DONALD C. HAGGIS

THE PORT OF THOLOS IN EASTERN CRETE AND THE ROLE OF A ROMAN HORREUM ALONG THE EGYPTIAN 'CORN ROUTE'

Summary. *Roman provincial warehouses and rural* horrea *in the Aegean and eastern Mediterranean remain largely undocumented and their functions are poorly understood. A recent intensive archaeological survey at the bay of Tholos in the Kavousi area of northeastern Crete has investigated one such* horreum *and has explored the regional archaeological context of the building and its hinterland. The present study discusses the architectural form and archaeological context of this warehouse and assesses its function within the broader political and economic sphere of eastern Mediterranean trade routes in the second century A.D. Patterns of coastal urbanization, settlement development, and land use in eastern Crete in the Classical and Hellenistic periods, are examined as background for discussion of Roman rule, and as factors that are crucial in understanding the economics of settlement and the role of Cretan cities and the port of Tholos in the first and second centuries A.D.*

The Roman port at Tholos, in northeast Crete, was first examined in 1900 by Harriet Boyd Hawes as part of her study of sites in the area of the modern village of Kavousi (Figs. 1–4) (Boyd 1901; 1904). Before turning her attention to the Minoan town of Gournia, Boyd conducted a number of small excavations, including an exploratory trench at Tholos within an exposed Roman building that she thought was a 'storehouse', 'one of the granaries from which Rome drew her food supply' (Figs. 4–5) (Boyd 1901, 156). Boyd described briefly the architectural remains and commented on the environs of the Tholos bay, but never published a plan of the building or associated artifacts. The site was later reexamined by Sanders, who published a detailed description of the area and the first sketch plan of Boyd's 'storehouse' (Fig. 18: a), which he dated tentatively to the second century A.D. (Sanders 1982, 140–1). Since Sanders' gazetteer of Roman Crete, Tholos was again the subject of study, this time by Harrison, who published a revised sketch plan of Boyd's 'storehouse', offering an alternative interpretation of the building as a cistern (Fig. 18: b) (Harrison 1990, 147–50). The aim of this paper is to review the archaeology of Roman Tholos in the context of a regional archaeological survey (Haggis 1992),[1] to reassess previous plans and interpretations

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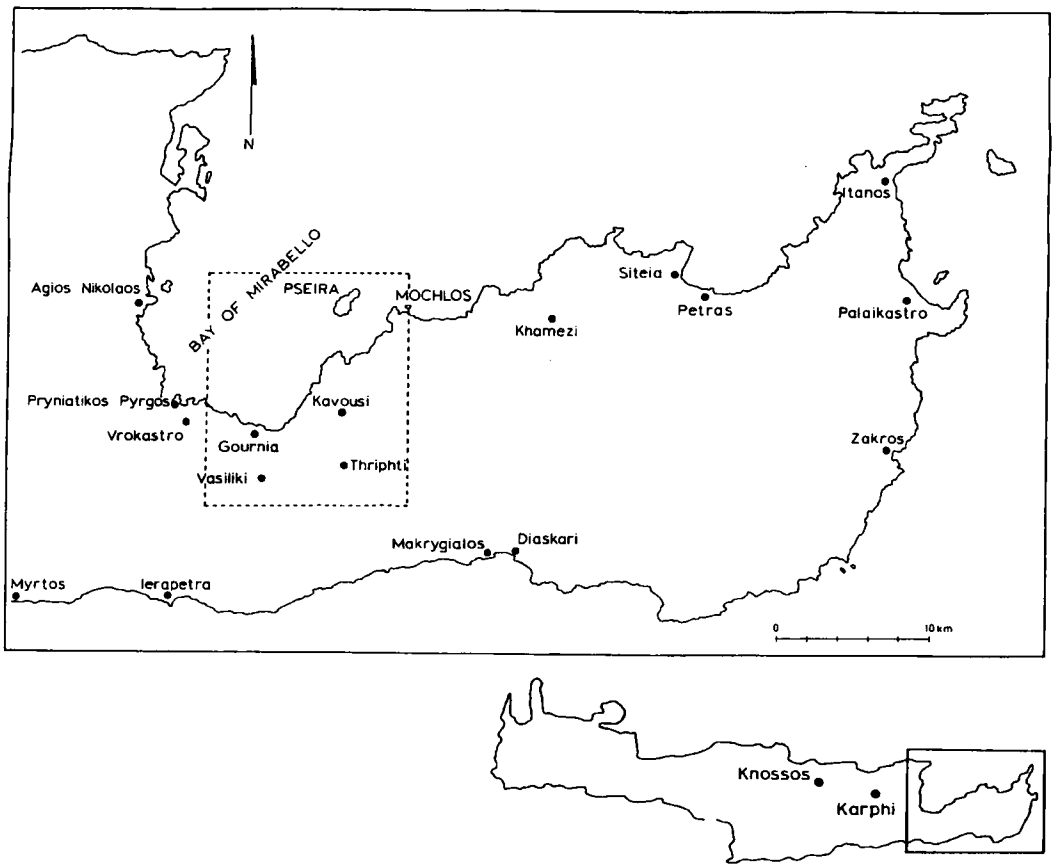

Figure 1
Map of East Crete: Kavousi area

of the excavated 'storehouse'; and to propose a function for the building and the site of Tholos within the broader context of inter-Mediterranean trade routes in the first-second century A.D. While military granaries have been systematically documented from Roman Britain (Gentry 1980), the archaeology of Mediterranean *horrea* is insufficiently studied (Rickman 1971, 147). In this article, it is argued that the Tholos 'warehouse' is a granary and that the associated port functioned as one important transshipment point along the 'corn route' between Alexandria and Rome.

SITUATION, ENVIRONS, AND SETTLEMENT PATTERNS

Tholos lies at the furthest and most accessible point north along the east side of the Bay of Mirabello in northeastern Crete (Figs. 1–4, 7). The harbor of Tholos occupies the southernmost edge of Pseira bay which is a wide, natural shelter protected by the promontory of Mochlos, Pseira island, and the headland of Skinias-Analypsi (Figs. 2–5, 7). Today, the bay of Pseira is a frequent anchorage for ships traversing northwesterly headwinds during the summer months.

