J.W. SHAW

Bronze Age Aegean Harboursides

ABSTRACT

R*ecent excavations and exploration have contributed new and crucial information warranting a review of our earlier understanding of Bronze Age Aegean harboursides, especially of the topographical conditions and geographical locations selected by the Aegeans. Major sites which can be cited are Kea, Kommos, Zakros, and Amnisos. Further information derives from precious pictorial depictions of coastal towns and possible harbours, as in frescoes found at Kea and, especially, in the West House at Akrotiri, or in the recently published sealing from Chania.*

The paper will discuss this new material and address questions of defence, ship storage, relations with inland towns, trade, relative water-levels, and the nature of the possible harbour installations during the Middle and Late Bronze Age in the Aegean.

Introduction

With its often large, well-furnished buildings, the Akrotiri settlement (Fig. 1) appears relatively opulent in comparison with Ayia Irini on Kea (Fig. 2)or more densely built Phylakopi on Milos (Fig. 3). At Akrotiri, of course, there still remain unusual contrasts among the building groups. For instance, the agglutinative room-group B/D, which probably consisted of three or more residences, appears to be sprawling in comparison with the much larger, more carefully planned ashlar buildings, whether one considers the relatively small West House, or Ashlars III and IV which in size and with the care given to their construction compare favourably with the largest of the houses at Ayia Irini (House A) or at Phylakopi (the Mansion) or, for that matter, with large houses in the Knossos area. It is important to point out here that the unusual circumstances of preservation at Akrotiri do not suffice to explain the relative wealth represented by its buildings. Rather, the explanation must be sought in the dynamism of the Theran culture and the associated circumstances that brought about accumulations of wealth leading to the construction of separate buildings of such size.

Any explanation of Akrotiri's opulence must deal with Thera's position north of Minoan Crete, flourishing at the time, and Thera's location between Crete and much of the rest of the Aegean world. It must deal with the possible roles that Thera may have played as part of that rich cultural mix that Spyridon Marinatos once referred to in conversation as that of the southern Aegean. One of those roles was certainly related to Theran ships, which secured Thera's links with that Aegean world. In this connection, one must inquire and wonder about Akrotiri's immediate physical relationship to the sea. What kind of harbour might we expect, and what facilities might there have been for the ships or for the goods that they may have been carrying to and from the island? Of course, the question may in the long run remain unresolvable because of the very thick layer of pumice covering what was Thera's Minoan shoreline (Doumas 1983, 55). We can nevertheless explore the possibilities, first by examining evidence for harboursides near selected Aegean seaside settlements, then by going abroad, outside the Aegean, to the Near East (for earlier surveys of the subject see Shaw 1972,89-90;

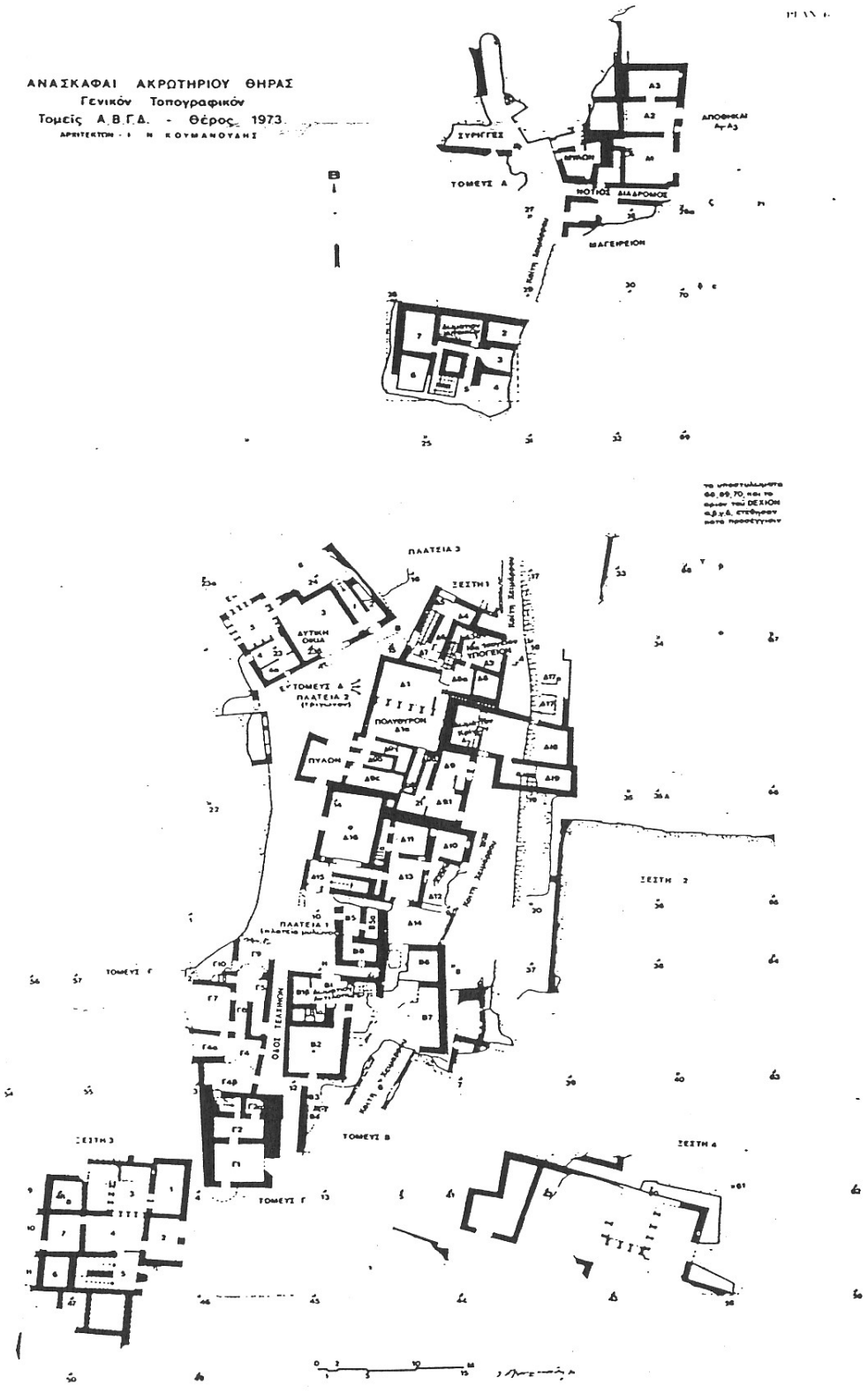


Fig. 1. Plan of Akrotiri site (after S. Marinatos 1976).

2

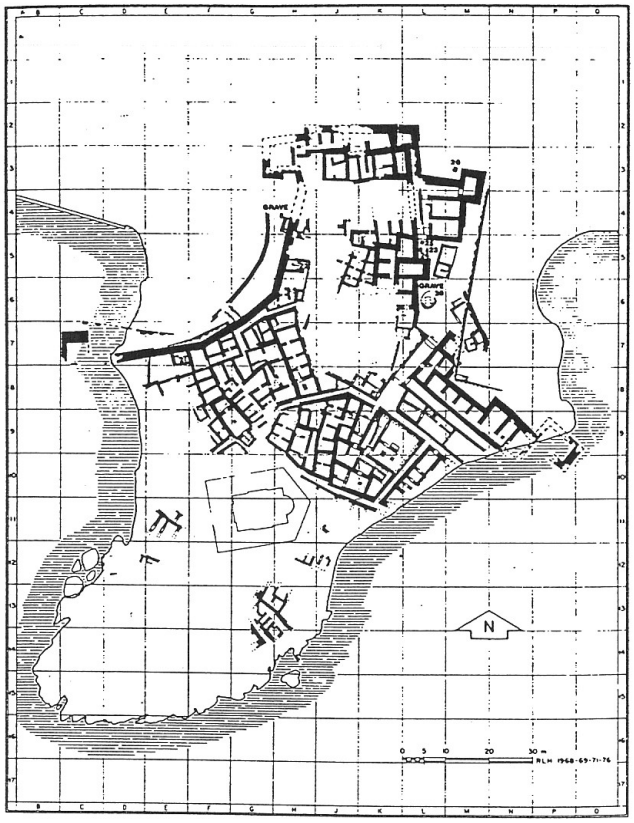


Fig. 2. Kea general plan (after Davis 1986, Pl. 2).

