Cyprus and Cilicia: The Typology and Palaeogeography of Second Millennium Harbors

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There is a growing body of literature concerned with second millennium B.C.E. *harbors and anchorage sites of Cyprus, and, to a lesser extent, Cilicia. One project in particular (Gifford 1978), has revealed a wealth of evidence relating to the palaeogeographic environment of the coastal littoral of Kition, in southeastern Cyprus. Through analyses of corehole samples taken from the area, Gifford was able to reconstruct the prehistoric coastline of Kition and ascertain the area of the Bronze Age harbor at* Kathari.

This paper outlines a topographical typology of anchorage sites, and identifies the problems involved in interpreting their location in relation to their immediate coastal palaeogeographic environments during the second millennium B.C.E. *A number of examples from both Cyprus and the Cilician delta are examined in order to demonstrate that, with enhanced geomorphological and archaeological analysis, a greater appreciation of the location of second millennium* B.C.E. *anchorage sites is realized. By assessing the contribution already made by archaeologists, in conjunction with geomorphologists, geologists, sedimentologists and geographers, an attempt is made here to clarify the problems of identifying the location, nature and extent of Bronze Age harbors in the eastern Mediterranean.*

The point of this paper is a simple one: Modern maps are misleading when we consider ancient harbors, and an appreciation of ancient conditions requires both evidence and imagination. The point is obvious, but it is only with these considerations in mind that we can hope to recognize what Bronze Age harbors and anchorages looked like and where they were located. "Harbors, havens and anchorages of every type and technical quality are located at the waterline. The water-line is in a constant state of flux: almost everywhere along the eastern Mediterranean seaboard, the present waterfront is not the same as in the past, and it will change again in the future" (Raban,1995: 139). We need to consider what the coastal topography of the Bronze Age eastern Mediterranean was like, how it has changed and how it differs from what is depicted on modern maps. In order to achieve this goal I will first outline a topographical typology of anchorage sites based on one presented by Flemming (Muckelroy 1980: 162–63). He identified six main types of natural anchorages, which have been extended here to encompass the major types of anchorages around the shores of the eastern Mediterranean.

A. Anchorages on high energy, cliff-lined coasts (fig.1):
   1. Natural bay (hundreds)
   2. Almost enclosed bay e.g. Fethiye, southwest Turkey
   3. Bays either side of an "anvil-shaped" headland e.g. Maa *Palaeokastro,* Cyprus
   4. Lee of promontory e.g. Cape Kiti, Cyprus

5. Sheltered valley
6. Offshore island or reef e.g. Pseria, northeast Crete

B. Anchorages on low energy, low-lying coasts (fig. 2):
   1. Riverine (River mouth/Upriver) e.g. Israeli coast in this period
   2 Inland lake upriver e.g. Enkomi *Ayios Iakovos,* Cyprus
   3. Natural embayment e.g. Bronze Age harbor of Kition *Kathari,* Cyprus
   4. Deltaic e.g. Cilician delta, Turkey
   5. Lagoonal e.g. Hala Sultan Tekké *Vizaja,* Cyprus; Marsa Matruh, Egypt

This typology addresses harbors on two types of coastline. There are those on high energy, cliff-lined coasts, such as large parts of the Turkish coast, the northern Levant and parts of the coast of Cyprus that, due to the nature of the coastline, could still be identified and even utilized as anchorages today. However, low-lying coastlines, as we have learned from the work of geomorphologists such as Butzer (1971), Vita Finzi (1969, 1972), Erol (1967), Kraft et al. (1977) and Gifford (1978), have changed. We have to look beneath the alluvial valley, upstream of the prograding delta, in order to identify anchorage sites of the second millennium B.C.E. Fig. 3 is an approximate outline of the coastal palaeogeography of the eastern Mediterranean in the second millennium B.C.E. and helps to illustrate how and where the coastline has altered.

Low-lying coastlines have been impacted more greatly by the processes of geomorphological change than cliff-lined coasts since, and during, the second millennium B.C.E. This is not to deny the varying effects of sea level change and tectonic activity around the coasts of the eastern Mediterranean during this period, however, again, it is harbors on low-lying coastlines that are more affected by these processes. Due to the nature of such coastlines, the lateral displacement is much greater than the vertical. Additionally, since tidal amplitudes in the eastern Mediterranean are minimal, there is no mechanism to assist deposited coastal sediments out to sea. This is particularly noticeable along low-lying coasts where sediment accumulates in river outlets, particularly those of insignificant perennial flow, adding to the problems of siltation at river mouths.

With the aid of geomorphological analysis and drawing on a number of examples from both Cyprus and the Cilician delta, I will illustrate how it is possible to suggest localities for unidentified sites known to have played an important role in the eastern Mediterranean during the Middle and Late Bronze Ages.

CYPRUS

Larnaca Lowlands

An obvious example from Cyprus is the area of the Larnaca Lowlands, which has received much scholarly attention in the last twenty years. Two harbor sites were to play an important role in Late Bronze Age trade, well-positioned in the east of the island for contacts with the Levant, Egypt and Anatolia, Kition *Kathari* and Hala Sultan Tekké *Vizaja.* Both were occupied throughout the Late Bronze Age and acted as seaborne trade centers, as well as regional outlets for the distribution of copper. Evidence for copper smelting has been identified at both sites. Gifford (1985: 47, fig. 2) identifies the location of the Late Bronze Age sites of Kition *Kathari* and Hala Sultan Tekké *Vizaja* within a reconstruction of the Late Bronze Age (ca. 1300 B.C.E.) palaeogeography of the Larnaca Lowlands.