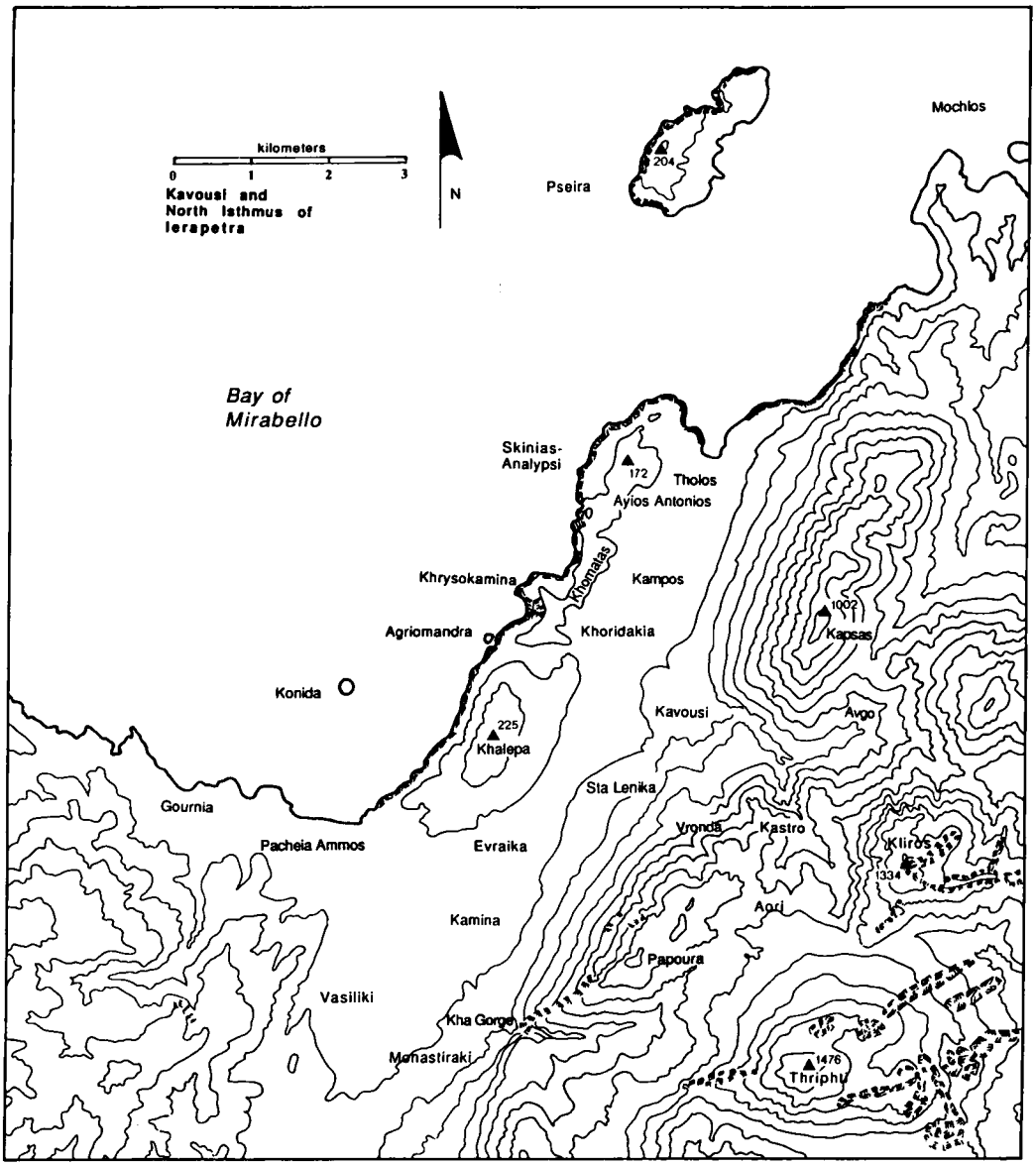

Figure 2
Map of Kavousi area and the North Isthmus of Ierapetra

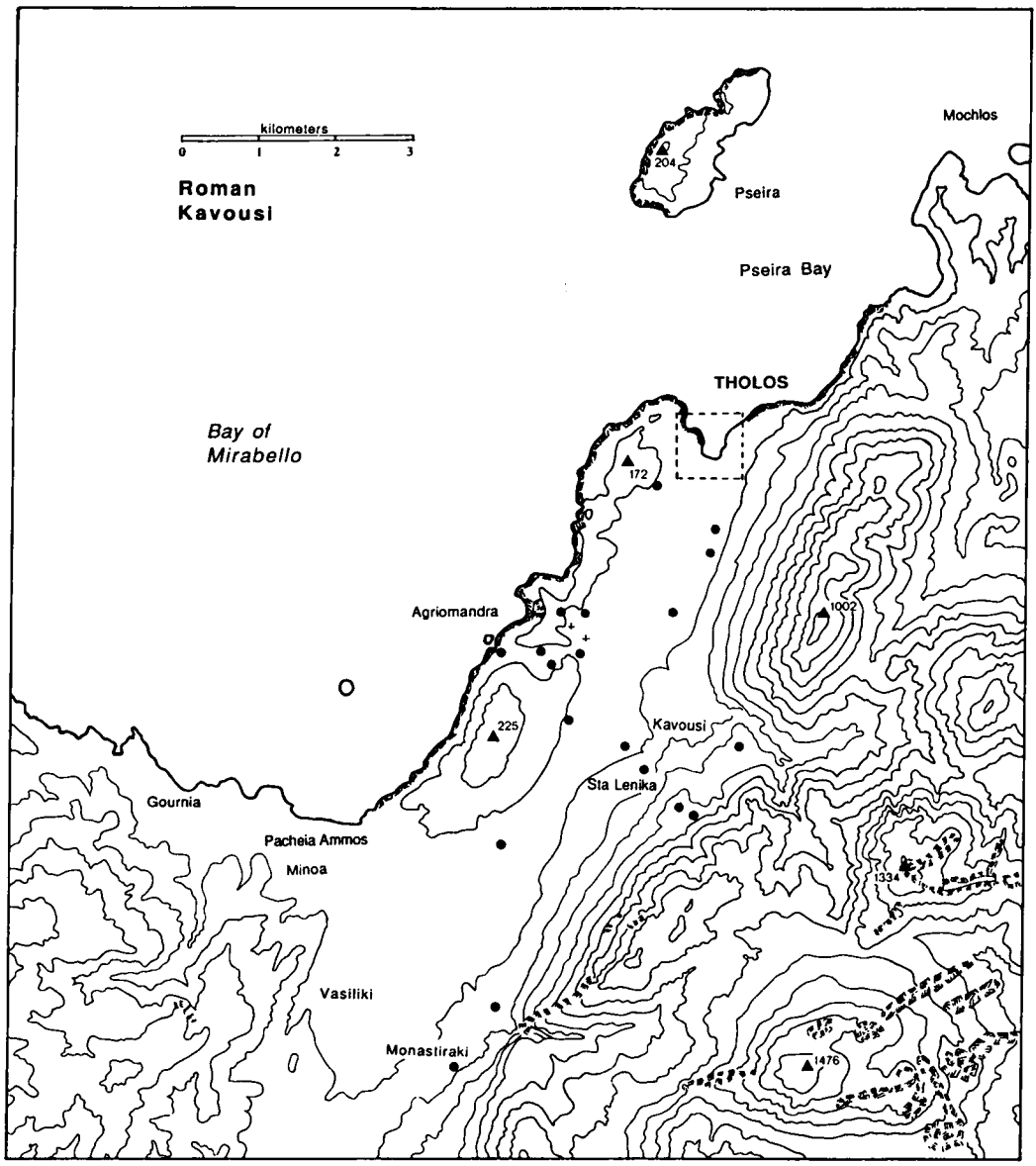

Figure 3
Map of Roman Kavousi: Tholos

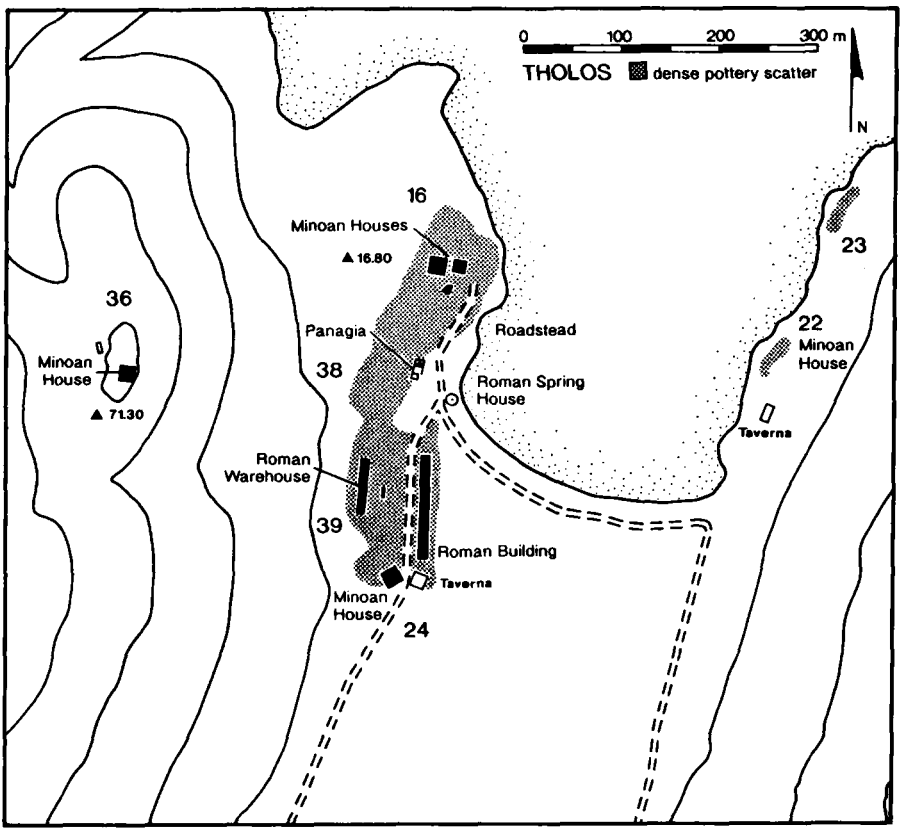

Figure 4
Map of Tholos

Tholos is a shallow inlet and natural roadstead ca. 500 m wide and 300 m deep (Figs. 4, 7), forming the mouth of the Platys river which drains from watersheds high in the Kavousi mountains (at Avgo and Thriphti) and extends northward the full length of the Kampos plain (Fig. 2). The natural hinterland of the Tholos site conforms to the district of the modern village of Kavousi which is situated in the center of the catchment area at the juncture of the Papoura mountain front and lowland plain (Fig. 2). The alluvial plain of Kampos is, more importantly, the natural northern extension of the Isthmus of Ierapetra (Greek and Roman Hierapytna) which is a wide, flat valley bordered by a series of fault fronts extending the full width of the island (northeast-southwest); the isthmus is divided by a low watershed at the location of Episkopi village (Figs. 2–3; 22, between Vasiliki and Larisa).

Today the Kampos plain (Fig. 2) is widely cultivated and exploited for olives, fruit trees, vines, and a myriad of small gardens. The full agricultural potential, however, has been realized only as a result of intensive irrigation projects of the Marshall Plan (ca.

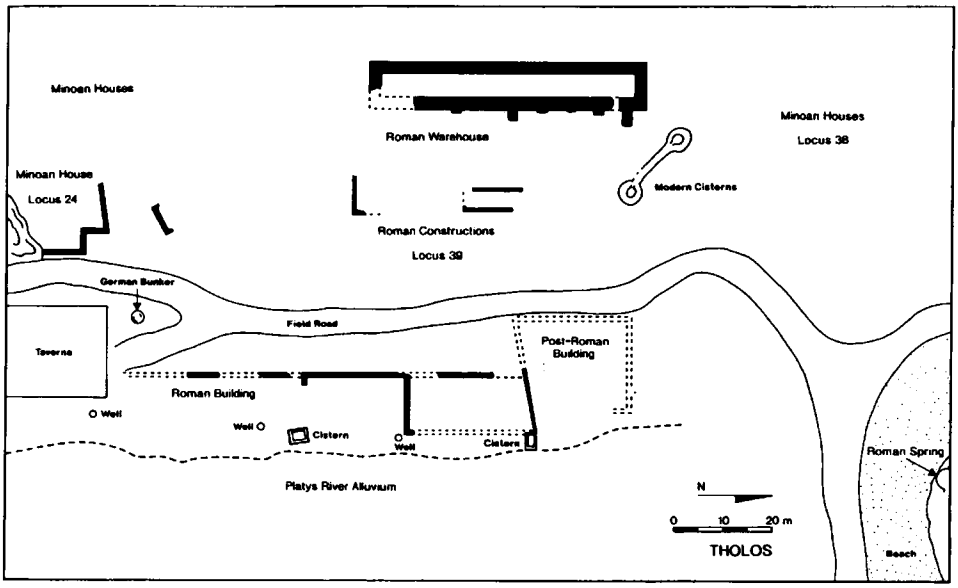

Figure 5
Sketch plan of Tholos

1950) and the Junta (ca. 1967), which encouraged the proliferation of deep wells (*geotreseis*) throughout the lowlands of Kavousi and the north Isthmus (Allbaugh 1953, 27–69). Before WW II, the rocky soils of the plain were apparently of marginal value. Traditional and ancient patterns of settlement testify to its disuse in preference to the rich silty phyllite soils of the coastal hills and terraced mountain-sides south and east of Kavousi village (Fig. 2). Although the highland terraces and isolated pockets of arable land in the lowland hills were ideal for rain-fed agriculture, they could not apparently support a population of any considerable size, and never seem to have produced barley and wheat yields beyond local subsistence needs.[2]

While the region of Kavousi was inhabited throughout the Bronze Age and Early Iron Age, settlement patterns are diachronically variable. In the protopalatial period (Middle Minoan I–II) and Early Iron Age (Late Minoan IIIC–Geometric), the clustering of hamlets and farmhouses around discrete concentrations of arable land suggests largely subsistence agriculture, a phenomenon that is reinforced by the agricultural potential of the region. In periods of increased contacts with external markets during the neopalatial (MM III–LM I) and Roman periods (first century BC–sixth century AD) the most dense human activity seems to have shifted to the area of Tholos bay and possibly Kavousi village (Fig. 3). From the sixth to second century B.C., the Kavousi area appears to have been largely abandoned. This local population decline coincided with the emergence of large, nucleated coastal towns at Stalis (Makrygialos or Goudouras), Siteia, Leuke island (Kouphonisi), Ampelos, Istron, Itanos, Olous, Lato (pros Kamara) and Hierapytna

(Ierapetra) which was by far the largest and most important city in the region (Figs. 2–3, 20–21).