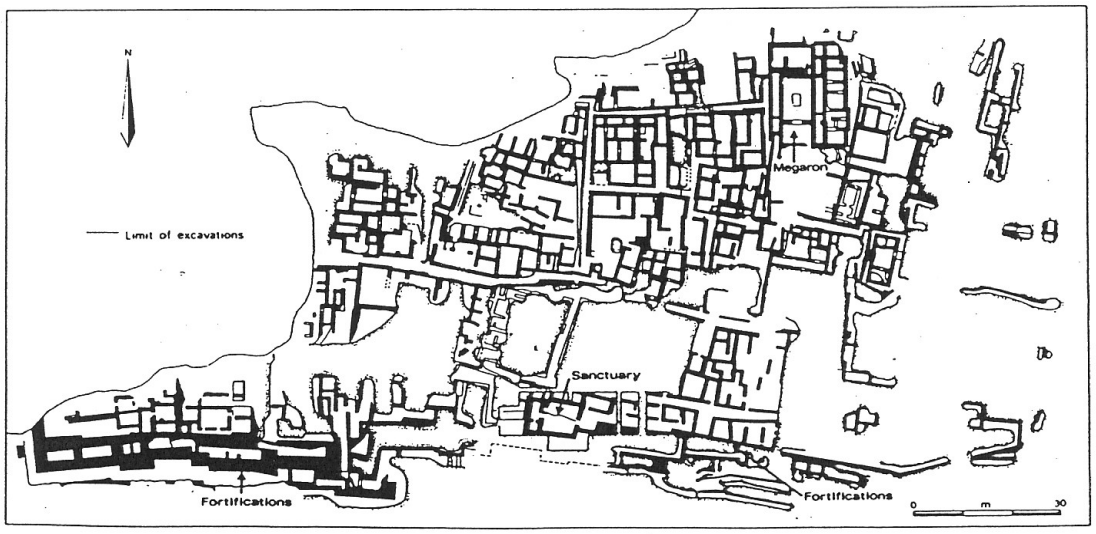
Fig. 3. Phylakopi general plan (after Renfrew 1982).

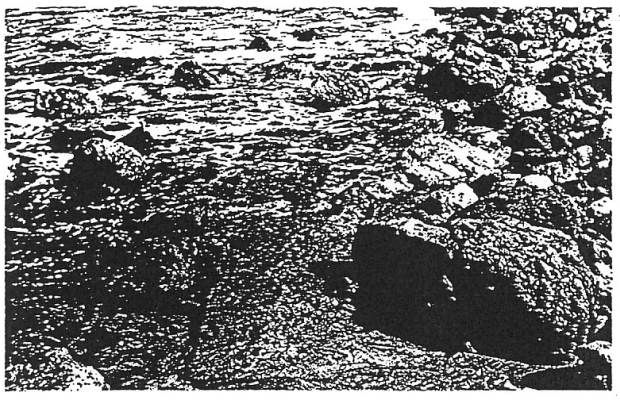
Fig. 4. Amnisos, ashlar corner of LM I Minoan house awash at shoreline, looking east (J.W. Shaw).

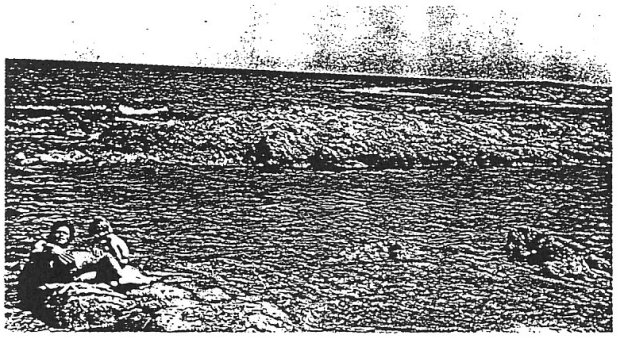
Fig. 5. Nirou Khani harbourside (after S. Marinatos 1926, 144).

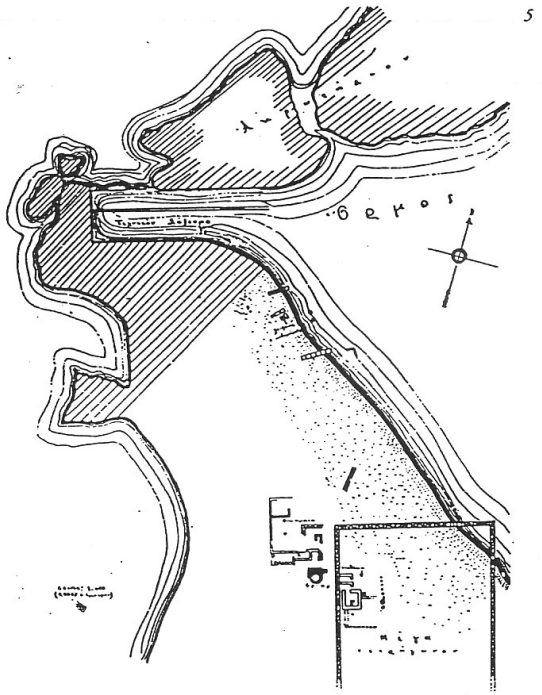
Fig. 6. Nirou Khani bedrock cutting, from south-west (J.W. Shaw).

3





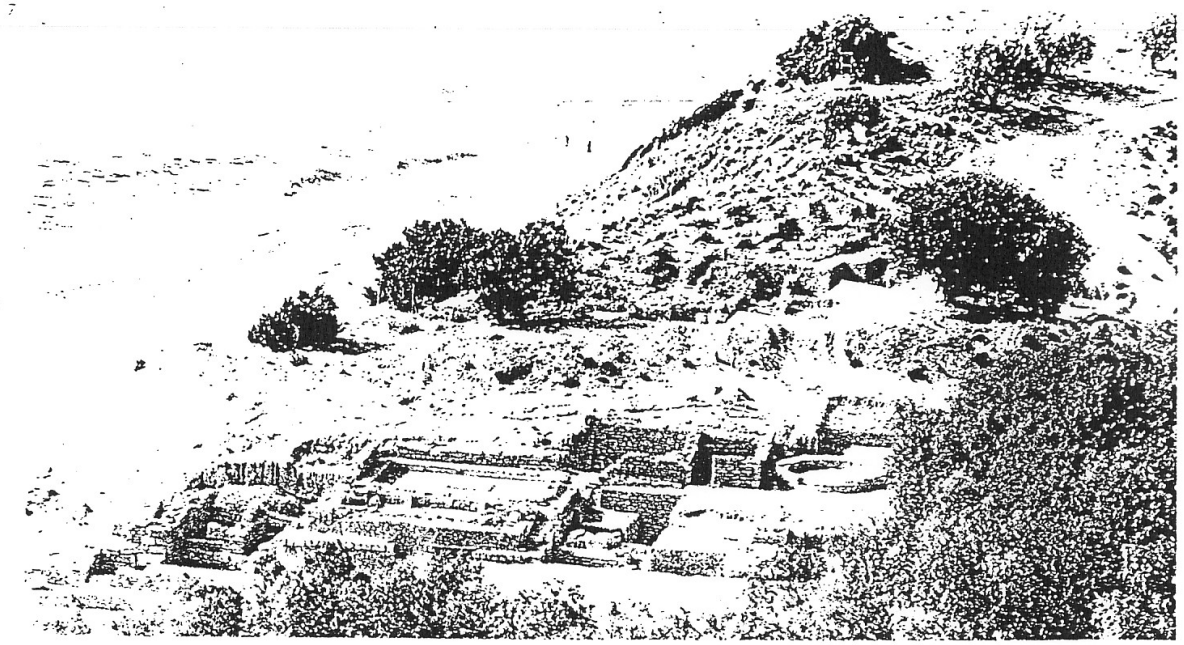




Blackman 1982, 90-94; Raban 1983, 238-241). With our general overview, we will be in a better position to return to Thera to consider, among other things, what the Miniature Fresco from the West House may reveal about harbourage.

Aegean harbours If we first consider the Aegean, it soon becomes clear that during the Bronze Age there was a preference for locating settlements on or near peninsulas. One of the most characteristic and most thoroughly excavated examples is that of EB-LB I Ayia Irini (Fig. 2), where most, if not all of the settlement, at least during the Middle Bronze Age, may have been on the small peninsula (Davis 1986, 102). During much of this time it was sheltered behind a strong fortification wall with towers set at intervals. This small peninsula was preferred partly for its defensibility, but also no doubt because it lies well within the relatively sheltered Bay of Ayios Nikolaos. As at many sites, seafarers would have the choice of beaching their ships on the sandy shore, or leaving them at anchor on either side of the peninsula, depending on the daily or seasonal weather and the direction of the wind. Since then is no clear evidence that the wall encircled the low peninsula on the sea side (Davis 1986, 15), one can argue that the defenders' chief concern was with armed attack from the land.