The two most active geomorphological elements of the Larnaca Lowlands coastal region during the Late Pleistocene and Holocene epochs, are, according to Gifford (1985: 45), the Tremithos River and its alluvial fan, and a natural salt pan just south of the modern city of Larnaca, known as the Larnaca Salt Lakes. The Tremithos River, primarily an agent of deposition, has carried millions of tons of alluvial sediment from the eastern foothills of the Troodos Massif down to the coast west of Cape Kiti. These deposited sediments have then been carried by currents and winds through a process of longshore drift around Cape Kiti and northward along the west side of Larnaca Bay, thereby altering the local coastal geography. Gifford (1985: 47) explains that the Salt Lake depression originated in the Late Pleistocene as "a discontinuous, shallow valley or trough between the toe of the Tremithos River's alluvial fan and earlier Pleistocene aeolian and marine rock units to the east."

The site of Hala Sultan Tekké *Vizaja* was located on the southwestern shores of a lagoon or marine embayment, still accessible to the sea, now known as the Larnaca Salt Lake (Gifford 1985: 47, fig. 2). During the late second millennium, the westward transgression of the sea caused by rising sea level, was reduced and net aggradation of the coastline seaward resulted. Northerly deposition of longshore drift sediments probably choked the eastern channel of the embayment of Hala Sultan Tekké, eventually cutting it off from the sea (Gifford 1985: 47–48). As stated by Åström and Engvig "It is highly probable that the present Salt Lake at Hala Sultan Tekké was a navigable harbor with an inlet from the sea in the Late Bronze Age. This is suggested by the situation of the Late Bronze Age town along its shore and by the many stone anchors found in the town" (1975:

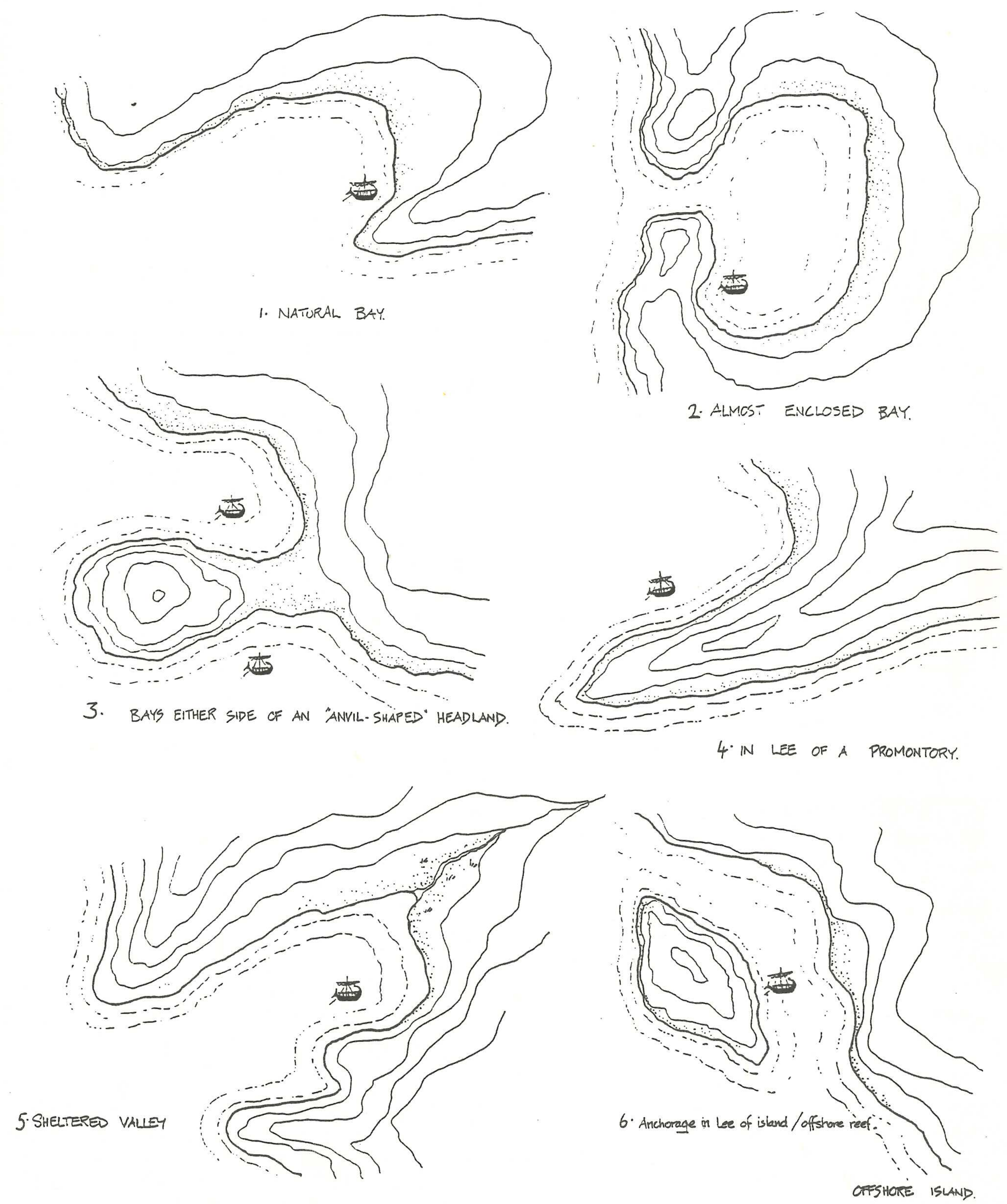

Fig. 1. Anchorages on high energy, cliff-lined coasts.

