency. Since ancient transport media could have reached coastal mainland sites and islands more easily than inland locations, one would expect to have more imported material at those sites with the easiest access. Thus, the quantity of andesite on Evraionisos is understandable, at one level, purely in terms of ease of transport; the islet is 33 km west of Aegina across the Saronic Gulf. But since the sheltered inlet at Frankolimano or Solygeias was equally accessible, why would people have bothered with a stop at Evraionisos? Perhaps the answer is simply that Evraionisos was easier to reach and required less time for ships plying the waters of the western Saronic Gulf (the trip from Solygeias beach at Frankolimano to Evraionisos takes 20–30 minutes in a boat with a 5 HP outboard motor). The ancient sailors may have been more concerned to reach the western shores of the Saronic where there were more substantial Bronze Age settlements at Kenchreai, Perdikaria (Blegen 1932: 112; Hope Simpson and Dickinson 1979: 64), Loutra Elenis (Wiseman 1978: 54), Kalamaki (Hope Simpson and Dickinson 1979: 70), and probably elsewhere, rather than divert their course from its E–W route. Such an explanation suggests that millstones, while important for processing food and other materials, did not carry the highest economic priority. After a brief stop to unload a number of millstones or nodules, the ships could resume course for primary destinations, leaving to the residents of Evraionisos the task of distributing the stones to their nearest neighbors on the mainland; it is possible that the millstones received at least some preliminary working on Evraionisos before further transhipment. Thus, despite its small size, Evraionisos could have served as a link in the andesite millstone trade that took place in the western Saronic Gulf during the Bronze Age.

Water Supply and the Late Roman Population

The major factor limiting the number of people that could have inhabited Evraionisos in the past is the lack of fresh water sources on the island. As mentioned above, the residents would have depended on rainwater collected in cisterns and water brought from the mainland. To gauge water availability in the past, one can examine modern climatic conditions that do not seem to have altered drastically in the last 2000 years. The east-central part of Greece has an aridity index of 10, similar to the northern Levant (Gottman 1962: 523). Annual rainfall in Attika, which is on the eastern edge of the Saronic Gulf, averages 406 mm per year, with a high of 77 mm in November and a low of 8 mm in July (MacMunn and Costa 1930: 80); severe droughts would have diminished even these meager amounts. In the analysis below we consider only the cisterns, because water transported from the mainland would have been only a supplemental source. In addition, we discuss only the three cisterns in Site 2 because only to these features can we assign a date (Late Roman) with any degree of certainty.

The three cisterns at the eastern end of the island probably served the residents of Sites 1 and 2 (FIGS. 3B, 7C, 7D). As we have seen, the capacities of the water reservoirs are 8.27 cu m, 10.09 cu m, and 27.15 cu m, respectively, for a total of 45.51 cu m (45,510 liters). Evenari, Shanan, and Tadmor (1971: 148–151) estimate that in arid regions minimum human water requirements are 1.5 cu m/person/year, or ca. 4.1 liters/person/day. Engels (1990: 180) notes that Roman Korinth in the 2nd century A.C. had abundant water sources from a series of springs and thus had the ability to allocate up to 20% of the supply to nondomestic uses. As a result of these factors, Engels suggests the per capita consumption rate may have been as high as 4.5 cu m/year (12.3 liters/day), although he does make population estimates based on both high and low rates. It seems logical that people using cisterns only, or primarily, would be abstemious in their water consumption, so a low rate for Evraionisos residents is most tenable. There would have been no lavish ornamental pools, fountains, etc. on desert islands like Evraionisos; furthermore, we saw nothing on the island that resembled a bath structure. Using the low consumption rate, we suggest the three cisterns on Evraionisos could have supported a maximum of 30.41 people per year (45,510 liters/(4.1 × 365)). If the residents maintained some domesticated animals, probably sheep or goats, the human population would have to be smaller still. It may be that the occupants kept only a few such animals to provide milk, and that

herders from the mainland brought out larger flocks to graze only occasionally, as they do today. If the residents grew crops on the island, some irrigation may have been necessary and would have reduced water reserves further. Thus, we present the figure of 30 people at Sites 1 and 2 as a maximum number. The fact that these people may have occupied the fortress and used other cisterns around the island at various times prevents us from expanding the figure much, if at all. We must admit that there may have been other cisterns we did not see; if so, the population estimates would be higher.