In the third century B.C. this powerful urban center of Hierapytna (Bowsky 1994, 4–6; Spyridakis 1970, 37–8; Bennet 1990, 201–2; Bosanquet 1939–40, 73; Chaniotis 1995, 74–5) expanded its influence northward by controlling Oleros, and crucial mountain communication routes to the Gulf of Mirabello (Hayden, Moody, and Rackham 1992, 333; Spyridakis 1970, 36–7). By means of a complex series of alliances with neighboring cities and overt territorial expansion, Hierapytna seems gradually to have dominated a large part of commercial interests in east Crete during the last two centuries B.C.(Spyridakis 1970, 37–9). After usurping the in-land territories of Praisos, Hierapytna eventually enveloped the coastal regions of Istron, Stalis, Leuke, and possibly Ampelos (Figs. 21–22) (Hayden, Moody and Rackham 1992, 318, 331–6; Bosanquet 1939–40, 69–70). In the second century B.C., alliances with Priansos, Gortyn, and Lyttos paved the way for Hierapytna's expansion into the regions of Lato to the west and Itanos to the east (Bowsky 1994, 6; Spyridakis 1970, 37–9); even Olous, on the northeast coast of the Gulf of Mirabello, sided with Hierapytna and Gortyn in border conflicts with Lato (Spyridakis 1970, 61). By the end of the last quarter of the second century B.C., the north Ierapetra Isthmus, probably including the entire Kavousi area, and more importantly, the port of Tholos, was under the economic influence if not the direct control of Hierapytna (Chaniotis 1995, 74–5; Bowsky 1994, 6; Papadakis 1986, 15; Bennet 1990, 200–202).

By the second century A.D., a rural population inhabited the Kavousi hinterland (Fig. 3)[3] and a substantial storage facility was built at Tholos. Roman-period activity in the Tholos bay itself can be traced over an unbroken period, roughly from the first century B.C. until the seventh century A.D. (Figs. 4–5; 6: locus 39). At the edges of the Kampos plain, thinly dispersed farmhouses with olive oil producing machinery, cisterns, and cemeteries are found (Fig. 3) (Boyd 1901, 155; Sanders 1982, 141; Pendlebury 1939, 375; Blegen 1936, 373); and small warehouses of Roman date were constructed on a hill above the plain, southwest of Kavousi village, at '*Sta Lenika*' (Fig. 3) (Schachermeyr 1938, 470 Haggis 1992, 195–6).[4] At Agriomandra, deep underwater, are dense deposits of Roman amphorae that testify to this having been a small harbor or roadstead in the first century A.D. In Kavousi village, Early Roman sherds were discovered under modern buildings and have provided evidence for some kind of aggregated settlement. On the north slopes of Papoura, directly south/southeast of the village, Roman pottery scatters are frequent reminders of the rich land resources in the upper elevations, the main water supplies in the area being perennial springs at Kavousi village and Vronda, and higher still in the mountain valleys of Avgo and Thriphti. Southwest of Kavousi in the Isthmus area, there are Roman villages at Gournia, Pacheia Ammos, Monastiraki, Vasiliki, and Episkopi (Sanders 1982, 17–18, 138–41). The density of settlement at the periphery of the Kavousi (Kampos) plain from the first century B.C. until the third century A.D. probably indicates non-extensive agricultural production for consumption by a modest-sized local population (Fig. 3).[5]

The importance of the Tholos site should not be evaluated in terms of the negligible agricultural production from the local hinterland and presumably minimal export potential, but in terms of its size (ca 2.5 ha), coastal position, spring house, and numerous

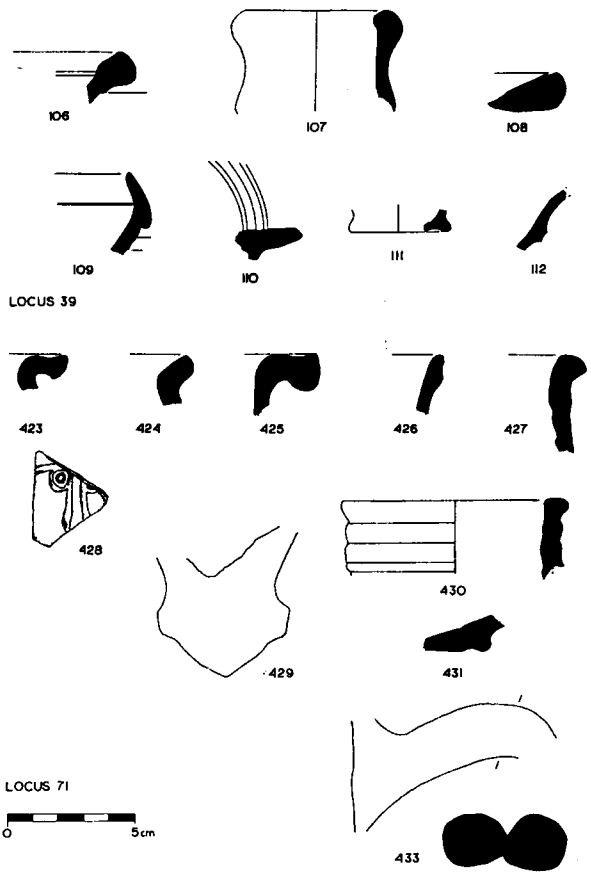

Figure 6
Pottery from Tholos (Locus 39)

special-function buildings (Figs. 4–5, 7). The most important of these remains is the well-built *horreum* whose builders and function have remained elusive. Rickman (1971, 147) has pointed out that 'we have so far surprisingly few extant remains of *horrea* in Italy or the provinces ... Perhaps however we should also bear in mind the possibility that the construction of massive *horrea* was most often brought about by state interference and the needs of the imperial *annona*'. Survey at Tholos has shown that inhabitants had returned to the small bay for the first time in the first century B.C., after a long hiatus beginning with the abandonment of the Late Minoan I town, whose function in the Bronze Age was surely related to maritime traffic within a complex palatial economy. By analogy Roman Tholos can be best evaluated by exploring its function as a port facility at the northern edge of the Isthmus over-land transportation route, and within the broader

Figure 7
Tholos bay from southeast

framework of the territorial and economic interests of the city of Hierapytna on the south coast.[6]

THE SITE OF THOLOS

Archaeological survey at Tholos has recovered an extensive Minoan site, some 3.0–4.0 ha in size, covering nearly the entire west side of the bay (Fig. 4: loci 16, 38 and 24; Fig. 7). Overlying the remains of this Bronze Age town, immediately southwest of the bay, are three primary areas of Roman building activity (Figs. 4–5: locus 39): the first is the large, well-preserved, concrete and brick building excavated by Boyd ('Roman Warehouse'). About 50 m east of the warehouse, along the west side of the alluvial terrace (formed at the mouth of the Platys river), are more walls, also of Roman date, which appear to form an elongated structure, or group of contiguous structures, ca. 100 m long and ca. 10–15 m wide (Fig. 5: 'Roman Building'). No certain plan of this building could be determined, however several north-south wall segments along the west side of the terrace and two cross walls might suggest a single long structure divided by walls at intervals of 20 m. Wall construction is field stone and concrete. The associated artifacts on this river terrace consist of roof tiles, bricks, and numerous amphorae fragments. While a few Roman walls exist between the building on the river terrace and the warehouse, the pottery on the eroded slope is primarily Minoan and must be associated with the Bronze Age town that was situated along this hillside between loci 24 in the south and 38 in the north (Figs. 4–5). It is likely that Minoan buildings were destroyed in order to clear the area for building and as a source of the wall blocks that were undoubtedly incorporated into the Roman installations. About 50 m north/northeast of the Roman

buildings, and 122–124 degrees east/southeast of the church of Panagia, at the extreme southwest corner of Tholos bay, in a tide pool, there is evidence for a Roman spring house (Figs. 4–5, 7, and 19). A roughly semi-circular natural limestone crevice (ca. 3.0–4.0 m radius) is ringed with a bridge of Roman concrete (cement imbedded with field stones and terra-cotta fragments). At the north edge of the pool, fresh water can be seen emanating through the sand and salt water (Fig. 19). Seager reported that while excavating at Pseira, he supplied his workmen with water daily from the Tholos spring (Seager 1910, 5). Finally, between the Roman Warehouse and the Roman Building are scattered concrete and rubble walls of smaller buildings with uncertain functions (Fig. 5: 'Roman Constructions'). The focus of Roman activity in the Tholos bay appears concentrated in an area of about 2.0–2.5 ha, south of the modern church of Panagia and west of the Platys river edge.