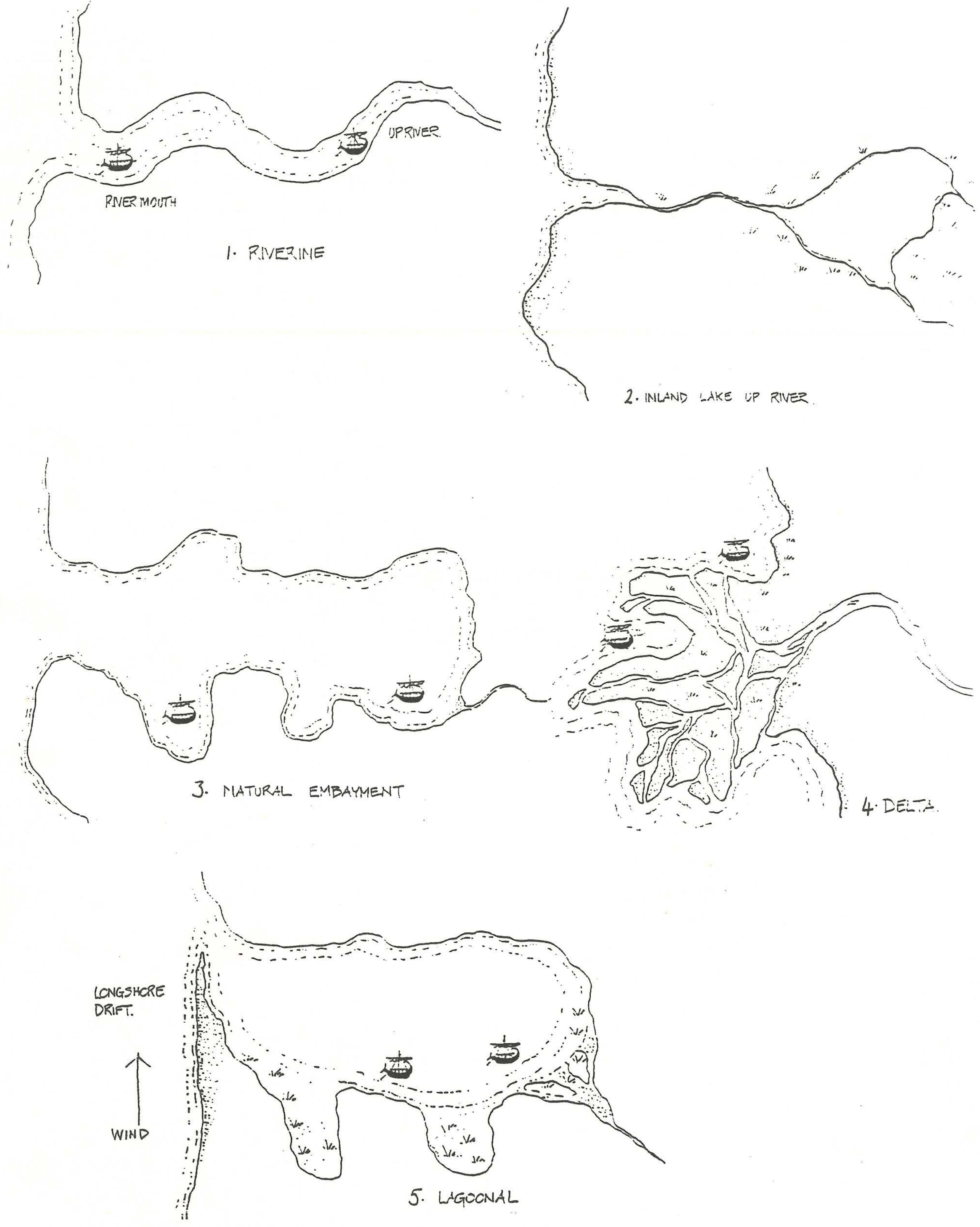

Fig. 2. Anchorages on low energy, low-lying coasts.

6). Slope wash from the land surface west of the Salt Lake depression also contributed to the infilling of the inlet (Gifford 1985: 48). Mollusca excavated from the Salt Lake from sealed Late Cypriot IIIA/1 levels support the theory that the lake must have been a lagoon at this period, soon to be cut off from the sea (Åström 1986: 68).

This process of northerly longshore transportation with the associated formation of sandbars and spits, combined with the progradation of slope wash deposits eastward, was also to affect the second millennium site of Kition, in the area of Kition *Kathari*. *Kathari* is located to the north of Classical Kition, on a low hill of marl bedrock which runs parallel to the present shoreline about 500 m away (Nicolaou 1976: 15). Marshy ground lies to the north and northeast of *Kathari* and is believed to have extended to the east and south east in antiquity (Gifford 1978: 56–83). This assertion is made by Gifford who in the 1970s took a number of corehole samples from the area of Kition (Gifford 1985a: 377, fig. 1), from which he was able to reconstruct the coastal palaeogeography of the Larnaca Lowlands and to ascertain the area of the Bronze Age harbor of Kition *Kathari*. Nicolaou (1976: 74, fig. 16) outlines the approximate position of the coastline of Kition in prehistoric times. The area of marshy ground that lies to the north and northeast of the Bronze Age settlement is believed to have formed a bay that gradually silted up until the end of the Late Bronze Age when only a small inlet to the sea survived (fig. 4).

The bay and then the inlet are believed to have acted as the Bronze Age harbor of Kition *Kathari,* which shrank in size due to longshore drift. Corehole samples taken by Gifford (1978: 163, fig. 59, 1985a: 385, fig. 4) reveal a lagoonal environment present in this area until at least the Hellenistic period.

Akrotiri Peninsula

The second example in Cyprus is one that until recently, with the Maroni, Episkopi and Vasilikos valley surveys, had received little archaeological or geomorphological analysis; that of the Akrotiri Peninsula on the south coast. Unlike the area of the Larnaca Lowlands, which played an important role particularly in Late Bronze Age trade, this area of

Fig. 3. Possible coastal palaeogeography of the eastern Mediterranean in the second millennium B.C.E.