Other low peninsular sites can be pointed out. For the EB period exclusively one can note Manika on Euboea (Konsola 1984, 69,97), Ayios Kosmas and Askitario in Attica (Konsola 1984, 70, 99 and 74, 100, respectively). Elsewhere, as at Kolonna on Aegina (Konsola 1984, 101), set on a promontory, the site remained occupied during the MB period when the town's buildings were, like those at Ayia Irini, protected against attack from the land side by substantial fortifications. It has also been argued, although without proof, that Phylakopi (Fig. 3), well-fortified from the landward side, may have had a similar plan, before erosion titled adjacent low areas and removed a substantial portion of the seaward town, built as it was upon a high but easily eroded bluff (Dawkins and Droop 1910-11, 7-8; Atkinson *et al*. 1904, 9; Davidson and Tasker 1982, 88; Wagstaff and Cherry 1982,



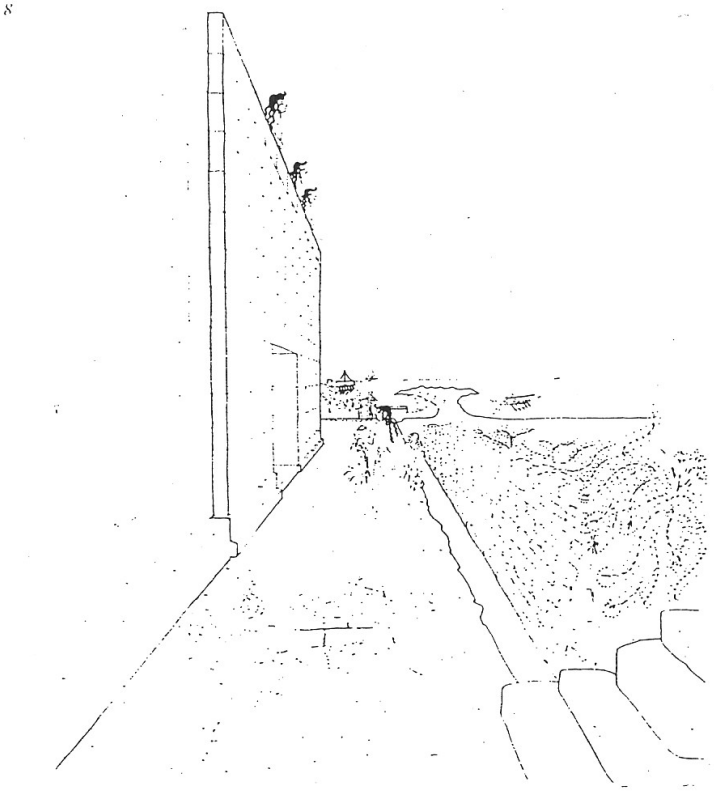


Fig. 7. View of Kommos site, from the south (J.W. Shaw).

Fig. 8. Kommos, restored view seaward west of Building J/T (by Giuliana Bianco).

258). Peninsulas were chosen for occupation along the coast of Anatolia at, for instance, partially explored LB Miletus (Gödecken 1986, *passim*) and Iasos (Levi 1969, Pl. C and *passim*; Laviosa 1973, *passim*; Mellink 1988, 115) or, off the shore of Crete, at LM I Pseira where, however, only the sheltered, western side of the peninsula could be used for harbourage (Betancourt 1988, 209 for the position of the harbour).

Some settlements were established along shores in relationship to offshore islands. In some cases, as at Klazomenai near Smyrna (Izmir) or Mochlos in Crete, the water between island and mainland was shallow enough to allow a causeway joining them to be built. (For the former, Bean 1966, 128, 135; Mellink 1984, but the causeway may be later, 450; for the latter. Frost 1963, 103; Psychoyos 1988, 143). In some cases the islands were little more than projecting reefs. In Crete, this was the case at at least three sites, Amnisos, Nirou Khani and Kommos. At the first (Fig. 4) there is a small islet off the shore, separated from the mainland by shallow water. It is clear that the relationship was substantially different during Minoan times, since there is at least one Minoan building, with the plan of a house, partly submerged at the shoreline. (The Amnisos shoreline was investigated during the 1964-1969 period by Stylianos Alexiou. In 1967 I was asked by him to make a plan of the partially submerged walls which turned out to be portions of at least three buildings of house type. That the floor level of the houses is now below water level is proved by a submerged threshold still *in situ*. For the most recent study of the antiquities in the Amnisos area see Jörg Schäfer *et al*., Neue Forschungen der Universität Heidelberg in Amnisos, 1983-1985, forthcoming in *AA*.) At the time that the shoreline house was being used, one can assume that its floor level was at a minimum of 3.00 m higher than now, a figure which can be used as a working estimate of the relative sea level at the time; surely no one would build his house where winter waves would wash up into it. With this in mind, we can postulate a sandy spit leading out to the present islet. Then, the area east of the peninsula would have been better sheltered than now, even though the beachline would have been significantly further out

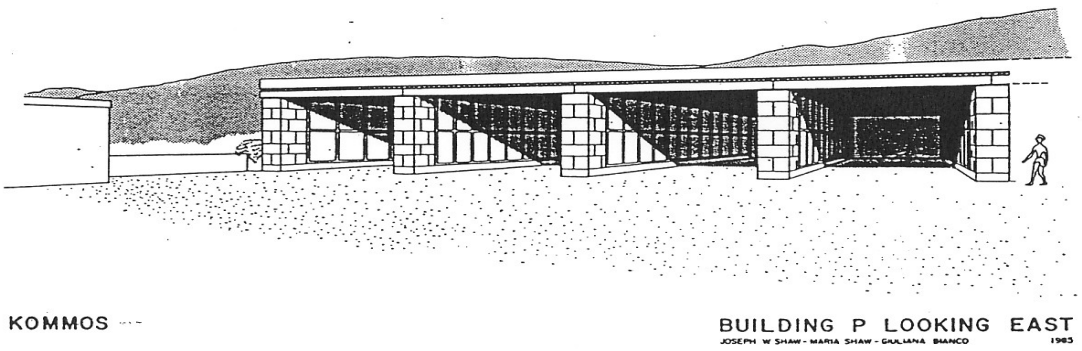


Fig. 9. Kommos, restored drawing of Building P (by Giuliana Bianco).

than now. Still, the approach during windy weather, when the waves can be large, must have caused mariners anxiety. Homer himself describes Amnisos as a difficult harbour (*Odyssey*, XIX 188f.).

At Nirou Khani, east of Amnisos, Spyridon Marinatos explored a small peninsular site referred to as Ayioi Theodoroi after a small nearby church (Fig. 5). There, what definitely seemed to be Minoan walls appeared on the beach, where he identified a possible building for storage, and even now some walls with typically Minoan ashlar blocks extend out until they disappear into the sandy bottom in the shallow water of the small bay. North-west of here, cut into the bedrock of the peninsula, is a large rectangular cutting (Fig. 6), shown by recent measurement by the author to be over 46 m long, and consisting of three (rather than the two represented) separate parallel spaces ranging from 4.45 to 5.00 m wide. That on the south is just above Modern Sea Level. The two on the north are submerged, being at least 1.80 m deep (bedrock is not visible except on the sides of the cuttings), and are partially separated by a p9rtition wall of bedrock a metre wide. While these cuttings,

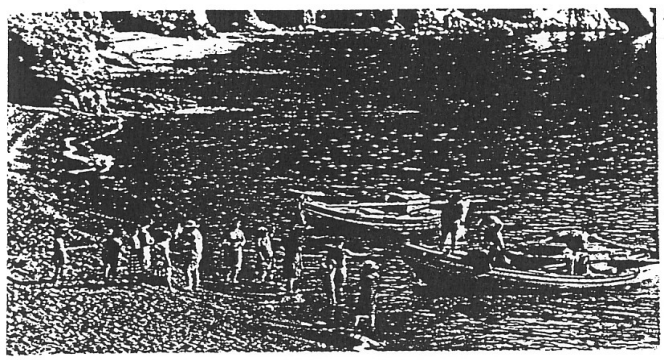
like so many cuttings in bedrock, cannot be dated, they may be Minoan. Marinatos thought they were and suggested that they might be ship-sheds, based on a model of those of the Classical period (S. Marinatos 1926, 146). As with Amnisos, the Relative Sea Level must have been considerably lower then than now, since again Minoan walls are submerged in the immediate area.

At Kommos (Fig. 7), probably the chief approach by sea to the Messara Plain and thus the *epineion* of Phaistos, there has been a similar change in Relative Sea Level of at least 2.50 m (Shaw 1986, 267 n. 106; Mourtzas 1988, *passim*). As at Amnisos, during Minoan times there was probably a sandy spit or tombolo connecting the land to a rocky islet which is now about a metre above sea level, but was at least 4.00 m above sea level in LM I and large enough to provide ships with some shelter (Fig. 8; Shaw 1982, 194). Similarly, part of the Minoan buildings near the shore have been inundated by the water. The situation at Kommos is somewhat different, however, from that at Nirou Khani or Amnisos, for at Kommos there is no evidence yet for submerged architecture (Shaw 1977, 202 n. 10). Rather, parts of LM I Building J/T with its floors still 2.72 m above present sea level have been destroyed, not simply submerged, by the winter waves. Some of the huge ashlar blocks accumulated seaward of the line of preservation, where they were found by the excavators, tumbled and without order. Here at Kommos is dramatic evidence - not of the size of the summer waves, which are pushed by the north-west trade winds obliquely along the shore – but of those generated by winter storms. These waves begin from far off' shore and crash directly upon the beach, their turbulent wash even now endangering the remaining Minoan shoreside buildings. These swells reflect the power accumulated during their travel when pushed by a strong south-west wind over the great width of the open sea between Crete and North Africa. Today, as then, during the winter months local craft are usually beached, as Hesiod advised in his *Works and Days*.