An Aegean Pattern?

As additional comparanda, we have noted a similar pattern of site use for the Late Roman period in the eastern Aegean. The small islet of Telendos near Kalymnos (FIG. 1) in the Dodekanese chain has abundant evidence of Late Roman occupation from the 4th through the 7th centuries A.C. (Newton 1865: 318; Volanakis 1982); Kalymnos itself has substantial Late Roman and Byzantine remains (Bean and Cook 1957: 129–131; Newton 1865: 304–317; Ross 1843: 92–97; Segre 1938). The remains on Telendos include a large Early Byzantine church (Agios Basilios-Saint Basil), a number of Late Roman house foundations, and a Late Roman pottery kiln on the waterfront on the east side of the islet. A large, well-fortified site associated with the chapel of Agios Konstantinos is situated high on the northern slopes and overlooks the extensive bay created by the long peninsular appendage of Kalymnos proper; this site has a number of large, well-built cisterns, elaborate houses, some sculptured ornamental reliefs, and a substantial Early Byzantine church whose apse forms the modern chapel (Volanakis 1982). The eastern Aegean area was not subject to Slavic invasions, so the remains, especially those of the lower settlements, from Kalymnos add further evidence to dismiss the refuge thesis. The Arab raids of the 7th century may have influenced the location of the fortified site of Agios Konstantinos, but the other remains still indicate intensive use of Telendos in a pattern similar to that in the western Aegean in the Late Roman period. The evidence from Mochlos and Pseira mentioned above also indicates significant Late Roman occupation of islets not threatened by the Slavic intrusions of the late 6th century A.C.

Conclusion

Abundant evidence from research over the last two decades necessitates modification of Hood's original hypothesis concerning isles of refuge. Better chronological control and systematic survey work clearly indicate that occupation of marginal environments occurred both earlier and under more positive economic and political conditions than Hood would allow. Hood's contribution was still vital in drawing attention to locations and sites generally ignored by archaeologists; he encouraged consideration of isolated sites as vital links in regional settlement systems. It is becoming increasingly clear that many small islands, despite their negative features (lack of water and difficulty of access in some cases), provided enough advantages to be used, at times heavily, from late prehistoric through early modern times, but especially in the Late Bronze Age and Late Antiquity. Finally, we would like to reiterate that the present study provides additional data for an examination of ancient economy from the local level, and we plan to pursue such an analysis in a future paper.

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Bean, G. E., and J. M. Cook
1957 "The Carian Coast III," *Annual of the British School at Athens* 52: 58–146.

Betancourt, Philip P., and Costis Davaras
1988 "Excavations at Pseira, 1985 and 1986," *Hesperia* 57: 207–225.

Biers, William
1987 *The Archaeology of Greece.* Ithaca: Cornell University Press.

Bintliff, John, and Anthony Snodgrass
1985 "The Cambridge/Bradford Boeotian Expedition: The First Four Years," *Journal of Field Archaeology* 12: 123–161.

Blegen, Carl
1932 "Pre-classical Sites," in H. N. Fowler and Richard Stillwell, eds., *Corinth I, Part i, Introduction, Topography, Architecture.* Cambridge, MA: Harvard University Press, 107–114.

Broneer, Oscar
1971 *Isthmia.* I. *Temple of Poseidon.* Princeton: American School of Classical Studies at Athens.

1973 *Isthmia.* II. *Topography and Architecture.* Princeton: American School of Classical Studies at Athens.

Cherry, John F.
1982 "Register of Archaeological Sites on Melos," in Colin Renfrew and Malcolm Wagstaff, eds., *An Island Polity: The Archaeology of Exploitation in Melos.* Cambridge: Cambridge University Press, 291–309.

Dinsmoor, William B.
1950 *The Architecture of Ancient Greece,* 3rd edn. London: B. T. Batsford.

Dunnell, Robert C., and William S. Dancey
1983 "The Siteless Survey: A Regional Scale Data Collection Strategy," in Michael B. Schiffer, ed., *Advances in Archaeological Method and Theory* 6. New York: Academic Press, 267–287.