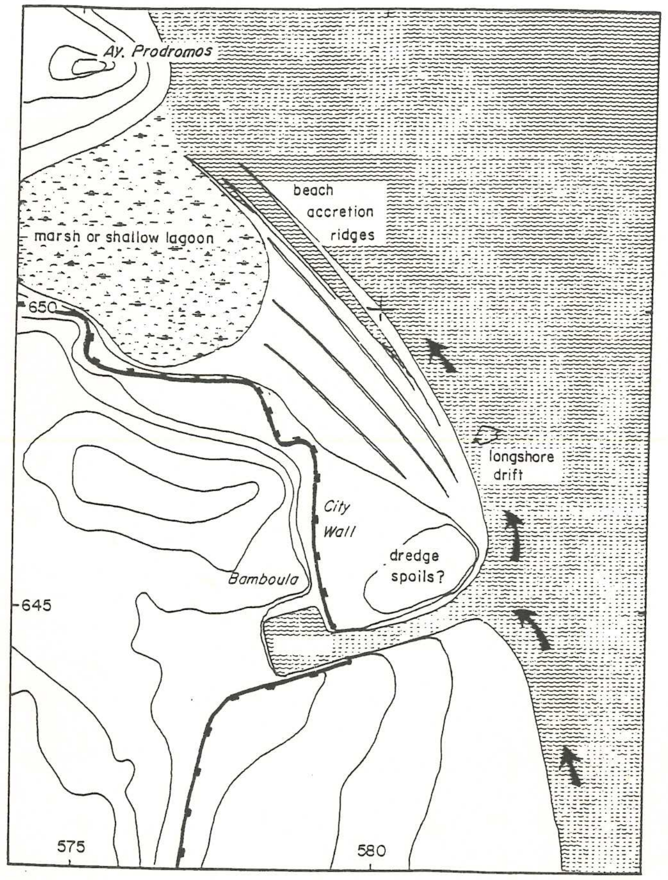

Fig. 4. Preliminary palaeogeography of the area around Kition in the second millennium B.C.E. After Gifford (1985a).

southern Cyprus does not appear to have been so prominent, except as an outlet for copper distribution. However, the picture that is currently emerging may perhaps change this view.

Swiny (1981: 51–87) first outlined the possibility of a land-based access or trade route, also relating to copper distribution nodes, that could well have been established in this period, channelling down the Kouris river valley, linking Morphou Bay, 70 km away in the northwest of the island, with sites along the south coast. Excavations in the Episkopi area have revealed a wealth of second millennium material including the Late Bronze Age sites of Episkopi *Phaneromeni* and *Bamboula,* as well as a line of copper production sites up the valley. A recent survey by Flourentzos (1991: 66) has revealed pottery parallels from sites on the north coast, such as the Linou-Katydhata area, with the Middle Bronze Age tombs of Alassa in the Kouris Valley.

The Kouris River, prior to modern damming at its head and tapping of several large springs near Alassa village, was one of the island's major rivers. The configuration of the shoreline in the areas of Episkopi-Akrotiri has been affected by the alluvial deposition of the Kouris River.

Based on this fact and assumptions made by Stanley Price (1980: 8) relating to the Akrotiri Salt Lake area, I suggest the following outline of the geomorphological processes that have affected the Akrotiri peninsula during and since the Bronze Age (fig. 5).

Stanley Price (1980: 8) stated that the "Akrotiri Salt Lake was probably formed as a result of seaward development of spits from mouths of (the) Kouris and Garyllis rivers eventually reaching (what was then) the offshore island (of Akrotiri) running west from the present Cape Gata and forming a tombolo, with an area of sea-water isolated as a salt-lake." Swiny (1981: 51–87) and Michaelides (1988: 1601) both testify to the large volume of sediment deposited at the mouth of the two rivers.

Although the assumptions of Stanley Price present a valuable introductory analysis of the pattern of geomorphological change in the area of the Akrotiri Salt Lake, the picture is more complex. Other factors must be taken into consideration. First, the littoral drift along the coast east of the Akrotiri peninsula is essentially easterly, which would not have encouraged the rapid southerly transportation of sediments from the Garyllis River mouth. In fact, the formation of the easterly spit that eventually linked the mainland to the island of Akrotiri, is not thought to have occurred until historic times (Nir 1993: 32), thereby leaving the eastern side of the peninsula open to the sea in the Bronze Age. However, prevailing winds on the west side of the Akrotiri peninsula are onshore, which prevent the River Kouris from prograding out into the sea, causing the build-up of sediment at the river mouth and forcing sediment to accumulate along the shore. This would correspond with Stanley Price's argument. The question of tectonic activity is not brought into Stanley Price's equation, despite the fact that localized fault activity is known to be present in the area, particularly along the south western side of Akrotiri Island, where Flemming and Webb (1986: 21) estimated a maximum subsidence of 1 m/1,000 years. Perhaps the problem is partially answered by aeolian deposition, wind blown deposits that have accumulated in the area of the Salt Lake. There can be no doubt that wind blown material has contributed considerably to the formation of the Akrotiri Salt Lake, particularly since the relative stabilization of sea level at the end of the Bronze Age. Geological maps clearly distinguish the Pleistocene marine deposits from those of recent alluvial and aeolian deposits that have accumulated in the area of the modern Salt Lake (fig. 5).