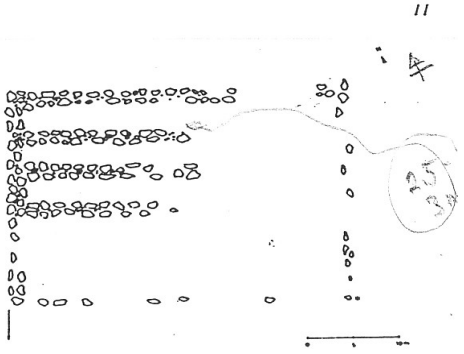
> *Haul your ship up on the dry land and make an enclosure*
> *of stones about it, to keep out the force of winds that blow wet,*
> *and pull the plug, so the rains of Zeus will not rot the timbers.*
> *Take all the tackle that's rigged to the ship, and lay it up indoors,*
> *neatly stowing the wings of the ship that goes over the water;*
> *hang up the well-wrought staring-oar over the smoke of your fireplace,*
> *and yourself wait for the time to come when a voyage is in season.*
> (Lattimore 1959, 623-631)

The Kommos site, being excavated now, consists of a settlement on a hill with civic buildings at the bottom to the south, beginning south of a broad east-west paved road that no doubt led inland to Phaistos, Ayia Triada, and points beyond. During LM I there was an enormous palace-like building (J/T) next to the shore, with an extensive colonnade facing onto a court in its centre. The building, however, contrasts with the palaces, for the lack of religious and domestic areas or spaces intended for public reception (Shaw 1984, 286), and the contrast between its massiveness and the humble houses suggest that J/T may not have been a palace like those known from elsewhere but, rather, may have had other uses more directly connected with the harbour and its commerce.

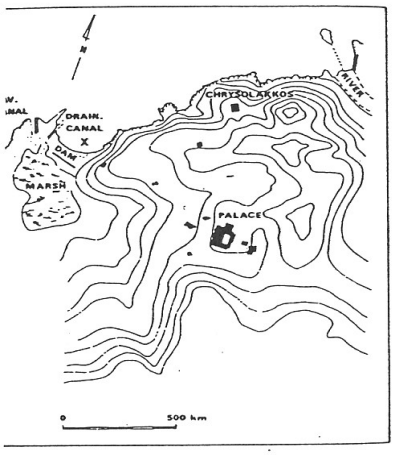
The role of J/T remains, however, to be explained more clearly, perhaps when in the future more rooms have been excavated. At the same time, more will become known about Building P. J/T's LM IIIA1 successor, P, is an unusual structure, consisting of a series of at least four east-west galleries, 5.60 m wide and without any signs of closure at their western ends where they face the sea (Fig. 9). The size of the galleries and comparison with similar structures elsewhere lead one to conclude that they were certainly for storage. Arguments can be made for sacks of grain or bales of wool (but wouldn't doors of some kind be necessary, even if only to keep the moisture out?). Timber might also be stored within (but would such massive works be built for such a purpose?). A stronger, but still tentative, argument can be made, as M.C. Shaw has (1985, 22-25), to explain the galleries as ship-sheds to be used during the winter months and perhaps to function in the same way as the great



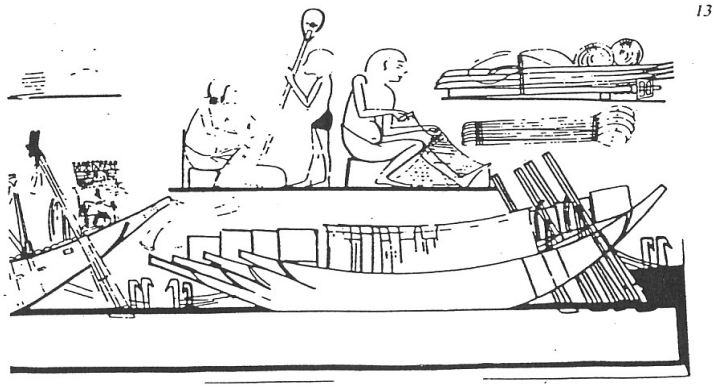
10



11



12



13

Fig. 10. Kato Zakros, view of unobstructed shoreline with fishing boats.
Fig. 11. Mallia, plan of remains of submerged building (after BCH *103, 668).*
Fig. 12. Mallia, partial plan of shoreline area (after Raban 1983, Fig. 11).
Fig. 13. Ships at Amarnan quay. Above, a paddle handle is shaped, a net is fixed, and gear has been stored (after N. de Garies Davies, The Rock Tombs of El Amarna, *Vol. V, Pl. 5, London, 1908).*

rock-cutting at Nirou Khani discussed above. While this is the best proposal made so far, however, substantiating evidence remains to be discovered. The case for a nautical/commercial explanation for P, in any case, is strengthened by the discovery in related LM III contexts of unusual amounts of imported wares from other parts of Crete and countries of the Mediterranean (Shaw 1986, 268).

In some cases where neither peninsulas nor offshore islands were available, arrangements were probably rather straightforward: the ships were simply anchored near the shore or were pulled up onto it (Houston 1988, 560). Such seems to have been the case at the palatial site of Kato Zakros on the eastern tip of Crete, with the buildings set in a small valley facing east toward Syria (Fig. 10). Zakros was a site no doubt useful for maintaining connections with the East (Platon 1971, 245). Or, for a mainland example, at Tiryns where the EB/MB site may have been much closer to the sea than now (Kraft *et al.* 1977, 944; Konsola 1984, 102) part of the site's *raison d'être* may have been commerce associated with its strategic position near the shoreline of the Plain of Argos.

There is little evidence in the Aegean that there was much sea-going commerce also associated with riverine trade, largely because there are few perennial, deep rivers flowing into the Aegean, unlike the situation in Egypt or Mesopotamia. Nevertheless, there are at least two proposals concerning harbours in connection with Cretan rivers that might be mentioned here. One concerns the Geropotamos River that flows by the sites of Phaistos and Ayia Triada. Ayia Triada, it has been thought, could be reached from the sea by navigating the then wider river, a theory supported by the proposal that the alluvial plain of the river is much younger than originally thought (Bintliff 1977,

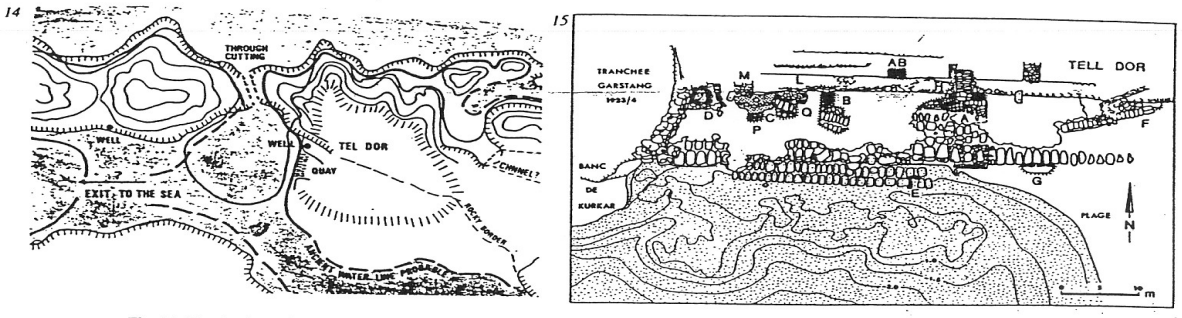


Fig. 14. Dor harbour in Israel showing city site and suggested lagoon harbour with quay (after Raban 1985, 24).

Fig. 15. Late Bronze Age quay at Dor (after Raban 1985, 26).

619). Recently this has been questioned (Warren 1979a, 344; see also Watrous 1984, 131-132). The possible discovery of bedrock in the bed of the Geropotamos near Ayia Triads (L.V. Watrous, in J. and M. Shaw, 1985, 40, 42) may obviate the theory of recent alluviation.

The second proposal concerns Minoan Mallia, where, while one of the French excavators maintains that Mallia did not have a major harbour (van Effenterre 1980, 75-79), others wonder whether walls defining narrow, parallel galleries recently discovered submerged in shallow water (Fig. 11) may be the remains of storerooms associated with maritime trade (Guest-Papamanoli and Treuil 1979; 1980, *passim*). As the latter say, there is no direct evidence to show that the building is actually Minoan, but Minoan occupation is clear in the general area, where there are few non-Minoan remains. Furthermore, the situation of the partially submerged building is quite analogous with that already described here at Nirou Khani and Amnisos to the west, or Mochlos to the east along the same northern shore of Crete, strengthening the argument that the building is indeed Minoan.