Several *a priori* assumptions can be made regarding the nature and function of the Tholos site. First, the lack of domestic architecture and agricultural equipment and installations (oil, wine, grain processing tools) in the immediate vicinity, and second, the presence of at least one storage facility of considerable size and imperial construction, suggest a very specialized storage role for Tholos bay. Finally, the sparsely populated hinterland and its meager agricultural potential are demonstrative features of this Roman landscape that point clearly to an inbound trade, storage, and transport-related function for the Tholos buildings.

BOYD'S WAREHOUSE

The well-built 'warehouse' at Tholos has attracted some interest since Boyd's early excavations in the Kavousi area (Boyd 1901,

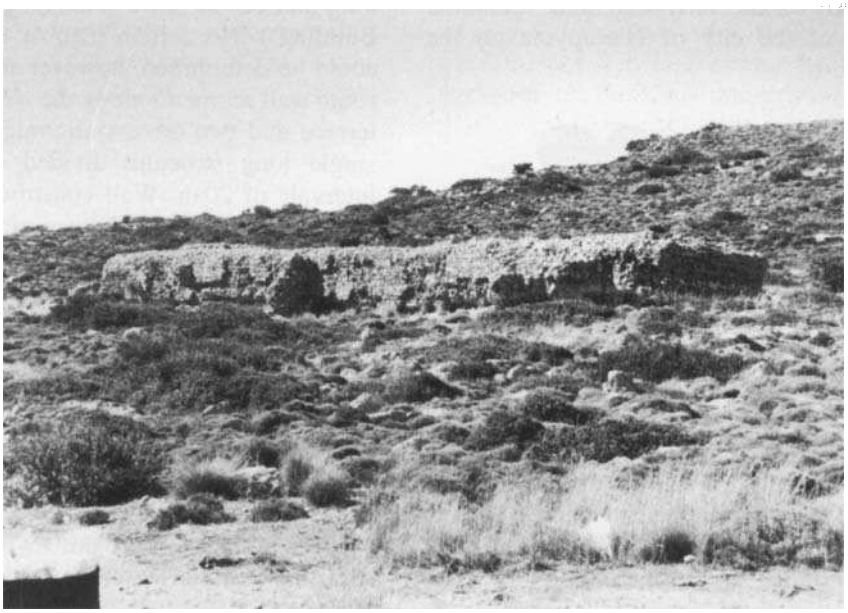

Figure 8
Roman warehouse from northeast

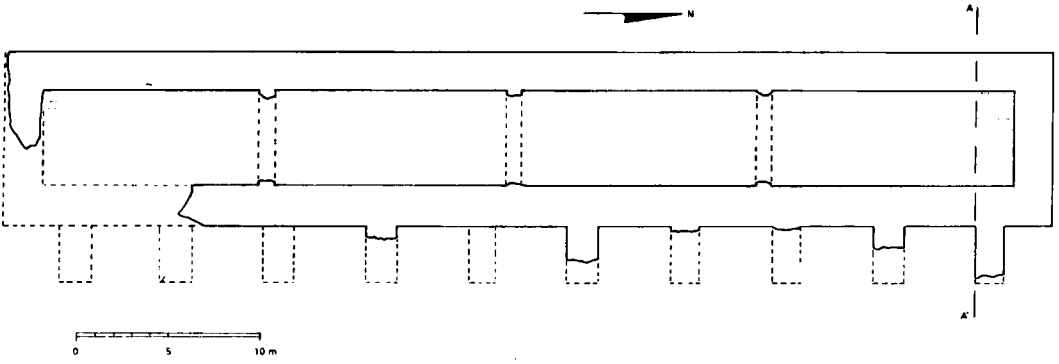

Figure 9
Roman warehouse: plan

155–6; 1904, 13; Pendlebury 1939, 376; Sanders 1982, 17, 91, 140–1; Harrison 1993, 188–91, 214–20, 280–4; Harrison 1990, 147–50; Bolanakis 1987, 258–9; Tsoungarakis 1988, 306). The oblong building is situated on the footslope of Skinias, southwest of the church of Panagia (Figs. 4–5). The building (Figs. 5, 8–17) has a north-south orientation and measures ca. 55.70 m (north-south) and 9.60 m (east-west), although Boyd (1901, 155), recorded a length of 57.0 m and width of 9.30 m. The warehouse is situated on a fairly level rise in the bedrock that slopes downward gradually toward the sea in the north/northeast, and rather abruptly from the eastern edge of the building to the river (Figs. 8–10). The walls are formed of a thick concrete core (*opus caementicium*) consisting of a cement matrix containing cobble-sized rubble and distinguishable layers of fitted stones (Figs. 10–11, 13–17) (Boethius and Ward Perkins 1970, 251; Dodge 1987, 113). At the eroded base of the northern wall, some

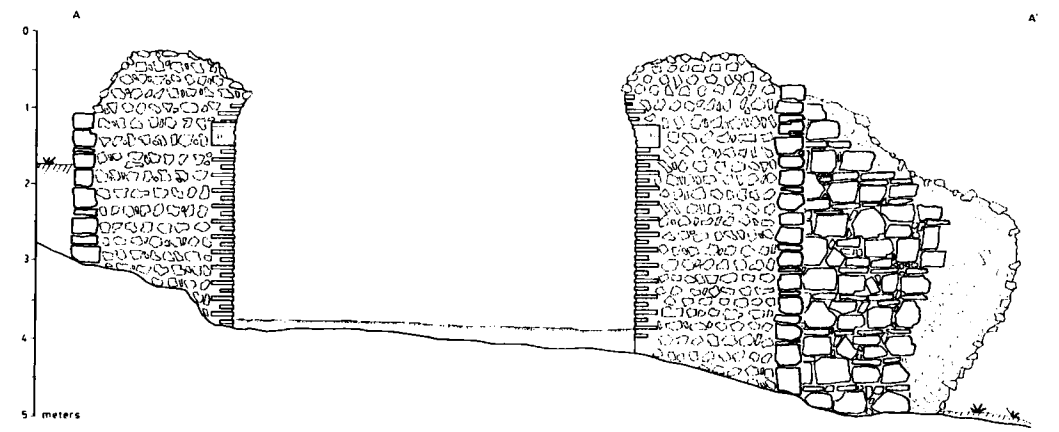

Figure 10
Roman warehouse: section

Figure 11
Roman warehouse: wall construction (*opus caementicium*)

stones are regularly fitted and tightly spaced, suggesting an *opus incertum* construction (Figs. 11 and 14). The interior is lined with brick-faced concrete, each brick (0.04 m thick and 0.24 m long) being separated by 0.04–0.045 m of cement (Figs. 10, 14, and 16–17) (Dodge 1987, 106–7). The exterior wall faces are large, regular, square dolomite blocks (ca. 0.30 m × 0.30–0.50 m × 0.20 m deep), some carefully dressed, and set in even courses (Figs. 10, 13, and 15–17) (Rickman 1971, 230). Occasionally, gray limestone and chert are used for the blocks of the exterior wall face and the thick concrete core. In places, the wall face has alternate string courses of smaller, flat schist stones (Fig. 13). All of the apparent stone is local; the dolomite is derived from the immediate surroundings of Skinias, and the schist and gray limestone were quarried from further

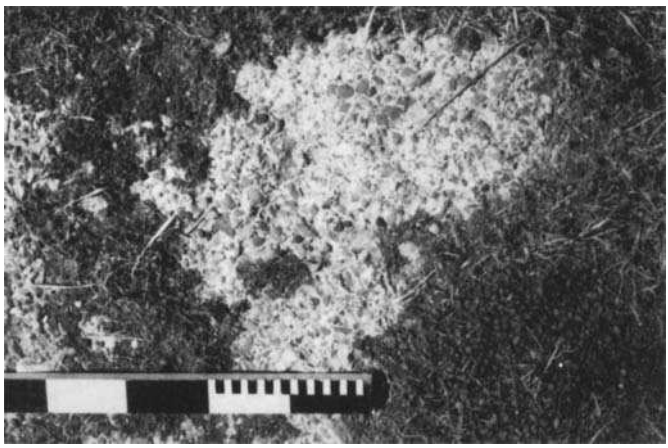

Figure 12
Roman warehouse: *opus signinum* floor detail

Figure 13
Roman warehouse: dolomite exterior facing

south at Ayios Antonios and Khordakia where Roman farmhouses and hamlets are found (Figs. 2–3). The west wall of the structure, ca. 2.08 m thick, is built against an artificial earthen terrace and directly upon the natural bedrock that slopes gently from west

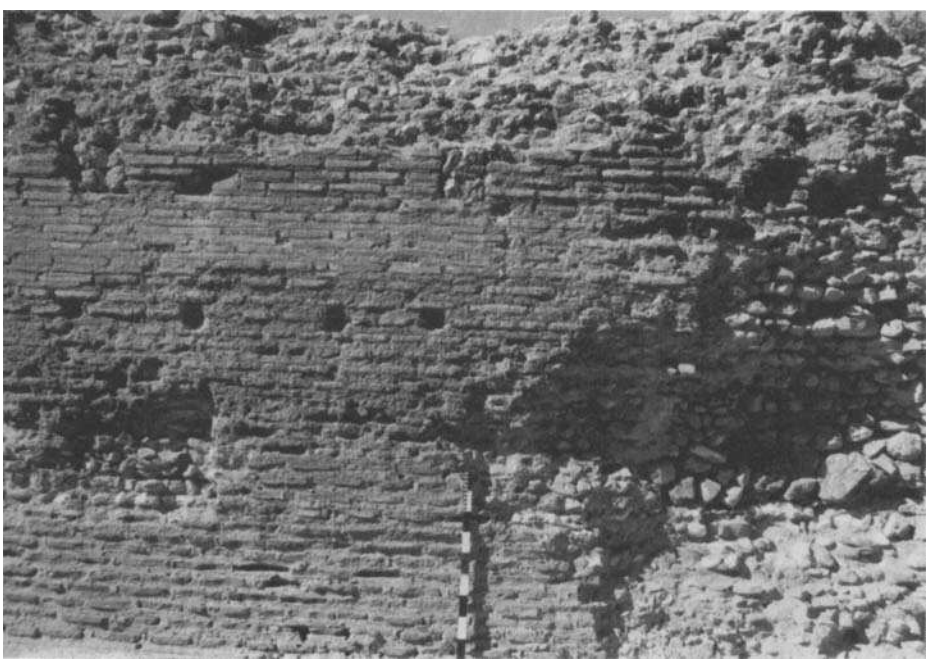

Figure 14
Roman warehouse: brick interior facing; beam holes; chiseled holes

Figure 15
Roman warehouse: east face from north; detail of buttressing

to east (Figs. 7 and 9–10). The east wall (2.15 m thick), somewhat wider than the west, is buttressed at no less than eight points along the exterior wall face (Figs. 8–10).[7] Six buttresses are extant and there are definite traces of two others. The buttresses are uniform in design (1.56 m–1.73 m thick) and are spaced regularly at intervals of