Bearing all these factors in mind, it is quite feasible that the infilling of the Akrotiri Salt Lake has occurred since

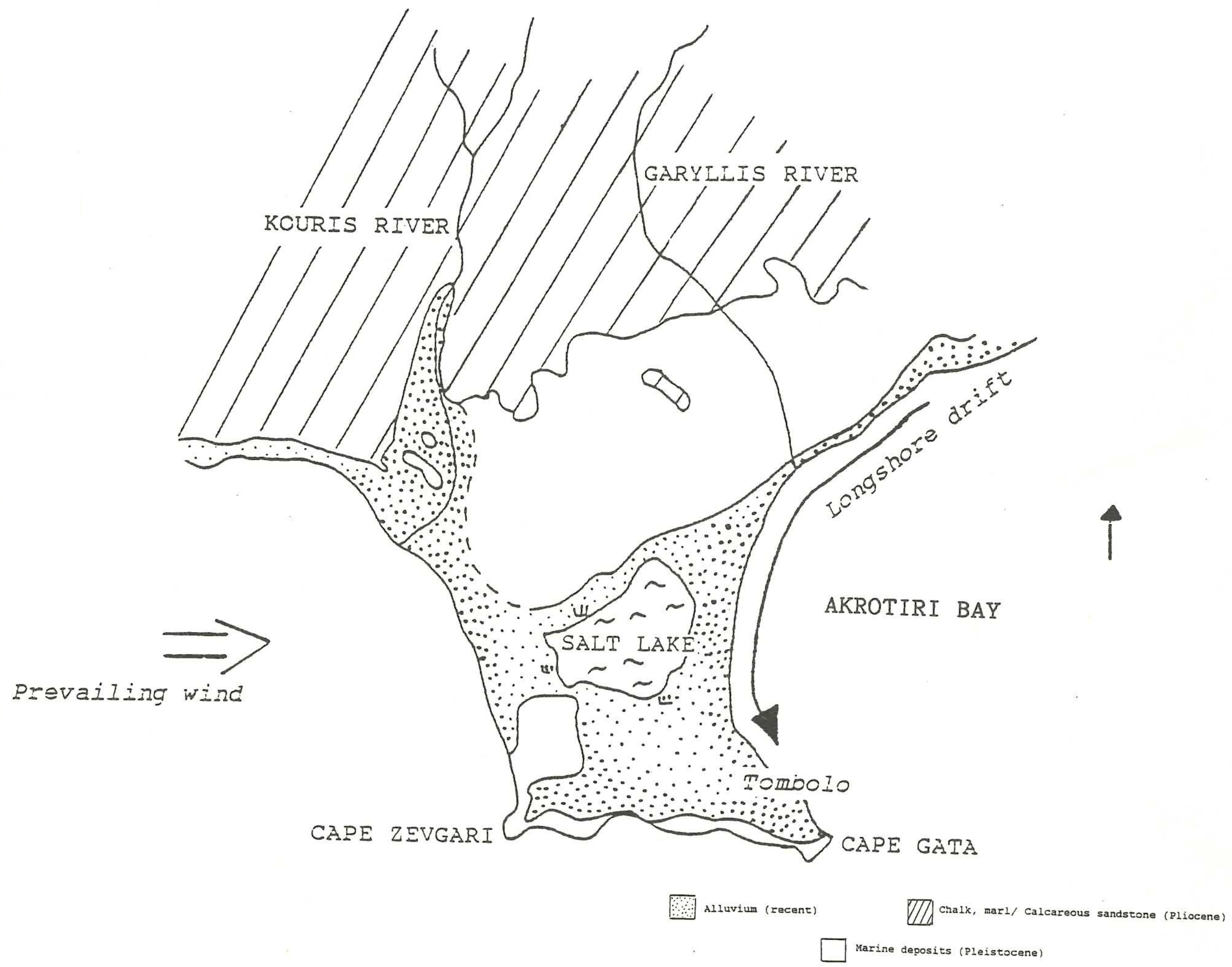

Fig. 5. Geology and prevailing maritime conditions of the Akrotiri Peninsula.

the Bronze Age and that prior to this period the area of the Salt Lake was a lagoon linked to the sea or a marine embayment providing sheltered anchorage behind the offshore island of Akrotiri.

The remains of a Hellenistic or Roman shipwreck have been identified some 150 m inland from the west coast of the peninsula (Heywood 1982: 164; Collombier 1987: 167), northwest of the modern town of Akrotiri, implying that this area was submerged during this period (fig. 6).

Furthermore, Gjerstad (1926: 15; Catling 1963: 161) identified a Late Bronze Age cemetery with associated pottery, near the modern village of Asomatos. The cemetery site of Asomatos *Phasouri* is currently located on the northern shores of the Akrotiri Salt Lake on the edge of the Pleistocene marine deposits. Heywood (1982: 166) states that the Late Bronze Age cemetery of Asomatos *Phasouri* was associated with a site of the same period. Thus, it is possible that the site of Asomatos *Phasouri* could well have utilised an extremely sheltered anchorage on the shore of a lagoon or marine embayment in the Late Bronze Age period.

Obviously a number of questions remain unanswered. No systematic corehole study of the Akrotiri Salt Lake has as yet been undertaken in order to ascertain the precise nature of the area during and since the second millennium B.C.E. Even if the area of the Akrotiri Salt Lake did offer shelter to vessels in this period, we have yet to determine the function of the harbor. What catchment area did it serve, and how did it relate to the possible anchorages at the mouths of the Maroni and Vasilikos valleys to the east and the Episkopi valley to the west? Further research needs to be undertaken to determine not only the typology of the anchorage at Akrotiri but also its function.