Engels, Donald
1990 *Roman Corinth. An Alternative Model for the Classical City.* Chicago: University of Chicago Press.

Evenari, Michael, Leslie Shanan, and Naphtali Tadmor
1971 *The Negev: The Challenge of a Desert.* Cambridge, MA: Harvard University Press.

French, Elizabeth
1971 "The Development of Mycenaean Terracotta Figurines," *Annual of the British School at Athens* 66: 101–187.

Furumark, Arne
1941 *Mycenaean Pottery.* Gothenburg: Svenska Instituten i Rom och Athen.

Gottman, Jean
1962 *A Geography of Europe,* 3rd edn. New York: Holt, Rinehart, Winston.

Gregory, Timothy E.
1984 "Diporto: An Early Byzantine Maritime Settlement in the Gulf of Korinth," *Deltion tis Archaeologikis Etaireias* 12: 287–304.

1985 "An Early Byzantine Complex at Akra Sophia near Corinth," *Hesperia* 54: 411–428.

1986 "A Desert Island Survey in the Gulf of Corinth," *Archaeology* 39: 16–21.

1993 *Isthmia.* V. *The Hexamilion and the Byzantine Fortress.* Princeton: American School of Classical Studies at Athens.

Gregory, Timothy E., and P. Nick Kardulias
1990 "Geophysical and Surface Surveys in the Byzantine Fortress at Isthmia, 1985–1986," *Hesperia* 59: 467–511.

Hall, Thomas D.
1986 "Incorporation in the World-System: Toward a Critique," *American Sociological Review* 51: 390–402.

Harding, Anthony, Gerald Cadogan, and Roger Howell
1969 "Pavlopetri, An Underwater Bronze Age Town in Laconia," *Annual of the British School at Athens* 64: 113–142.

Hayes, John W.
1972 *Late Roman Pottery.* London: The British School at Rome.

1992 *Excavations at Saraçhane in Istanbul. Volume II. The Pottery.* Princeton: Princeton University Press.

Hendy, Michael F.
1985 *Studies in the Byzantine Monetary Economy c. 300–1450.* Cambridge: Cambridge University Press.

Hood, Sinclair
1966 "An Aspect of the Slavic Invasions of Greece in the Early Byzantine Period," *Sborník Norodhniho Muzea v Praze* 20: 165–171.

1970 "Isles of Refuge in the Early Byzantine Period," *Annual of the British School at Athens* 65: 37–45.

Hope Simpson, Richard, and O. T. P. K. Dickinson
1979 *A Gazetteer of Aegean Civilisation in the Bronze Age,* Vol. I: *The Mainland and Islands.* Göteborg: Paul Åströms Förlag.

Hope Simpson, Richard, and H. Waterhouse
1961 "Prehistoric Laconia: Part II," *Annual of the British School at Athens* 56: 114–175.

Iakovidis, Spyros
1977 "On the Use of Mycenaean 'Buttons'," *Annual of the British School at Athens* 72: 113–119.

Jameson, Michael, Tjeerd van Andel, and Curtis Runnels
in press *A Greek Countryside: The Southern Argolid from Prehistory to the Present Day.* Stanford: Stanford University Press.

Kardulias, P. Nick
1988 *The Byzantine Fortress at Isthmia, Greece and the Transition from Late Antiquity to the Medieval Period in the Aegean.* Ph.D. dissertation, Ohio State University, Columbus. Ann Arbor: University Microfilms.

1992a "Estimating Population at Ancient Military Sites: The Use of Historical and Contemporary Analogy," *American Antiquity* 57: 276–287.

1992b "The Ecology of Bronze Age Flaked Stone Tool Production in Southern Greece: Evidence from Agios Stephanos and the Southern Argolid," *American Journal of Archaeology* 96: 421–442.

Kardulias, P. Nick, and Timothy Gregory
1989 "Island Survey in the Saronic Gulf," *Old World Archaeology Newsletter* 13(2): 21–22.