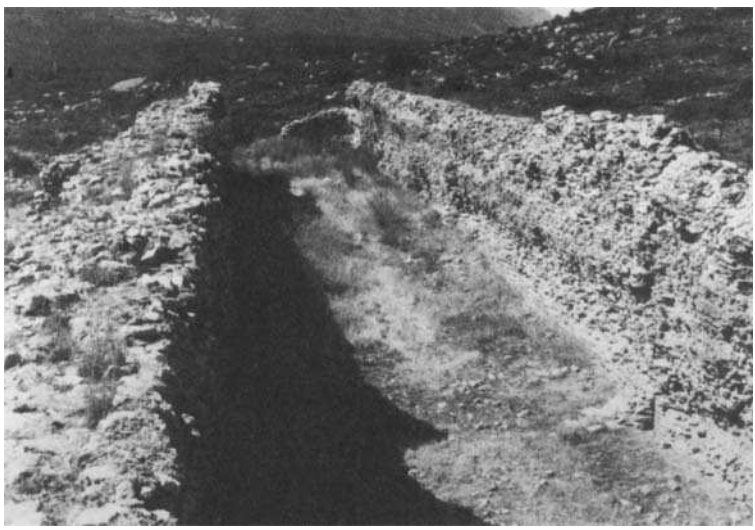

Figure 16
Roman warehouse: interior from north

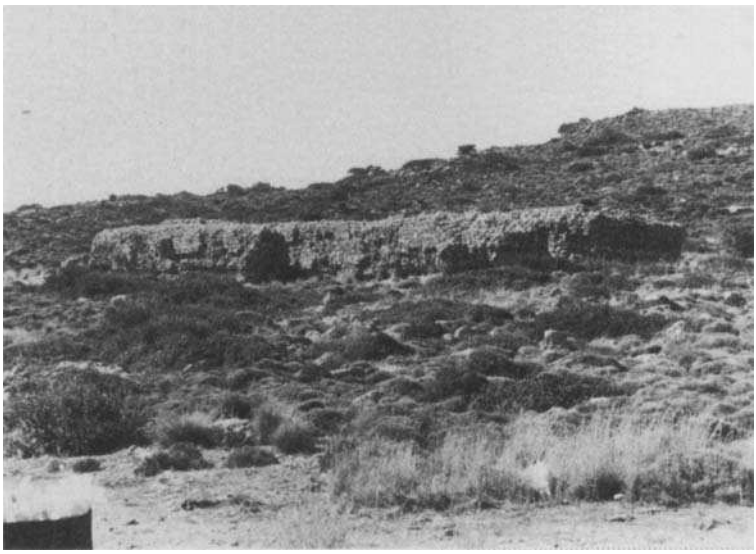

Figure 17
Roman warehouse: interior from south

3.90 m except at the north end where the distance from the building's northeast corner to the buttress is exactly 3.00 m (Fig. 9). The south end of the building has been greatly disturbed, and the entire southeast corner is no longer extant (Fig. 9). Considering the regular spacing of the buttresses and the occurrence of the northern-most at 3.00 m from the northeast corner, it is possible to reconstruct two more buttresses in the south where the wall has been destroyed, giving a total of ten buttresses to the building. The even spacing of the eight extant buttresses at intervals of 3.90 m allows the tenth buttress to be placed exactly 3.00 m from the southeast corner of the building. This reconstruction (Fig. 9) is supported by Boyd, who described a total of nine buttresses still standing in 1900, and indicated the position of a tenth, in the south, where the wall had partially fallen away (Boyd 1901, 155–6). The northern-most buttress is the best preserved and projects from the wall face ca. 2.75 m, but may have been somewhat longer. The regularity and uniformity of the buttress spacing, size and width, and the greater thickness of the eastern wall were carefully recorded by Boyd, but inaccurately drawn by the subsequent investigators

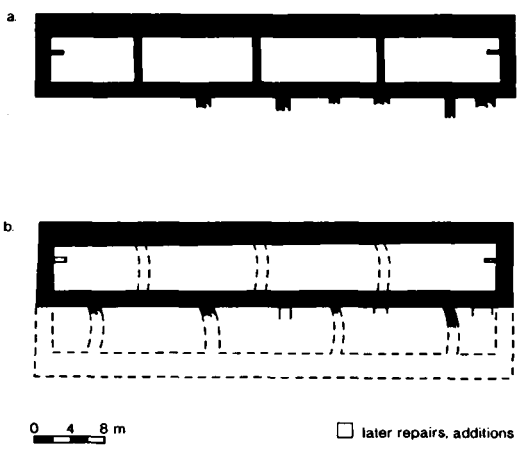

Figure 18
Roman warehouse: a. Sander's plan; b. Harrison's plan and reconstruction

Figure 19
Roman spring house

Sanders (1982, 140) (Fig. 18: a) and Harrison (1990, 147) (Fig. 18: b). Boyd (1901, 155) originally recorded the buttress thickness at 1.50 m and their spacing at an even 3.80 m.[8]

The building's interior consists of remains of three brick screen walls (0.85 thick) dividing the building into four cells measuring 5.20 m wide and ca. 12.0–13.0 m long (Figs. 9; 16–17), with the two innermost cells being of uniform dimensions; the length of each cell from north to south is: 11.80 m, 12.70 m, 12.70 m, and 13.30 m. Similar screen walls are found in the well-known *horrea* at Myra and Patara (Rickman 1971, 138–9; Akurgal 1990, 262–3).

The highest extant walls are in the north and measure between 3 m and 4 m high. The floor of the building consists of a concrete plaster matrix containing sea pebbles, terra-cotta fragments, and crushed bricks (*opus signinum*) (Fig. 12), a common floor construction in the *Grandi Horrea* at Ostia (Rickman 1971, 47, 226, 230). Within each cell are eight square beam holes carefully constructed of brick (0.25 m wide, 0.30 m high, and ca. 0.30 m deep), and spaced at regular intervals (ca. 1.55 m) from north to south; the first in the north begins about 0.30 m from the north interior corners (Figs. 10 and 14). These are evidence for an attic, upper floor, or wooden scaffolding for the concrete vault (Rickman 1971, 138; Akurgal 1990, 262–3). Such an attic (1.50 m–2.0 m high in the center) could have been reached easily by a ladder cut through a wooden floor. In the northeast interior corner, evidence of vaulting suggests either *opus caementicium* or brick-faced concrete construction for the roof; the lack of ceramic tile from the immediate area of the building might preclude a tile-roof reconstruction (Fig. 10). The building has an eastern aspect and is situated on a steep bedrock slope which required both the buttresses and the

greater thickness of the east wall (*contra* Sanders 1982, 140, and Harrison 1990, 147–50). No doorway to the building is extant, but the ruined condition of the south end does not preclude a ramp or platform in this area (Rickman 1971, 233–4, 248).

Associated with much later use of the building are chiseled beam holes, roughly-cut into the brick work, ca. 1.63 m above floor (ca. 0.13 diameter); they functioned perhaps for some makeshift shelter within part of the building (Fig. 14). Probably of modern date are small bins (constructed of field stones and modern cement) in the northwest and southwest corners (Figs. 16–17). Finally, facing the east interior wall of the second cell from the north, there is porous, soft, white plaster, covering an area of about 5.40 × 2.10, and containing a narrow (0.05 m) horizontal black-painted band. In recent times the building has been reused as a shepherd's mandra and, during the German occupation, as a storehouse. A possible *terminus post quem* for these numerous later additions is Boyd's detailed description of the building in 1900, which contains no mention of chiseled beam holes, concrete bins, or painted plaster.

Boyd unfortunately recovered no pottery from her excavations within the building itself or from underneath the floor (1901, 155), and the function and date are thus, not entirely certain. The pottery in the immediate vicinity of the structure on the severely eroded bedrock slope is primarily Minoan in date. The ceramic material situated downslope from the warehouse on the river terrace in the areas of the 'Roman Building' and the 'post-Roman building' (Figs. 5; 6: locus 39), is dated from the first century B.C. to seventh century A.D., with many good second-fourth-century forms and wares. Datable wares recovered during the collection of the river terrace included Eastern Sigillata A (Fig. 6: 111) and B (Fig. 6: 109), Phocaean red-slipped ware (110), a dish of the sixth-seventh century (Fig. 6: 106), and sixth-century combed ware; the most frequent diagnostic profiles are dated first-third century A.D. Sanders (1982, 141) recorded a sherd of Eastern Sigillata B (earlier phase: ca. 10 B.C. to A.D. 75) and suggested a date between A.D. 100 and 300 for the warehouse itself. The type of brickwork and tile-faced concrete on the building's interior faces and cross-walls tends to strengthen a date in the second century (Figs. 10 and 14) (Dodge 1987, 106–7). In Dodges' chart of brick thickness-joint thickness ratios by periods and regions, it is for the Trajanic period in Greece alone, that she records a 0.045/0.04 m relative brick-to-mortar thickness, a ratio that is identical to the Tholos brickwork. The next closest ratio is for the Severan period in Asia Minor, where brick thicknesses range from 0.035 to 0.05 m, and mortar is uniformly 0.04 m thick (Dodge 1987, 107). The structure is thus well at home in the first-second century A.D., and the individual architectural elements – such as the dolomite-faced concrete for the outer walls, and brick for the inner walls – are identical to features of the late first century to early-second-century A.D. 'Kastro' at Gortyn, which was also a vaulted warehouse or official building of some kind (Sanders 1982, 71–3; Taramelli 1902, 155–7). The ground plan and structural components of the Tholos 'storehouse' are similar to those of civic and especially military *horrea* (Rickman 1971; Gentry 1976, 15–22), and are well in accord with Boyd's original hypothesis that the building functioned as a granary for Rome's shipments from Egypt.