Further to Mallia, Frost has argued that a sloping rock-trench, running from the land down into the sea, was connected with Minoan harbour works (Frost 1963, 105-106, Pl. X). The trench was used, however, as the sluice for a watermill built after the Second World War (Shaw 1973, 35 n. 5), as reconfirmed recently by local inhabitants. More recently Raban, echoing Frost's suggestion, has written that the Minoans created a harbour within a lagoon behind the coastline at the same point (Fig. 12). They did this, he thinks, by damming the natural outflow from a lagoon and small river, and that ships would enter the lagoon through a four-metre-wide channel to the north (Raban 1983, 239), where the specific references to the site are, however; somewhat unclear to this writer. Actual excavation work should probably be carried out to confirm the hypothesis, however. One factor complicating the theory is that the possible Minoan storage building (Fig. 11), mentioned above, lies in the shallow water just north of the dam, at x in Fig. 12. If that building is Minoan, and following a line of argument similar to that in the case of the Amnisos Minoan house, then the Relative Water Level at Mallia must have been at least throe metres lower then than now. This makes the channel/lagoon arrangement proposed less likely since all three elements in the relationship proposed (dam, lagoon, and entrance) would have had to conform to a lowered sea level situation, one that seems uniform for that stretch of the Cretan coastline. Anne Guest-Papamanoli believes that any harbour must be searched for 100 metres away, north of the present shore, near the end of the rocky promontory (pens. comm.).

Harbours in the Near East

Harbour development seems to have been considerably more advanced in the the Near Fast than in the Aegean. A major factor making this possible was that two of the major cultures there, those of Mesopotamia and of Egypt, were located in fertile riverine plains, valleys and deltas. The rivers became arteries of communication at the same time that they were the sources of agricultural wealth, and, though annual flooding of a

riverside quay or basin would still have to be reckoned with, the waters could be expected to retreat every year and the quay would usually be reusable until the river channel might change. The situation in the Mediterranean is quite different. There the lack of tide means that seaside establishments were not affected but they were usually faced with the power of the constantly beating waves and the currents, especially in areas where the fetch of the waves was great and the sites were exposed to the sea.

In Mesopotamia safe, convenient docking basins were excavated and enclosed within the city walls of late third millennium Ur, and we hear of a small dock, built with mud-brick, covered and joined by bitumen, alongside a bank of the Euphrates at Assyrian Til-Barsib *c.* 700 BC (Blackman 1982, 92). In Egypt the works were many and varied. In the third millennium, for instance, canals were sometimes excavated from the Nile to the valley temples of the Giza pyramids so that building materials (and, later, the corpse of the dead pharaoh) could be carried to the burial ground by barge. Quays were also commonly established along the Nile, for instance at 14th century BC. Amarna where in one relief boats are shown tied next to each other and parallel to shoreside quays equipped with bollards (Fig. 13). A separate basin linked to the Nile was also provided for ships in connection with a fort in late second millennium Sudan, and an enormous basin has been reported from near 14th century Thebes (Blackman 1982, 92).

Recent investigations along the Levantine coast have provided much new information about shipping and harbours. There, towns were often established on defensible peninsulas or even islands, and offshore reefs would provide shelter from winds and waves, almost unknown in the river valleys. Once again, however, as in case of the cutting in the bedrock along the shore at Nirou Khani in Crete, the difficulties of dating cuttings in the rock prevent the attribution of such features at Tyre and Sidon, a special problem at such sites because of their long history of use. (Avner Raban has most thoroughly explored the situation in a number of articles: 1983, 1985, 1988.) Although there is general agreement about the attribution of numerous moles and quays to the Romans and a few to the Phoenicians, however, few can be dated to the Bronze Age. The most likely candidate for a constructed harbour facility is a quay discovered recently at Tel Dor in Israel (Fig. 14). This quay (Fig. 15), established alongside a sheltered lagoon south of the city site, was forty metres long and ten metres wide; from it two ashlar paved stages led toward the city (Raban 1983, 229-238; 1985, 23-27). The construction was a particularly strong one and at the same time, with its large headers laid next to one another, typical of masonry that has come to be associated with the early Canaanite and Phoenician coast-dwellers. The date of the quay and its various stages of reuse, based on the type of ceramic evidence that is usually lacking at the more exposed sites, is *c.* 1200 BC, and has been ascribed to the resettlement by the Egyptians of the Sea Peoples along the Syro-Palestinian coast. The situation at Dor, with a sheltered- lagoon being used for shipping, has recently been compared with that at Kition in Cyprus, where walls that may have been quays have been associated, as the result of geomorphological surveys, with lagoons that later silted up (Collombier 1988, *passim*).

Akrotiri and its Miniature Frieze

Although incompletely preserved, the Miniature Frieze from the West House is still the most complex and informative single depiction from the Aegean, and has provided startling new material for debate, whether about ships and their variety, about the various themes of war and the Mycenaeans, about possible Bronze Age relations with Libya, about the possible ritual occasions being enacted, or about the identity of the person who commissioned it. It also has provided us with not simply one, but three quite different and detailed views, two of them panoramic, of settlements next to the sea. My own aim is to discuss the shore topography of the three depictions, and consider possible harbourage.

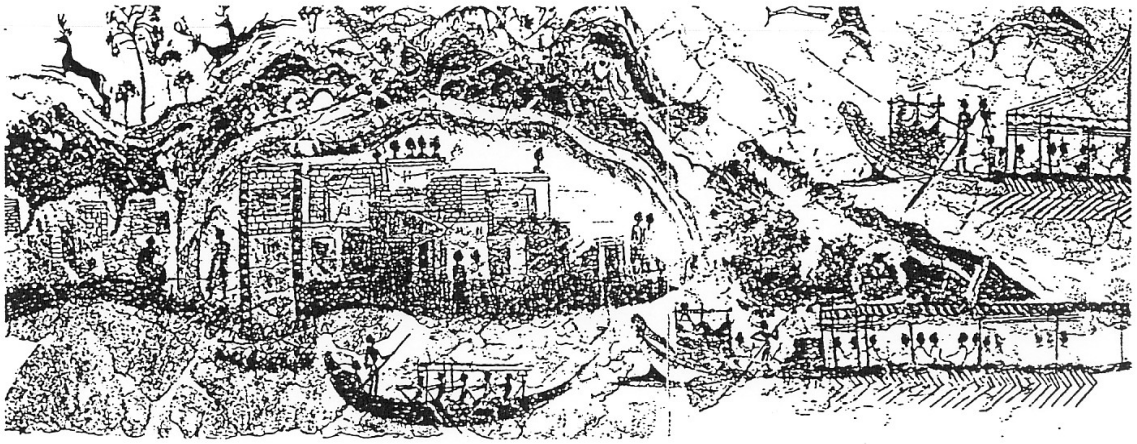
The north wall of Room 4 provides the first depiction of the coastline (Fig. 16). At sea there are ships and the apparent aftermath of a battle; on the land warriors march from the beach area

Fig. 16. Shoreside scene with ships, soldiers, and buildings, Miniature Fresco from West House at Akrotiri (after S. Marinatos 1974, Pl. 7).

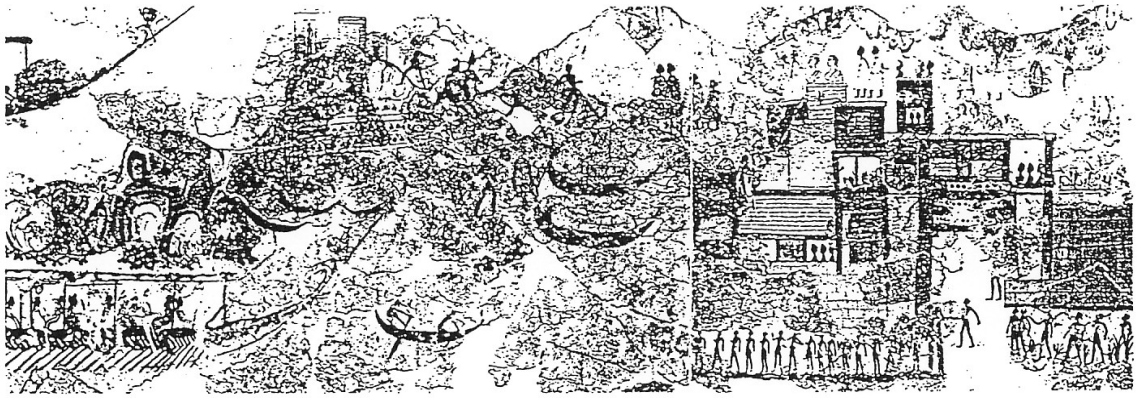
toward the right, perhaps toward the main part of the town that is set back somewhat from the sea. The coastline depicted is, on the right, at first very rocky, as suggested by the abstract, bluish extrusions which can probably be interpreted as being at least partly below water. On the shore, to the right of a seaside cliff, shown by the-boulder-like contours, there is a partially preserved small structure with four or more mysterious triangular projections on its side. To the left of it, beyond the cliff, is the smooth beach area where landing would take place, and a little further on, bordering the shoreline, a larger building of one storey, with the usual flat Aegean roof, but with an unusual facade consisting of at least four large openings, two of which are painted bluish-black and the other two white. Perhaps the white background was chosen to outline the two figures, one of which carries a stick and walks casually along the shore. The darkness of the other two openings (the excavator also thought these were open: S. Marinatos 1974, 40) may indicate that they are deep. The partition walls are shown to be of ashlar blocks. That these are indeed openings is strongly suggested by the horizontal yellowish-brown, wooden cross-beams visible below the line of the roof, and the fact that the usual windows, doors, and ashlar wall construction that characterizes depictions of houses are absent (cf. the houses in Fig. 17).