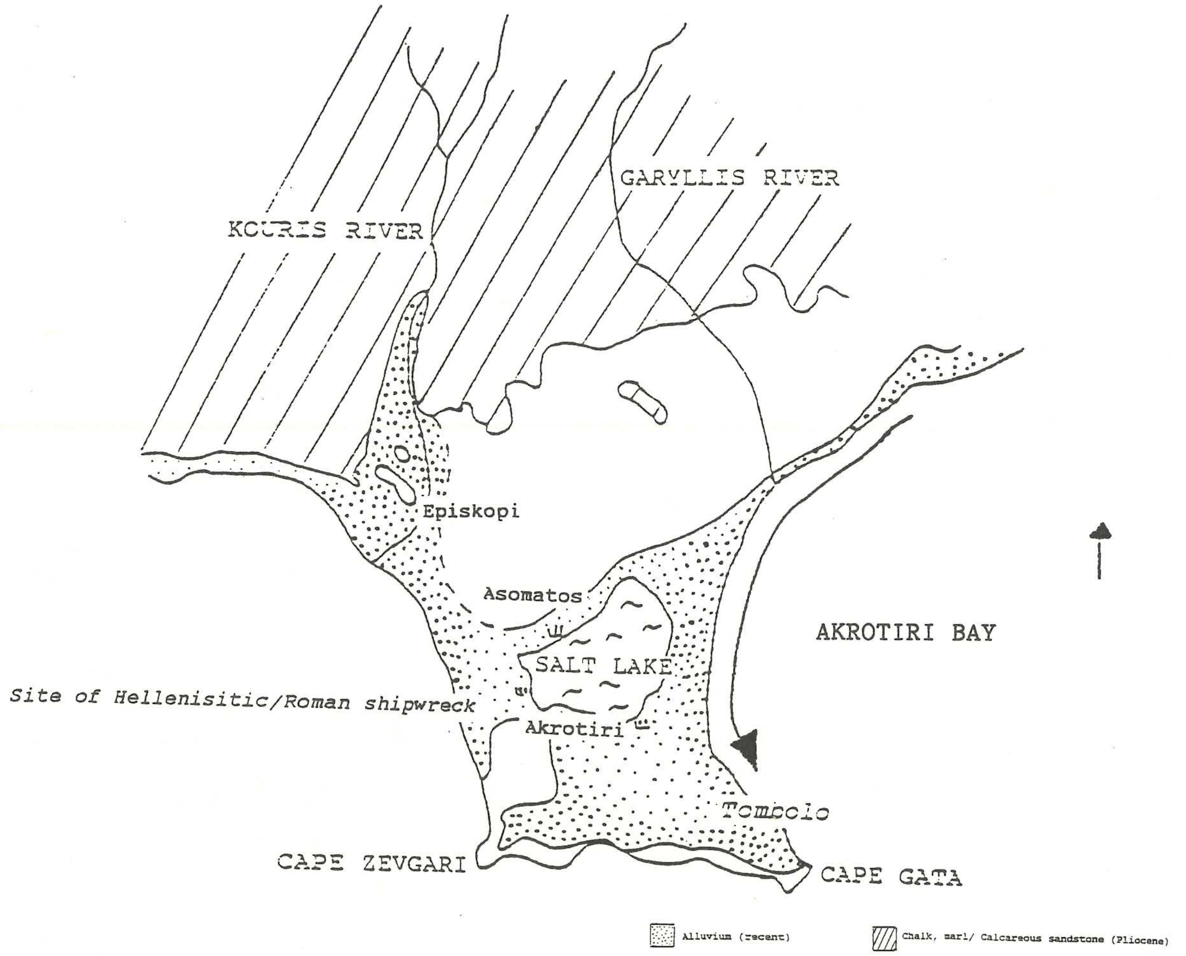

Fig. 6. Akrotiri Peninsula, locations of sites referred to in the text.

CILICIAN DELTA OF SOUTHERN TURKEY

The Cilician delta in southern Turkey is a crucial but relatively poorly investigated center of maritime trade, with links to the Hittite empire, the Levant and Cyprus.

Textual evidence certainly implies the existence of maritime activity and trade along the coastline of Cilicia (Gordon 1958: 28–31; Hoffner 1967: 21–22, 34–38; Linder 1981: 33–35; Astour 1981: 12–29). The Ugaritic and Hittite texts refer to trading activities between the two areas throughout the second millennium (KBo XII 42 rev. Col. III; PRU IV (17.130); RS 17.316), with particular reference to a coastal town believed to have been located in western Cilicia, called *Ura* (RS 20.213). This site has yet to be identified with a specific settlement, although Garstang (1943: 1–12) places it in the vicinity of the Bronze Age site of Silifke. It was known to have been the city that specialized in *tamkarutum,* foreign trade (RS 17.319); and is believed by Heltzer (1977: 203–11) to be the "real port of entry to the Hittite Empire." A Ugaritic tablet (RS 26.158) relates the shipment of grain to *Ura;* and a Hittite text (KBo XII 12) notes the shipment of metals such as silver, gold, copper, and tin to Ugarit. The rivers of the Cilician delta undoubtedly were an excellent means by which to transport products between the coast and the Anatolian plateau, via the Cilician Gates.