Harrison (1990, 147; 1993, 189), however, has most recently argued against Boyd's 'granary' theory suggesting that the building was a cistern or reservoir (Fig. 18: b). Such a

reconstruction is difficult to support: the Tholos building is situated above ground, and is thus dissimilar to the well-documented subterranean cisterns at Aptera and Kouphonisi, or the vaulted cisterns at Zaros which are built directly into modified hill slopes (Sanders 1982, 155; Taramelli 1902, 122–8; Leonard 1972, 353).[9] While topography and situation are crucial factors in making functional designations for cisterns and water-carrying buildings (Hodge 1992, 63), more important are the specific and definitive architectural features such as feeding channels, aqueducts, and the ubiquitous and resilient hydraulic cement (Hodge 1992, 56–66), which are summarily lacking in the Tholos structure.

THOLOS AND THE ROLE OF HIERAPYTNA

What was the function of this 'warehouse' and what might have been the relationship between Tholos and Hierapytna in the Roman period? In lieu of specific epigraphic references to a place name and port facility that might be identified with the Tholos site, we are admittedly at a disadvantage. Coastal urbanization in east Crete from the sixth to the second century B.C. explicitly involved two interrelated factors that are perhaps of

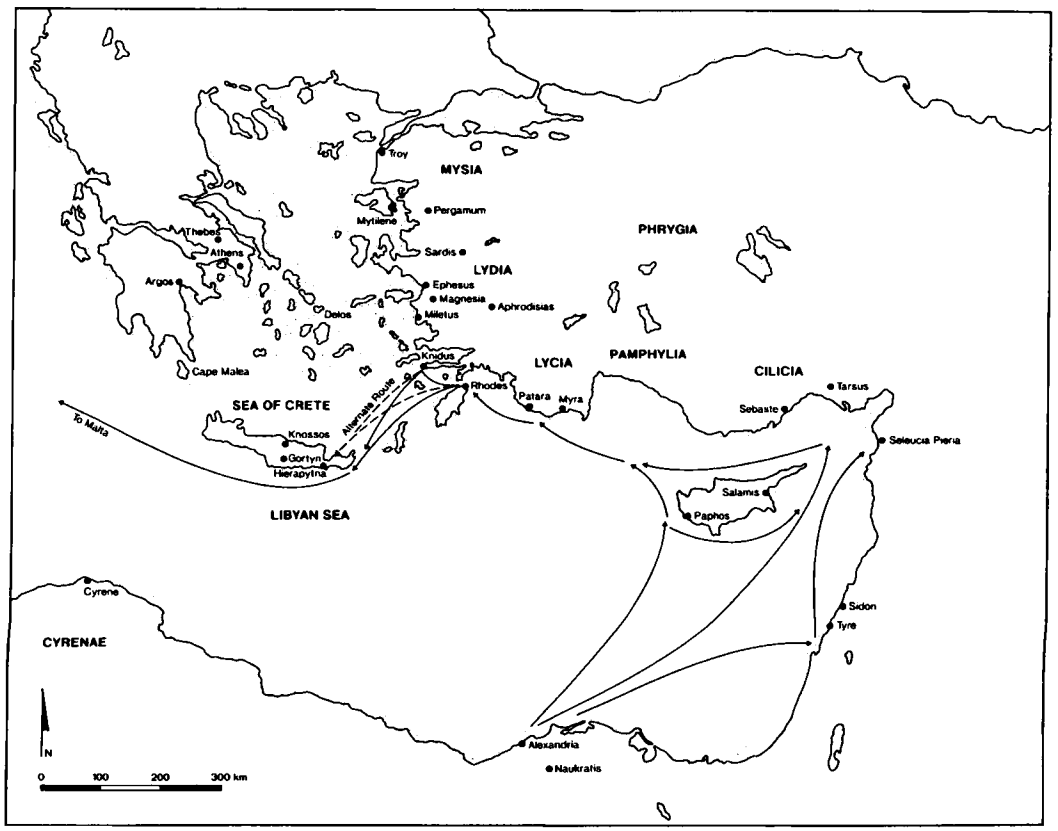

Figure 20
Eastern Mediterranean: corn route

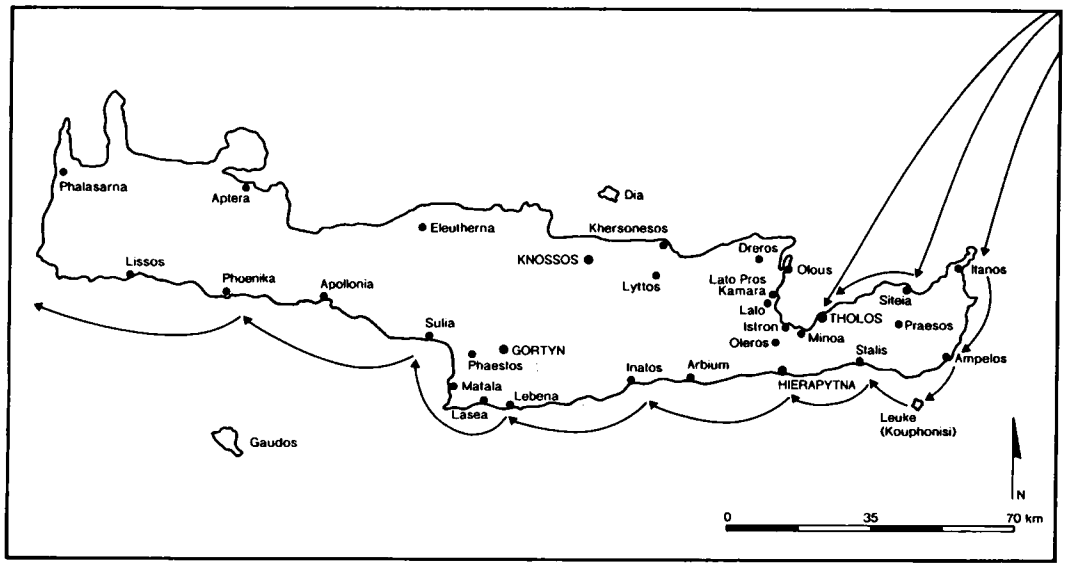

Figure 21
Crete: Hellenistic and Roman cities and transshipment points

considerable importance in understanding and reconstructing not only the function of Tholos and the role of Hierapytna, but the nature of east Cretan cities in the Roman Empire. First, autonomous nucleated towns had emerged in the first half of the first millennium B.C. along the coastal fringes of the Mediterranean as a response to the extreme exigencies of the poor agricultural hinterland (Sherratt and Sherratt 1993; Lembesi 1990, 27).[10] Second, cities developed and grew within an economic structure that apparently involved maritime activities in expanding inter-Mediterranean communication routes (Chaniotis 1995, 74; Harrison 1988, 129–31). Classical and Hellenistic communities such as Hierapytna, Stalis, Kouphonisi (Leuke) and Itanos drew their wealth and grew prosperous as coastal centers with maritime economies and as middlemen along important east-west routes (Bowsky 1994, 7) (Figs. 20–22). Maritime activity reached its apex in the latter two centuries B.C., but continued to thrive after the Roman conquest of the island by Metellus in 67 B.C. (Bowsky 1994, 9; Chaniotis 1988, 79; 1995, 74–6).[11] Fishing, purple production (murex fishing and processing) and export, slave trade, and textile production, had become significant components of the economy of these east-Cretan communities. By the first century B.C. an important aspect of the cities' economy was based on the control of ports and their exploitation of the expanding and peaceful coastal communication routes. In the Roman period, Cretan cities were exporting wine, cypress wood, purple and herbs (Sanders 1982, 32–35; Tsoungarakis 1990, 67–69; Chaniotis 1988, 62–89; 1995, 76; Harrison 1988, 152–53; Bosanquet 1939–40, 72; Petropoulou 1985, 61); and their activities were fundamentally linked to eastern Mediterranean transshipment points along sea passages from Egypt, the Levant, and southwestern Anatolia to Rome (Fig. 20) (Bowsky 1994, 9).