This building, obviously not a house, was interpreted by the excavator as a cheese-dairy (S. Marinatos 1974, 41). More likely is its identification as ship-sheds made recently by M.C. Shaw, based on its immediate proximity to the sea, the uniform width and impressive height of the successive rooms, which were apparently open to the shoreline, and the lack of a second storey, rather unusual in representations of large buildings in the rest of the fresco at Thera (M.C. Shaw 1985, 21-24). Indeed, once attention has been brawn to this type of building, one may start noticing its presence elsewhere. For instance, a partially preserved building in a fresco fragment from Ayia Irini on Kea may well be very similar to the one under discussion from Thera (Fig. 20) (Abramovitz 1980,62; J. Shaw 1986, n. 103). The setting is another seaside scene, as indicated by the blue water and brownish sand, and three men, probably cooking, are occupied with two cauldrons before them. To their left appears the

17



18



19

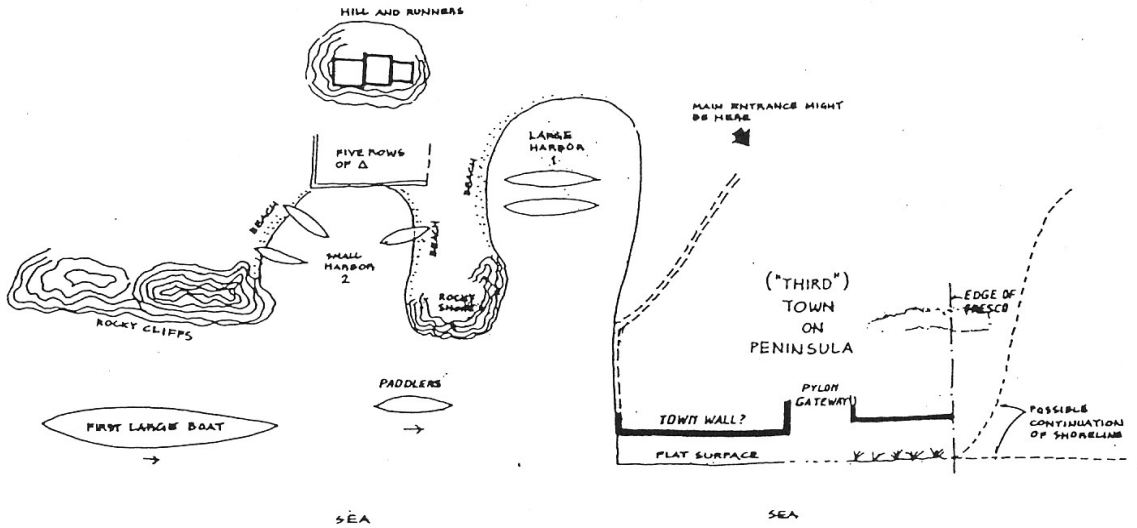


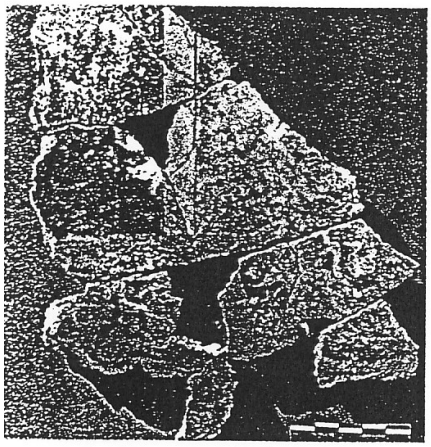
Fig. 17. Second Town, passed by ships, from Miniature Fresco from West House (after S. Marinatos 1974, Pl. 9).

Fig. 18. 'Arrival' town with double harbour in Miniature Fresco from West House (after S. Marinatos 1974, Pl. 9).

Fig. 19. Sketch plan of shoreline of the (third) 'Arrival' town in Miniature Fresco from West House (J. Shaw, Giuliana Bianco).

building of which a portion is preserved at its corner. Like the end walls of the building in the Theran fresco, its corner wall is also of ashlar construction (two painted joints are visible) and the space to its left is wide and tall. The plain, dark-brown colour used suggests here, as in Thera, that this space represents not a solid wall but, rather, a darkened interior. The somewhat later Bronze Age Building P at Kommos (Fig. 9), consisting of a number of tall, successive rooms, is once again as comparable to this building as to that depicted in Thera, at least in appearance, if not in function (M.C. Shaw 1985).

The second scene in the fresco from Thera (Fig. 17) on the south wall of the same room, depicts groups of ships usually moving to the right, probably having passed one town (on the left, the second town) and travelling to another (on the right, the third town). The second town (Fig. 17) appears to be a moderately-sized one, probably a village, its shoreside buildings set on rather low land next to the sea. Of special note is that the town is set next to the mouth of a small river or stream. The fresh-water stream may account for the vegetation (reeds?) shown growing along the shore – such growth is otherwise missing at most Mediterranean shores. Of some interest is the way that the stream is shown ending at the two points where it is actually preserved. On the seaside it is not shown as entering the sea directly, usually the case for a stream which, unlike the more powerful river that will forte the accumulations along the shore to dissipate seaward, flows under and through the beach accumulation of pebbles and sand. The stream's other end, above and in the hinterland where a lion



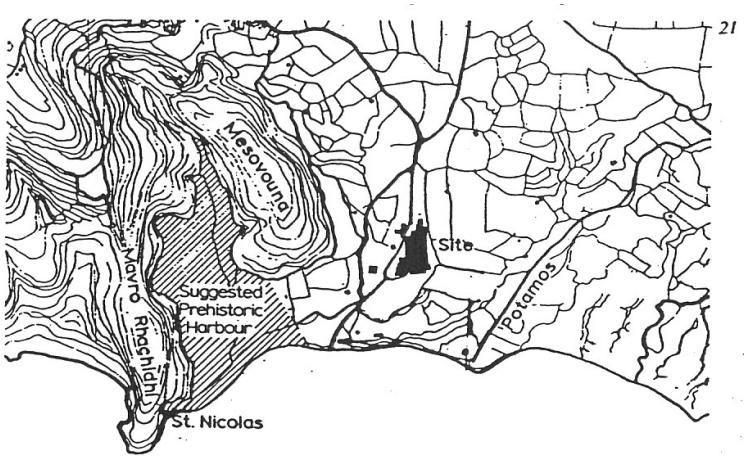


Fig. 20. Fresco fragment from Kea depicting men, cauldrons, and a building (after Abramovitz in Hesperia *1980, 62).*
Fig. 21. Akrotiri area plan, indicating area suggested for location of Bronze Age harbour (after Doumas 1983, Fig. 2).

pursues stags, disappears in a declivity between hills, much as it might when seen by the eye. The second, right-hand, branch of the river is restored as curving around the town until it nears the sea. More likely, however, it dwindled and disappeared above the town toward the hills; a return, to flow into the sea at a second point, seems doubtful. It seems to me that the landward part of the town is on higher ground than the part along the shore, as is also possibly implied by the stepped depiction of the town. In this situation it is my guess that the usable shoreline is across the stream, where a number of small buildings are set into valley-like areas in front of the hills and behind a low-lying shore.

The third town is of the greatest interest for a study of Bronze Age harboursides. There we have, in effect, a double harbour arrangement, with a smaller harbour separated from a larger one by a rocky point of land (Fig. 18 and 19). That on the viewer's left, with a low, sandy shore, has three small boats, all three being partly pulled up on the shore – a unique depiction but, as already stated here, probably the normal method of leaving ships when not in use.

Behind the ships is a most curious large shoreline structure, still unexplained. Despite its poor preservation, it seems to be built at least partly of ashlar blocks (the left-hand wall). It has five rows of triangular openings, each separated by a horizontal layer suggesting, perhaps, a series of roofs. This building, without clear precedent in either architecture or iconography, was thought by Marinates to be

a dove-cote (1974, 43) because of the clear parallel with actual dove-cotes known in Greece. Another suggestion, although not convincing, is that we have here a series of ship-sheds, made because there was an opening in the centre where fragments arc actually missing (Stucchi 1976, 39). A very attractive suggestion, on the other hand, was made by Denys Page (Page 1976, 144), that what we see are beehives set upon a series of terrace walls. This would explain why the horizontal lines above the triangles do not look like roofs. It would also explain why there is no horizontal line above the upper row of hives which would have been set upon the last retaining wall before the cliffside.