In order to analyze existing archaeological data and identify possible anchorage sites, it is important to understand the changes in the palaeogeography of the Cilician delta. It is composed of three slightly tilted fill terraces of Pleistocene age, surrounded at a lower level by a deltaic plain, believed by Erinç (1978: 87–108, fig. 3) to be of post-glacial date, prograding at a rate of 150–300 m/100 years, not necessarily a gradual or continuous process (fig. 7). Strabo (12.2.34) notes the rapid progradation of the delta in first century B.C.E. This deltaic growth is believed to have

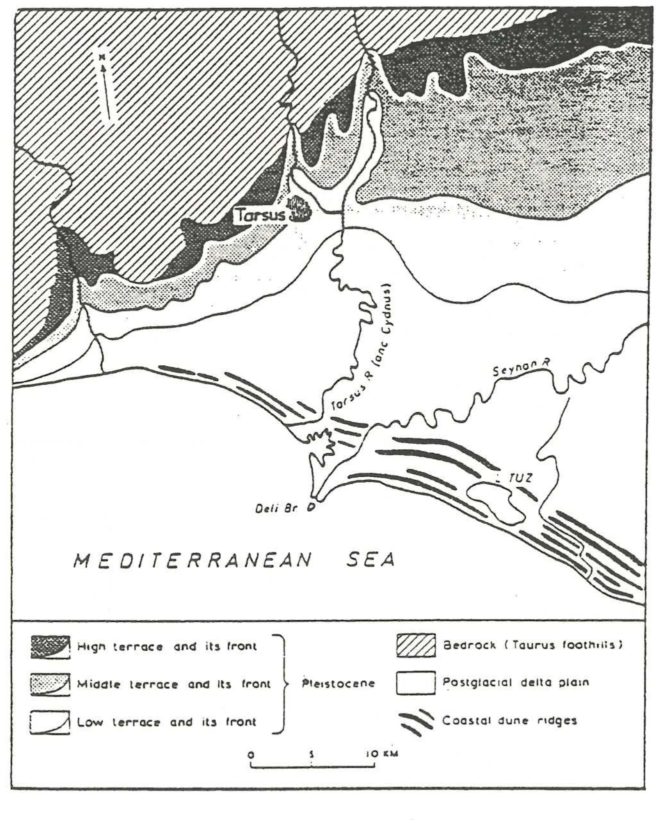

Fig. 7. The deltaic plain of Çukurova (Cilicia). After Erinç in Brice (1978: 101, fig. 3).

increased with the reduction in the rate of sea level rise around the end of the second millennium, "the effects of subsidence (thereby being) overcome by those of alluviation" (Russel 1954: 378, 382), and is therefore likely to have landlocked any harbors that functioned prior to this date, or buried them beneath deposits of alluvial sediment. As Evans (1973: 100) states, "the infilling and decline of many harbors is thus an almost inevitable consequence of their construction." Hence traces of harbors in deltaic regions are often slight and to be revealed require large scale excavation.

As a result of the unstable nature of the delta, settlement appears to have been largely restricted to higher ground around the Pleistocene terraces and Karataş/Misis Dağ promontory (Seton Williams 1954: 121–56).

One of the better known sites in the area of the Cilician delta is Tarsus or Gözlü Kule. The tell is presently situated some 15 km inland, not on the coastal delta, but on the lower fill terraces to the west of the coastal delta, with the nearby River Tarsus deeply entrenched (fig. 8). Excavated by Hetty Goldman (1950) in the 1930s and 1940s, Tarsus has revealed significant Bronze Age remains, with occupation levels dating from Neolithic times. Ceramic remains have revealed second millennium connections throughout the eastern Mediterranean (Astour 1965: 16). From textual evidence, Tarsus, Hittite *Tarsa,* is known to have been an ancient harbor. The exact location of the harbor is unknown

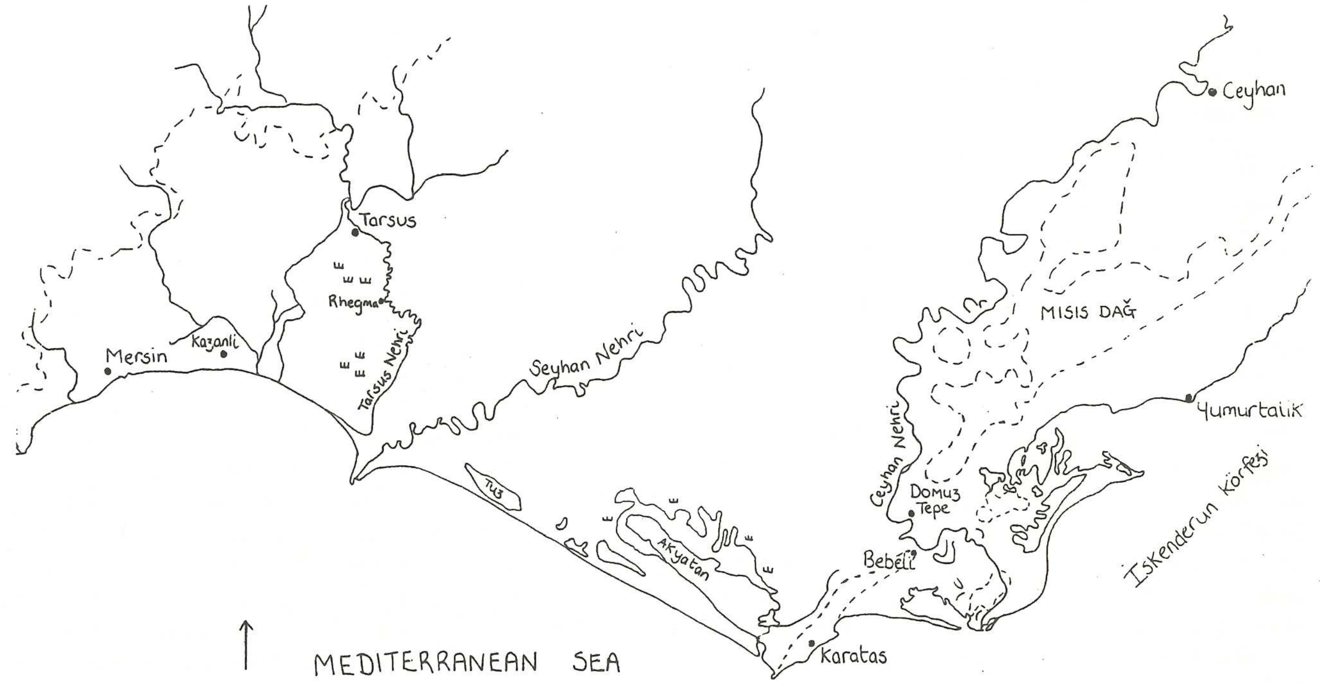

Fig. 8. Cilician Delta.