Within such an international market

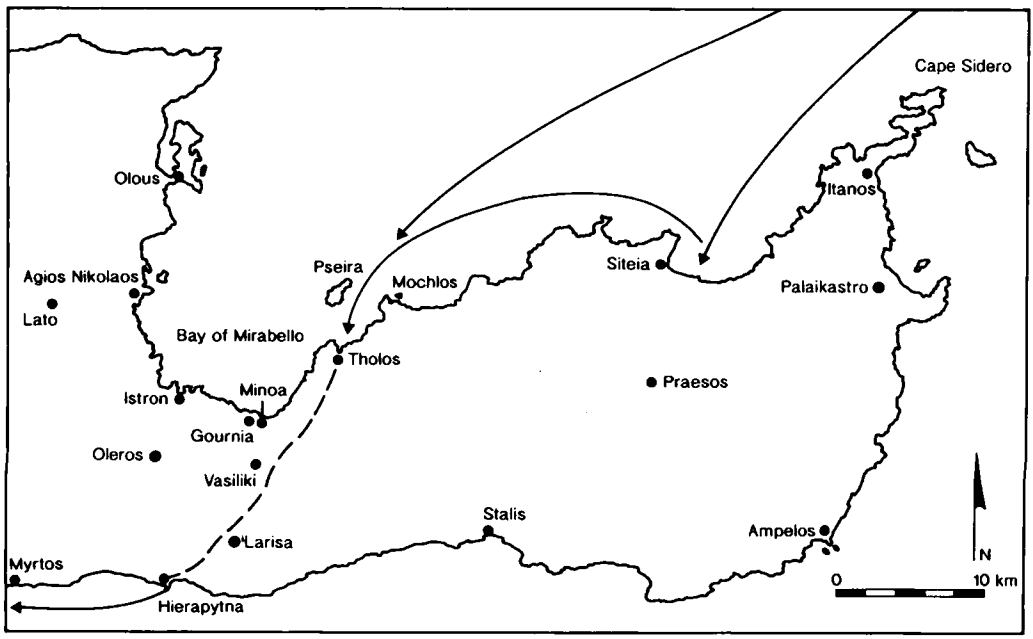

Figure 22
East Crete: Ierapetra Isthmus route

economy and the established east-west 'corn route' from Alexandria to Italy, the south-coast cities of east Crete were ports of call with urban populations drawn primarily from the hinterland. Preeminent among these was Hierapytna (Figs. 20–21) (Bowsky 1994, 9–14; Sanders 1982, 18, 31, 35, 139; Bennet 1990, 203). It is thus, not surprising that the growth of Tholos coincides with the spread of Hierapytna's maritime interests to the north coast in the last quarter of the second century B.C. If Tholos had become the main northern port of Hierapytna's landed hegemony, then the significance of the site lies is its location at the narrowest (12 km) land link between the Aegean and Mediterranean (Figs. 20–22). The simple and parochial character of Roman remains in the Kavousi area betrays the peripheral nature of the region to Hierapytna's wealthy south-coastal base, and the well-built warehouse commanding Tholos bay, stands in marked contrast to the rural installations further afield. The level of economic interaction that existed between Tholos and Hierapytna has eluded epigraphic or literary reference. It is arguable, however, that the small port had an economic function within the Hierapytna's sphere of influence; and the Roman remains at Hierapytna itself, including an amphitheater and numerous other civic buildings, are a clear reflection of the city's status, extreme wealth, and economic importance in the region (Sanders 1982; Bowsky 1994, 11–13).

Although the extent of Roman intervention in the affairs of Hierapytna is not yet fully understood, the city had clearly been of interest to Rome and indeed was the primary focus of Metellus' conquest of the eastern part of the island. Was it Hierapytna's well-entrenched strategic position, enormous

nucleated population, and firmly established territory that helped it to maintain its city status and to encourage imperial recognition into the first century A.D. (Bowsky 1994, 9; Harrison 1991, 116)? The city's power, economic viability, and longevity, were initially based on its own maritime commercial expansion, and were perhaps sustained precisely because the city's position was in accord with the conditions of Rome's trading interests.[12] An important aspect of Hierapytna's stability into the early Roman period is that it had been a coastal central place since Classical times or earlier; and settlement nucleation, usually a condition or result of Roman economic and political restructuring, had already been accomplished by Hierapytna by the Hellenistic period. Rome could simply absorb a city-state whose economy was long entrenched not along lines of local agricultural production (and mobilization for export), but as a trade conduit and land link for off-island seaborne commerce (Bowsky 1994, 36–7; Sanders 1982, 35). The most important commercial interest was ultimately the imperial *annona*, and a crucial point along Hierapytna's land link is the port of Tholos on the Isthmus of Ierapetra.

In the hinterland of Tholos, a rural population inhabited the fringes of the Kampos plain and the northern area of the Isthmus (Figs. 3 and 22). The existence of Roman hamlets south of the Tholos — at Ayios Antonios, Khordakia, and underneath the modern village of Kavousi — suggests a small but thriving local agrarian population (Sanders 1982, 140). In the broader north Isthmus area, Gournia, Pacheia Ammos, Vasiliki, and Monastiraki are Roman villages, and Istron itself was no doubt a community of considerable size (Hayden, Moody and Rackham 1992, 333). It is interesting that archaeological survey in the area of Vrokastro (Fig. 22: Istron) has recovered a string of Roman sites leading from the northwest coast at Istron, and following southward mountain passages through Oleros to Hierapytna. A similar and ostensibly more efficient north-south land route was the Isthmus itself. The location of Tholos at the first viable land fall on the north coast west of Siteia was another important factor in the siting of the warehouse. At Mochlos, to the east, there is a good roadstead, but the area is entirely enclosed by mountains (Fig. 3) (Sanders 1982, 136). Pacheia Ammos (Fig. 3: Minoa), lying to the west, is an exposed harbor that is an inefficient anchorage even today for most of the fall and winter months (Boyd 1904, 13–15). The port at Tholos and the sheltered bay of Pseira (Fig. 3) would have provided a perennial and secure harbor.

THOLOS AS A TRANSSHIPMENT POINT

The geographical position of Crete at an obvious cross-roads in the eastern Mediterranean remains intriguing and requires reexamination (Fig. 20). The island is situated at the southern edge of the Aegean forming a veritable gateway between the cities of the Greek and Anatolian coasts and the wider Mediterranean trade circuit. Crete was a link between the Aegean and Cyrene, and Gortyn's early alliance with Hierapytna and her later role as capital of the Roman province are, in this light, perhaps not so surprising (Harrison 1988, 144–8; Fulford 1989, 179–88). Bennet (1990, 201) has rightly observed that Gortyn was 'a single capital which lay in the center of the island's main grain-producing region, with convenient access to the Libyan sea and Cyrene, the other half of the Roman province'. However, even with ports at Lasea, Matala,

and Lebena (Fig. 21), Gortyn's administration of the province, and her control of west-bound trade from the east Aegean and Mediterranean must have depended on close contacts with more opportunely located coastal centers with city status (Harrison 1988, 145). Hierapytna and her northern and southern coastal territories were no doubt important in this respect.

Most significant however is Crete's position at the last land fall before the long open-sea passage to Malta along the trade route between Alexandria and Rome (Fig. 20). Casson has long argued that Knidos and Rhodes were the traditional stopping points for return grain shipments from Alexandria in the late spring and fall (Casson 1950, 47–8; Rickman 1980a, 226; Rickman 1980b, 118–19; Greene 1986, 28–9). During the summer months, grain haulers would leave Alexandria against the prevailing northwesterly winds, sailing north of Cyprus and skirting the south coast of Cilicia and Lycia (Fig. 20). After putting in at the popular ports of southwestern Asia Minor or Rhodes, the traditional route led vessels abruptly southward and then west along the southern shore of Crete, thus avoiding the Aegean and, most importantly, the dangerous seas around Cape Malea and Sidero (Figs. 20–21) (Casson 1950; 1984, 80; 1959, 238; Tsoungarakis 1990, 69; Fulford 1987, 70; Harrison 1988, 145; 1993, 220; Sanders 1982, 35, 139). Such a south-Cretan route provided a number of safe havens and water supplies in the event of inclement winds and weather, and before the final and longest leg of the journey to Malta. Sites such as Itanos, Ampelos, Leuke (Kouphonisi), Stalis, and Hierapytna were logical ports of call on the initial leg around eastern Crete (Fig. 21). In addition to Kali Limenes, where Paul anchored in route to Rome in A.D. 61 (Acts 27.7; Tsoungarakis 1988, 197), there were many roadsteads and ports west of Hierapytna: Inatos, Lebena, Lasea, Matala, Apollonia, Phoinika, Suia, Lissos, and even Gavdos (Fig. 21) (Bowsky 1994, 15; Tsoungarakis 1990, 56–9; Sanders 1982, 31). These ports functioned as storage facilities and harbor stations along the corn route, not unlike the ports at Myra and Patara on the south coast of Lycia, which were equipped with enormous granaries of Hadrianic date. Rickman (1980a, 266) has argued that such granaries 'were to house supplies for the imperial *annona* rather than for the local communities of the district'. (Rickman 1980b, 118–19; 1971, 137–40). Why then is the Tholos granary on the north coast and what is its significance, if completely outside of this main east-west trade route?

Three possibilities present themselves. Ships with Cyrenean produce bound for Greek and Anatolian cities of the Aegean could have avoided cape Malea and cape Sidero by banking east/northeastward with the prevailing winds to Hierapytna (Figs. 20–22). There they could have unloaded their cargo for transport overland[13] across the Isthmus to Tholos where the produce would await shipment to northern ports in the Aegean (Fig. 22).[14] Such a route would have reduced both time and the danger of traversing both Malea in the west, and the rough waters and headwinds around cape Sidero and the Dionisades in the east. Contacts between Egypt and Cyrenaica and the Aegean, Anatolia, and northeast Mediterranean are well attested archaeologically from Hellenistic and Roman periods and strongly reinforce the potential importance of a transshipment gateway through the Ierapetra isthmus corridor (Bowsky 1994, 15).[15] Certainly after the third century A.D., as grain shipments from Africa became increasingly diverted to

Constantinople, the Tholos granary could have continued to function along these lines.

The second possible function of the Tholos port is as a storage facility for Rome- or Cyrenaica-bound shipments of produce from Thessaly or coastal Asia Minor whose merchants wished yet again, to avoid Malea.[16] Such a south-bound route across the Isthmus would be preceded by a quick and easy passage in the Aegean with ships traveling generally with the north winds into the Gulf of Mirabello, the Pseira anchorage, and Tholos bay; the goods from Tholos would then be reloaded in the south at Hierapytna for continuation of their journey along the traditional south-coast route into the Mediterranean, south to Cyrene, or on to Malta and Rome.