To the right of the scene is the second, apparently larger harbour basin. A man carrying a load on a stick, a common Aegean theme, walks behind another near the shore, while others run excitedly up or down a nearby hill. In the harbour ride two medium-sized boats, each with a crew-member (captain?) who, according to Marinatos (1974, 43), are preparing to leave in order to welcome the arriving fleet, but who look to me more as if they are sitting in boats at anchor, with the wind perhaps blowing from the right. Perhaps this partly explains why some of the larger ships arc being paddled, rather than sailing, since they may be heading into the wind.

Town Three itself is of great interest from the point of view of its setting. First, it is established on a headland, perhaps even upon a peninsula (see Fig. 19, right, for two suggestions of how the coastline might have continued). A group of men, one leading a goat, are gathered along the shore, their gestures and stances reflecting the interest being shown in the approaching fleet by so many others in the town. The shoreline they stand upon appears limited, and in front of them, where the town meets the harbour, it appears as if the buildings begin from the water's edge. On the right side, along the shore, the third town appears to have high ashlar walls as well as a monumental gate, suggesting that we are looking at the depiction of a town probably walled at least on the shore sides (as S. Marinatos, M. Shaw and L. Morgan have argued (S. Marinatos 1974, 52-53; Shaw 1987, 112-114; Morgan 1988, 161) and perhaps all around. As such it seems to stand in contrast with the two other towns discussed here and provokes comparison with actual towns known from the Aegean.

Conclusions

How, then, do the shoreside scenes in the Miniature Fresco compare with what we know or surmise from the archaeological record? On the whole, I think that there is some correspondence. For instance, we see that in the painting both the second and the third towns are placed on headlands or peninsulas, a reflection of actual practice. The fact that no quays are shown may actually mean that a need for them had not yet developed in the Aegean. Of real importance to our theme are the shoreside buildings, apparently dedicated to storage, that we see on both the Theran and Kean frescoes. This probably reflects a normal practice of storing certain ships during the winter months, as has been argued for actual buildings at Nirou Khani and Kommos (S. Marinatos 1926, 146; M. Shaw 1985, *passim*; J. Shaw 1986, 262-269). The buildings may also have been used for storing goods and material for trans-shipment or processing and/or for nautical gear in order to avoid carrying it back and forth from town to shore. Perhaps during winter months, however, or during uncertain times, the same material might have been stored within the town itself, for at both Tiryns and Kea there are rooms that could have been used for storage placed near the entrance ways but still within the fortified enceinte.

There remains the possibility that Town Three may be Akrotiri itself, as some have claimed (N. Marinatos 1984, 42; Doumas 1983, 55; Morgan 1988, 161). To believe this, however, we must assume that we are viewing an actual historical location, rather than a generic representation, and our evidence for at least Minoan iconography seems to be that types of scenes, rather than specific, time-limited events were depicted (Groenewegen-Frankfort 1951, 187; Warren 1979b, 120). Are the Theran depictions substantively different from the Minoan ones from that point of view? Unlike so many other of their contemporaries, the Minoans did not leave us records of their rulers and their deeds, but they did depict the types of activities and surroundings that they thought to be significant.

There are also specific topographical considerations. Pichler has proposed that, while there was once a deep bay between Aspronisi and Cape Aspronisi that may have served for harbourage, the most convenient harbour lay just west of the Akrotiri site (Pichler 1980, 16; as Doumas 1983, 55) (Fig. 21). The bay was between the ridges of Mavro Rachidi and Mesovouna. To conform to the fresco depiction, however, we must imagine that there was a rocky spit of land which would create the double harbour effect clearly shown in the fresco, also, that a major part of the town was on a promontory next to the sea, as in the fresco.

For the future, we can search for clarification of the pictorial details by looking for material evidence to explain such features as the projections alongside the small building of the first town, or the beehives/dovecotes of the third town. More important is for us to encourage during the next decades survey and excavation at promising places in the Aegean where more shoreside buildings can be encountered. Surely there are some in the shallow waters as at the sites mentioned earlier along the northern shores of Crete. If Kommos is representative, then more buildings like those found there near the shore will probably have been established in connection with the local administrative centres. People more familiar with certain mainland, island, or Anatolian shores can include in their programme of future work survey and excavation of likely harbour spots. This will improve our understanding of seaborne commerce which, hopefully, will be clarified even more when a determined effort is made in the Aegean to search for, and to properly excavate Minoan, Cycladic and Mycenaean wrecks of ships that frequented the very harbours we have been discussing.

Addendum We should consider another, newer theory elaborated upon in the Session on the Theran environment. Namely, Minoan Thera was apparently not the solid, round island that was envisioned earlier by many. Rather, as Heiken, McCoy and Sheridan explained (1990 and earlier articles), during Minoan times there may have already been a deep, flooded depression (a caldera from an earlier eruption?) connected to the sea on the west by a wide channel between a joined Therasia/Aspronisi and, opposite to the south, the Akrotiri peninsula. Subsequently, the Minoan eruption created an overlapping caldera on the north, blasting away at the same time the extension of Therasia to leave the rim of the caldera as we know it now. This proposal has received extensive, although often qualified, backing (e.g. Aston and Hardy 1990; Sparks and Wilson 1990; in Druitt *et al*. 1089).

Two aspects of this proposal, as it affects our theme here, should be examined. First, it has been suggested that in Minoan times the southern depression ‘would have been an excellent natural harbour, well-protected from most Aegean storms’ (Heiken *et al*. 1990; see also Rackham 1990.) But there is no evidence that extremely deep water bordered by cliffs was chosen for harbourage by the Aegeans. Deep water, perhaps in the Minoan ‘depression’ at least 200 m deep, would not have allowed them more than temporary anchorage. Nor, with the surrounding cliffs, would there have been a friendly shoreline for their ships. Also, at that time a quay could not have been built out from the shore over deep water, as we can do now, for fishing and pleasure craft as well as for passenger boats. While, moreover, it has been argued that ‘land-locked embayments’ such as the caldera/depression would have been most likely used as a port – the island of Milos being given as an example (Aston and Hardy 1990) – it is instructive to point out that the chief Bronze Age trading settlement known in Milos, Phylakopi, was set, like Akrotiri on Thera, along the outer rather than the inner periphery of that island, with its own small natural harbour.

Second, on the basis of their palaeotopographic interpretation, Town 2 in the Miniature Fresco from the West House also served as the basis for a novel proposal (Heiken *et al*. 1990) that, if imagined as being seen from the south-west, the. town depicted may be one once on the southern tip of an extended Therasia/Aspronisi peninsula. Behind the town, according to them, is shown the form of the depression/caldera.

In their oral and first written presentations the authors were not clear about how the depression/caldera is suggested in the fresco. As we look at it, it may have been suggested to them by either the yellow background silhouetting the five figures presumably on a rooftop at the 'top' of the town, or on the form of the 'river' higher up, within the landscape itself. If the first, I should point out that the yellowish colour used is not used elsewhere in the fresco to depict water (blue and grey are usual) but rather, is used to accentuate figures, as for instance the men standing next to the shore in the same fresco. Moreover, to the right of the men on the roof, the fresco is not preserved – the yellowish background colour and river are simply painted in. If, on the other hand, the authors interpret the sinuous, snake-like river as the edge of the flooded depression/caldera, as seen above the town, then I would argue that the river really is a river and not the edge of a broad (36 km^2?) of water. One argument on the internal evidence of the painting itself is that the river has a tributary leading up into the hills beyond, to the top of the ridge-line. Moreover, in the quite separate fresco, the so-called 'Subtropical Landscape', we have the same sinuous shape surrounded by vegetation and animal life, also with the same anvil-like shapes projecting into the river as in Town 2. Nor are there the coral-like projections in the river that we find in the sea-shapes of Towns 1 and 3.

It has also been proposed that there were a number of possible harbour sites along Thera's southern coast, before projections of land became merged into a more uniform coastline created by the build-up of ash and pumice from the Minoan eruption (Aston and Hardy 1990, Fig. 3). Perhaps here we have a realistic estimate of the number of plates that offered shelter. On the other hand, the major settlement would have been located near its respective harbour(s). If that settlement was Akrotiri itself, then we should probably revert to the possibility proposed earlier by Pichler (1980, 16), one that would, perhaps not surprisingly, conform to present-day mariners' preference to anchor their boats near the shore south of Akrotiri.

Acknowledgements

I am indebted to Professor Ellen Davis for allowing me to inspect the intriguing fresco fragment in the Chore Archaeological Museum, Kea, during the summer of 1988, discussed in the text.