Kardulias, P. Nick, and Curtis Runnels
in press "The Lithic Artifacts," in Curtis Runnels, Susan Langdon, and Daniel Pullen, eds., *Artifact and Assemblage: Finds from A Greek Countryside.* Volume I: *The Prehistoric Pottery and the Lithic Artifacts.* Stanford: Stanford University Press.

Koder, J.
1978 "Zur Frage der Slavischen Siedlungsgebiete im Mittelalterlichen Griechenland," *Byzantinische Zeitschrift* 71: 315–331.

Kohl, Philip
1987 "The Use and Abuse of World Systems Theory: The Case of the Pristine West Asian State," in M. Schiffer, ed., *Advances in Archaeological Method and Theory* 11. New York: Academic Press, 1–35.

MacMunn, Nora E., and Geraldine Costa
1930 *Europe. A Regional Geography.* Oxford: Clarendon Press.

McDonald, William A., and George R. Rapp, eds.
1972 *The Minnesota Messenia Expedition. Reconstructing a Bronze Age Regional Environment.* Minneapolis: University of Minnesota Press.

Newton, Charles T.
1865 *Travels and Discoveries in the Levant.* London: Day and Son.

Ross, Ludwig
1843 *Reissen auf ben Griecheschen Inseln bet agaischen Meeres,* Vol. 2. Stuttgart: Drud und Berlag.

Rosser, John
1985 "The Role of the Great Isthmus Corridor in the Slavonic Invasions of Greece," *Byzantinische Forschungen* 9: 245–253.

Runnels, Curtis
1981 *A Diachronic Study and Economic Analysis of Millstones from the Argolid, Greece.* Ph.D. dissertation, Indiana University, Bloomington. Ann Arbor: University Microfilms.

1985 "Trade and Demand for Millstones in Southern Greece in the Neolithic and the Early Bronze Age," in A. B. Knapp and T. Stech, eds., *Prehistoric Production and Exchange: The Aegean and Eastern Mediterranean. UCLA Monographs in Archaeology.* Los Angeles: University of California at Los Angeles Press, 30–43.

1990 "Rotary Querns in Greece," *Journal of Roman Archaeology* 3: 147–154.

Runnels, C. N., and T. H. van Andel
1987 "The Evolution of Settlement in the Southern Argolid, Greece: An Economic Explanation," *Hesperia* 56: 303–334.

Sampson, Adamantios
1984 "Hersaia kai Nesiotika Kataphygia tes Promis Vyzantinis Periodou stin Evoia kai Anatolike Voiotia," *Archaeon Evoiakon Meleton* 26: 363–372.

Scranton, Robert, Joseph W. Shaw, and Leila Ibrahim
1978 *Kenchreai, Eastern Port of Corinth.* I. *Topography and Architecture.* Leiden: E. J. Brill.

Segre, Mario
1938 "Relazione Preliminare Sulla Prima Campagna di Scavo Nell'Isola di Calimno," *Memorie Istituto Storico Archeologico Rhodie* 3: 33–55.

Soles, Jeffrey S., and Costis Davaras
1992 "Excavations at Mochlos, 1989," *Hesperia* 61: 413–445.

Stroud, Ronald
1971 "Thucydides and the Battle of Solygeia," *California Studies in Classical Antiquity* 4: 221–247.

van Andel, Tjeerd H., and Curtis Runnels
1987 *Beyond the Acropolis. A Rural Greek Past.* Stanford: Stanford University Press.

Volanakis, Ioannis
1982 "Ta Palaiohristianika Mnimeia tis Nisou Telendou," *Kalymniaka Hronika* 3: 55–63.

Wallerstein, Immanuel
1974 *The Modern World System I. Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century.* New York: Academic Press.

Wiseman, James
1978 *The Land of the Ancient Corinthians. Studies in Mediterranean Archaeology,* Vol. 50. Göteborg: Paul Åströms Förlag.

Woolf, Greg
1990 "World-Systems Analysis and the Roman Empire," *Journal of Roman Archaeology* 3: 44–58.

Wright, James C., John F. Cherry, Jack L. Davis, Eleni Mantzourani, Susan B. Sutton, and Robert F. Sutton
1990 "The Nemea Valley Archaeological Project: A Preliminary Report," *Hesperia* 59: 579–659.