The third and most likely scenario is that Tholos functioned as a contingency harbor and temporary storage facility for the *annona* along the Alexandria-Rome corn route (Figs. 20–22). After leaving the safe havens of Knidos, Rhodes, and other ports in southwest Asia Minor, ships often met difficult winds and hazardous conditions, especially off of cape Sidero, sending them north instead of south of Crete (Fig. 22). Such a mishap was indeed the fate of the famous grain hauler, Isis, reported by Lucian (*Navigium* 7–10) to have been driven into the Aegean where it eventually found safe haven in the Piraeus (Casson 1950; 1959, 235–6; Rickman 1980b, 119; Greene 1986, 28). Could Tholos have functioned as a transshipment point for grain-bearing vessels either misjudging their directions or banking too far westward to the northeast coast of Crete? Casson (1950, 48), commenting on St. Paul's famous and perilous trip along the south coast of Crete (*Acts* 27:7), has emphasized that from Rhodes or Knidus, 'it is hard to resist laying a course north of Crete due west to Malea. But a sailing vessel cannot travel west on the northwest winds and these are the ones, as we have seen before, that prevail in these waters. The best it can do is sail SW × W, a course that will ultimately force it ashore somewhere on the north coast of Crete'. Even if ships were to bank against the northwesterlies, they could easily have misjudged their southward direction or intentionally made for northeast Crete in the variable winds during a late return to Rome in late August or September. Watrous (1992, 177), countering traditional assumptions of a constant prevailing northwesterly, has emphasized the variability and uncertainty of winds during parts of the sailing season: 'According to the *Mediterranean Pilot* (1900: 6–7), southerly winds alternate with northern winds during March and April; during May and June, the weather is serene, with northern winds, light breezes, and calms; and in September, the prevailing wind is from the south'. Such variability, especially at the end of the sailing season, when north and south winds are frequently interchangeable, permits the possibility that ships heading for the south coast of Crete might have been easily sent onto the northern shore. Such vessels that landed on the northeast coast (Fig. 20: 'alternate route') could have avoided a hazardous and time-consuming attempt to backtrack around cape Sidero by finding safe anchorage at Tholos where their grain could be stored and then transported quickly overland across the isthmus to waiting merchant vessels in Hierapytna (Figs. 21–22). The ultimate aim was to reduce as much as possible the duration of an already difficult and time-consuming return voyage. The extreme southwestward course that ships needed to follow in order to make for the south coast of Crete from southwestern shores of Asia Minor, and the extreme changeability of weather in this area of the southeastern

Aegean during the summer and fall months, suggest a highly plausible, and indeed potentially important role for this seemingly obscure Cretan port.

CONCLUSION

While secondary in political status to Gortyn in the second century A.D., Hierapytna nonetheless dominated the eastern end of the island of Crete. Even as early as the second century B.C., the city had expanded its maritime interests eastward with the aim of controlling the harbors of Stalis, Leuke and possibly Ampelos. The city's northern territory was also part of its circumscribed maritime sphere of influence, including Minoa and Tholos. The motivation for such territorial expansion can be sought not in the marginal agricultural lands within these regions, but rather, in the coastal trade that suited Hierapytna's commercial aims in the Hellenistic period, and subsequently those of Rome within a wider and more complex economic system. Inscriptions of the Hellenistic and Roman periods from east Crete are dominated by references to harbor fees, purple production (murex fishing), and fishing rights – the famous Magnesia-mediated conflict between Hierapytna and Itanos over Kouphonisi and Stalis being the most salient Hellenistic example (Bosanquet 1939–40, 735; Spyridakis 1970, 56–9; Bennet 1990, 201).

The growing power and prestige of Hierapytna and its continuing prosperity into the Roman period depended on its inextricable link to the west-bound trade from Near Eastern and Egyptian ports, and an important route between Cyrenaica and the east Aegean. The extent to which Tholos represents local, Hierapytnan, or imperially directed mobilization, storage, and transshipment of produce in either direction along the isthmus route is unknown. The direction of the 'corn route' however, suggests a means for Hierapytna and a locally based population to benefit from small-scale and short distance trade ventures and transport services, as well as harbor revenues. Hierapytna's interest in the northern harbor of Tholos, and the establishment of a commercial-size granary at this location in the reign of Trajan indicate the high volume of sea traffic, the city's continuing effort to maintain control of both land and sea routes in eastern Crete and the southeast Aegean, and while suiting Rome's primary interests, to benefit indirectly from the safe and efficient passage of the *annona*.

Department of Classics
University of North Carolina at Chapel Hill
212 Murphey Hall
Chapel Hill, N.C. 27599-3145

NOTES

1. Intensive survey in the area of Kavousi (1988–1991) was conducted as a component of the Kavousi Project Excavations which are directed by G.C. Gesell, L.P. Day, and W.D.E. Coulson. Permission for the survey was granted by the KD' Ephoreia of Prehistoric and Classical Antiquities and the author is grateful for the support of M. Tsipopoulou, K. Davaras, and N. Papadakis of the Archaeological Service of Eastern Crete. Many thanks is owed to Lee Ann Turner (University of Pennsylvania) who drew the plan and section of the Tholos granary (Figs. 12–13), and for much analysis and useful discussion concerning the architecture and function of Tholos. I would like to acknowledge the help and useful input of Angelos Chaniotis, John Hayes, Kenneth Sams, Jennifer Tobin, and Vance Watrous.

2. Stavrakis (1890, 137) records the population of Kavousi (636 Christians, 319 Turks) in 1881 as 955, or

roughly 29 persons per square kilometer; such a number appears to be a pre-WW I maximum population. Boyd 1904, 10–13, offers a detailed description of the environment of Kavousi in 1900, emphasizing the agricultural disparity between mountains and coastal plain, and commenting on the intensive exploitation of the mountain terraces for barley cultivation. Information on relative soil values and potential for dry agriculture was derived from interviews with local land owners, and much useful discussion with J. Foss, J.T. Ammons, M. Timpson, and M. Morris (University of Tennessee), who have conducted the soil study for the Kavousi Project.

3. Chaniotis 1988, 79–82 discusses the restructuring of rural settlement and agricultural production on Crete in the first century A.D.

4. Chaniotis 1988, 80–2, suggests an increased specialization of agricultural production in the Roman period, wine being a particularly important export crop. See Sanders 1982, 30, on the expansion of rural settlements in the Mesara in the second century A.D.; and Mitchell 1993, 257 on the increase in grain production and urbanization in Roman Asia Minor. It is indeed possible that a limited local wine and oil production in the Kavousi area might account for the warehouses at *Sta Lenika* and Tholos, however, given the agricultural potential of the region, the siting of farmhouses in distinct areas of arable land and water supplies suggests non-extensive irrigation and limited intensive agricultural production. Unlike the rich alluvium of the Mesara (Gortyn) and Knossos, or the expansive arable land of central and coastal Anatolia, the north Isthmus soils are poor and generally unsuitable for dry agriculture. It is doubtful that the area could have produced any significant or consistently viable export crops. Chaniotis (1995, 75–6) comments on low rainfall and subsistence strategies in the Isthmus of Ierapetra.

5. See Sanders 1982, 30–1; Chaniotis, 1988, 79–83; Harrison 1988, 150 on changes in rural production and settlement patterns in the first century A.D.; see also Alcock 1993, 80–5 and 93–127 on changes in settlement patterns and land use in Achaia.

6. Sanders (1982, 35), has emphasized the importance of coastal trade in the prosperity and survival of many Cretan cities: 'Perhaps the most important effect of trade was on the southern coast cities, some of which must have relied on it for their wealth, if not their existence'.

7. See Boethius and Ward-Perkins 1970; Rickman 1971, 226–31 for buttressed barreled vaults in the first and second century A.D.

8. Harrison's (1990, 147) suggestion that the buttresses themselves were actually projecting cross-walls of a lateral chamber must be rejected. There are neither traces of wall foundations for such a parallel chamber along the bedrock slope, nor apertures or channels piercing the building's east wall.

9. Personal observation. See Papadakis 1983, 58–65. Other second century A.D. parallels include the northern buttressed segment of the L-shaped cistern at Aptera; see Sanders 1982, 165–8; and Matz 1951, 89–90.

10. See Chaniotis 1995, 74 for discussion of the growth Hierapytna in the Hellenistic period through 'colonization, emigration, and conquest' and as a direct response to the limited productive arable land of the isthmus and the need for securing agricultural territory for a growing population. See most recently, Bowsky 1994, 6–7; Watrous *et al.*, 1993, 229–31; Hayden, Moody, and Rackham 1992, 329–32; and Alcock 1994, 178–80 for Hellenistic settlement patterns on Crete.

11. Bennet (1990, 201) has pointed out the role and status of cities in the Roman period: 'The increase in the importance of coastal settlements undoubtedly reflects Crete's participation in wider, off-island systems of interaction, such as the major east–west trade route along the south coast'.

12. See Alcock 1993, 170, for discussion of regional systemic variables in the nature of Roman intervention in Greece; for Crete, see most recently Bowsky 1994.

13. On over-land transport of African grain see Harris 1993, 27–8; Mitchell 1993, 245–6, 258 on the importance of land transport in Roman Asia Minor; see also Greene 1986, 35–6; Rickman 1980a, 264–5; and Tengstrom 1974, 29 on roads and land transport; and Harrison 1993, 214–15, 219–20 on trans-Ierapetra isthmus shipments and Hierapytna's roads.

14. See Sanders 1982, 34–35 on trade between Crete, Asia Minor, the Greek Aegean and the Levant; Mitchell 1993, 253–4 on African grain diverted to cities in Asia Minor; see Harrison 1988,. 145 on the sea route between Cyrene and the Mesara.

15. On the connections between Cyrenaica and the east Aegean, see Fulford 1989, 171–80. Given both the easterly direction of currents and the prevailing northwesterly winds, travel to Crete from Cyrene would have been along a decidedly northeastern trajectory; this might suggest a relatively easier passage to the eastern area of the island than directly north into the straights off Malea.

16. See Rickman 1980b, 119, on Roman interest in Anatolian grain sources.

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