J.W. SHAW
Department of Fine Art, University of Toronto, Toronto, Ontario M5S 1A1, Canada

REFERENCES

ABRAMOVITZ, K.
1980 'Frescoes from Ayia Irini, Keos. Parts II-IV', *Hesperia* 49, 57-85
ASTON, M.A. an HARDY, P.G.
1990 'The Pre-Minoan landscape of Thera: A preliminary statement' (volume two of this Congress)
ATKINSON. T.D., CROWFOOT, J.W., EDGAR, C.C., BOSANQUET, R.C., MACKENZIE, D., SMITH, C. and WELSH. F.B.
1904 *Excavations at Phylakopi in Melos', (JHS Suppl. 4)*, London
BEAN, G.E.
1966 *Aegean Turkey, An Archaeological Guide*, London
BETANCOURT, P.
1988 "Excavations at Pseira, 1985 and 1986', *Hesperia* 57, 207-225
BINTLIFF, J.L
1977 'Natural Environment and Human Settlement in Prehistoric Greece', Part II, *BAR Supplementary Series*, 28 (ii)
BLACKMAN, D.
1982 'Ancient harbors in the Mediterranean, Parts 1 and 2', *IJNA* 11, 79-10-4.185-211
COLLOMBIER, A.M.
1988 'Harbour or harbours of Kition on southeastern coastal Cyprus', in A. Raban 1988, 35-45

DAVIDSON, D. and TASKER, C.
1982 'Geomorphologial evolution during the late Holocene', in C. Renfrew and M. Wagstaff 1982, 82-94
DAVIS, J.L.
1986 *Keos, Volume V Ayia Irini: Period V*, Mainz
DAWKINS, R.M. and DROOP. J.P.
1910-11 'The Excavations at Phylakopi in Melos', *BSA* 17, 1-22
DOUMAS, C.
1983 *Thera: Pompeii of the Ancient Aegean*, London
DRUITT, T.H., MELLORS, RA., PYLE, D.M. and SPARKS, R.S.J.
1989 Explosive volcanism on Santorini, Greece', *Geol. Mag.* 26, 95-126
DRUITT, T.H. and FRANCAVIGLIA, V.
1990 'An ancient caldera cliff fine at Phira and its significance for the topography and geology of Pre-Minoan Santorini' (volume two of this Congress)
EVANS. A.
1921-36 *The Palace of Minos at Knossos*, I-IV (in six) and Index volume, London
FROST, H.
1963 *Under the Mediterranean*, London
GÖDECKEN, K.B.
1986 'A contribution to the Early History of Miletus: The settlement in Mycenaean times and its connections overseas', in E.B. French and K.A. Wardle (eds.). *Problems in Greek Prehistory*. Bristol, 307-315
GROENEWEGEN-FRANKFORT, H.A.
1951 *Arrest and Movement*, London
GUEST-PAPAMANOLI, A. and TREUIL, R.
1979 'Bâtiment immergé, *BCH* 103, 668-669
1980 'Discovery of an important building in the sea at Malia, Crete', *AAA* XIII, 99-101 (in Greek)
HEIKEK G., MCCOY, F. and SHERIDAN, M.
1990 'Palaeotopographic and Palaeogeologic reconstruction of Minoan Thera' (volume two of this Congress)
HOUSTON, G.W.
1988 'Some comparative materials on Roman merchant ships and ports', *AJA* 92, 553-564
KONSOLA, D.
1984 *Early Urbanization is Early Helladic Settlements*, Athens (in Greek)
KRAFT, J.C., ASCHENBRENNER, S.E. and RAPP. G. Jr.
1977 'Paleogeographic reconstructions of coastal Aegean archaeological sites', *Science* 195, 941-947
LATTIMORE, R.
1959 Hesiod - The Works and Days, Theogony, The Shield of Herakles, Ann Arbor
LAVIOSA, C.
1973 'Rapporti fra Creta e la Caria nell' età del Bronzo', *Pepragmena tou III Diethnous Kritologikou Synedriou*, I, Athens, 182-190
LEVI, D.
1969 'Gli scavi di Iasos', *ASAtene* 29-30, 537-590
MARINATOS, S.
1926 'Excavations at Nirou Khani, Crete', *Praktika*, 141-147
1974 *Excavations at Thera*, VI, Athens
1976 *Excavations at Thera*, VII, Athens
MELLINK, M.
1984 'Archaeology in Asia Minor', *AJA* 88, 441-459
1988 'Archaeology in Anatolia', *AJA* 92, 101-131
MORGAN, L.
1988 *The Miniature Wail Paintings of Thera*, Cambridge
MOURTZAS, N.D.
1988 'Neotectonic . evolution of Messara's Gulf – Sub-merged archaeological constructions and use of the coast during the prehistoric and historic periods', in P.G. Marinos and G.C. Koukis (eds.), *Engineering Geology of Ancient Works, Monuments and Historical Sites*, Rotterdam, 1565-1573
PAGE, D.
1976 'The Miniature frescoes from Akrotiri, Thera', *PAA* 51, A, 135-152
PICHLER, H. and FRIEDRICH, W.L.
1980 'Mechanism of the Minoan eruption of Santorini; in C. Doumas (ed.), *Thera and the Aegean World II*, 15-30
PLATON, N.
1971 *Zakros, The Discovery of a Lost Palace of Ancient Crete*, New York
PSYCHOYOS, O.
1988 Déplacements de la ligne de rivage et sites archéologiques dans la mer Egée, au néolithique et à l'âge de Bronze, Jonsered
PYLE, D.M.
1990 'New estimates for the volume of the Minoan eruption' (volume two of this Congress)
RABAN, A.
1983 'Recent maritime archaeological research in Israel', *IJNA* 12, 229-251
1985 'The ancient harbours of Israel in Biblical times (From the Neolithic period to the end of the Iron Age)', in A. Raban, (ed.), *Harbour Archaeology, Proceedings of the First International Workshop of Ancient Mediterranean Harbours* (*BAR International Series* 257), 11-44
1988 'Coastal processes and ancient harbour engineering', in A Raban (ed.), *Archaeology of Coastal Changes, Proceedings of the First International Symposium 'Cities on the Sea Past and Present'* (*BAR International Series* 404), 185-208
RACKHAM, O.
1990 'Observations on the historical ecology of Santorini' (volume two of this Congress)
RENFREW, C and WAGSTAFF, M. (eds)
1982 *An Island Polity, The Archaeology of Exploitation in Melos*, Cambridge
SHAW, J.
1972 'Greek and Roman harbourworks', in G.F. Bass (ed.), *A History of Seafaring*, London
1973 'Minoan Architecture; Materials and Techniques', *ASAtene* 33
1977 'Excavations at Kommos (Crete) during 1976', *Hesperia* 46, 199-240
1982 'Excavations at Kommos (Crete) during 1981;, *Hesperia* 51, 164-194

1984 'Excavations at Kommos (Crete) during 1982-1986', *Hesperia* 53, 251-287
1986 'Excavations at Kommos (Crete) during 1984-1985', *Hesperia* 55, 219-269
SHAW, J. and SHAW, M.C. (eds)
1985 *A Great Minoan Triangle in Southcentral Crete: Kommos, Hagia Triads, Phaistos (Scripta Mediterranea 6*), Toronto
SHAW, M.C.
1985 'Late Minoan I buildings J/T, and Late Minoan buildings N and P at Kommos: Their nature and possible uses as residences, palaces, or emporia', in J. and M. Shaw 1985, 19-25
1987 'The Lion Gate relief of Mycenae reconsidered', *Philia Epi, Festscrift G. Mylonas*, Athens, 108-123
SPARKS, R.S.J. and WILSON, C.J.N.
1990 'The Minoan deposits: A review of their characteristics and interpretation' (volume two of this Congress)
STUCCHI, S.
1976 'Il Giardino delle Esperidi e le tappe della conoscenza greca delta costs cirenaica', *Quaderni di archeologia della Libia* 8, 19-73
TELEVANTOU, C.A.
1990 'Now light on the West House wall-paintings' (this volume)
VAN EFFENTERRE, H.
1980 *Le Palais de Mallia*, two volumes, Rome
WAGSTAFF, M. and CHERRY, J.F.
1990 'Settlements and resources', in C. Renfrew and M. Wagstaff 1982, 246-263
WARREN, P.
1979a Review of Bintliff 1977, *PPS* 45, 344-346
1979b 'The Miniature fresco from the West House at Akrotiri, Thera, and its Aegean setting', *JHS* 99, 115-129
WATROUS, L.V.
1984 'Ayia Triada: A new perspective on the Minoan villa', *AJA* 88, 123-134

DISCUSSION

SINCLAIR HOOD: I wondered if there was shy possibility that an outer wall towards the beach had been totally eroded away from your possible ship sheds at Kommos?
JOSEPH SHAW: It is possible. We have no evidence to show that it wasn't there. On the other hand, based on what we see, it *wasn't* there.
ARIS STAMATOPOULOS: In relation to what we mean by a harbour, it seems to me that nowadays the emphasis, as far as constructing something, is laid on the sea, where we want to have mooring facilities and a dock; whereas at that time the emphasis must have been on the shore, where we want to be able to pull out the ships onto a beach, and having some storage for the ships.
JOSEPH SHAW: This is my impression too.