but geomorphological surveys by Evans (personal communication), demonstrate that it was situated to the southwest of Tarsus in a large marine embayment that was eventually drained as a result of tectonic uplift in the area of Tarsus and general silting up of the Tarsus (Kydnos) River, which drove the shoreline seaward. The harbor of Tarsus, known later as *Rhegma,* or marsh, was abandoned by Justinian prior to the sixth century A.D., at which point the river was diverted to its present channel east of the modern city (Stillwell 1976: 883–84). Sedimentary evidence suggests that the area of the ancient harbor is now drained marshland, covered with extensive plantations of eucalyptus trees that drain the swamps, and define the area of the lagoon prior to silting (Van der Have, personal communication).

Domuz Tepe, the second site that I would like to consider on the Cilician delta, is less well studied than Tarsus. It is presently situated 12 km from the coast on the eastern side of the delta, just on the western edge of the Karataş/Misis Dağ promontory, north of the present course of the Ceyhan River, which passes through a saddle to cross to the eastern side of the promontory at this point. Fig. 8 identifies the location of the site of Domuz Tepe.

Seton Williams (1954: 121, fig. 1) in her survey of 1951, lists Domuz Tepe among the important Middle and Late Bronze Age sites in the area, with traces of Mycenaean IIIC pottery (Mee 1978: 121–56) and Middle Cypriot III ware (Seton Williams 1954: 154).

Situated to the northwest of the modern town of Yeşilköy on the edge of a low, limestone plateau, commanding a good view over the flat Ceyhan River valley plain, the site extends over an area of roughly 100 by 150 m, and stands approximately 20 m high (fig. 9).

Although the river is now about half a kilometer to the west of Domuz Tepe, it is believed once to have passed much closer to the site (Bird 1985: 96). However, as a result of the Tarsus uplift, large quantities of sediment built up to the west of the Misis Dağ, causing the river baseline to rise to the lip of the saddle and ultimately forcing it through the saddle at Bebeli, to build its delta out into the İskenderun Gulf to the east, as opposed to directly south as was its previous course (Bird 1985: 96, fig. 53/1916; Evans 1971: 394). This change in the river course is very apparent on aerial photos (Gilbert, personal communication). The date of the change in the river course is not clear, although it is believed to have occurred sometime during the first millennium B.C.E. (Erol 1967: 98). Figure 10a shows the location of the ancient coastline. Just prior to the change in the river course Domuz Tepe would have been well situated in a sheltered position behind the dağ close to the mouth of the Ceyhan River. It is therefore possible that the site, located on the edge of the only area of high ground in an unstable marshy region, could have acted as a riverine harbor monitoring the movement of vessels entering the Ceyhan River. However, at this stage these assumptions are only speculative and further research needs to be undertaken in order to ascertain the precise nature of the area during the second millennium B.C.E. and the function of the site of Domuz Tepe.

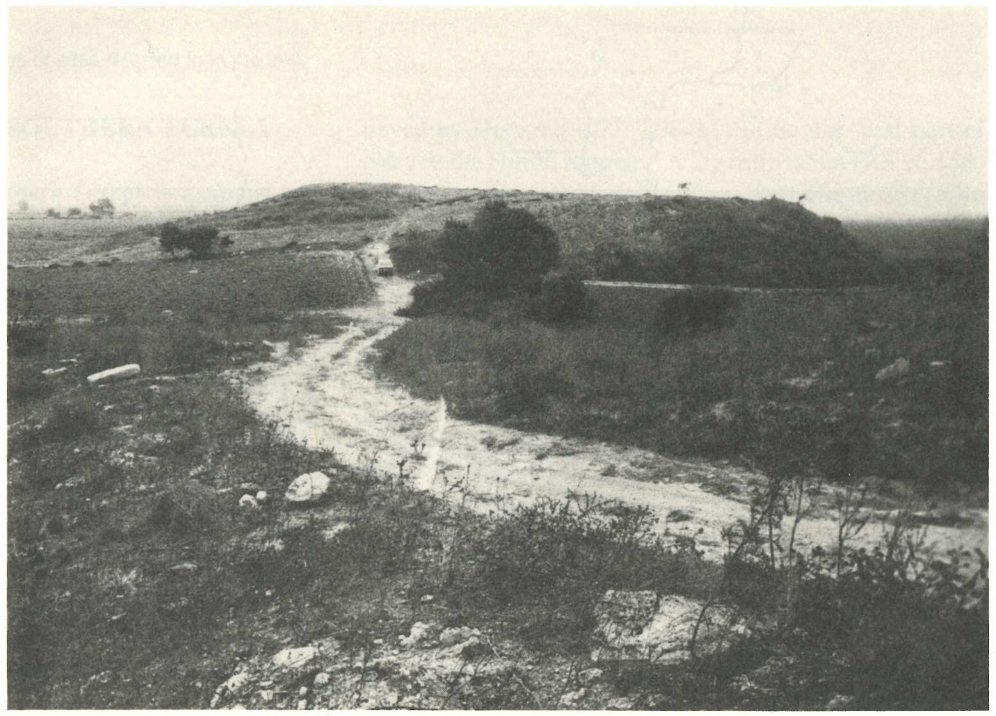

Fig. 9. Domuz Tepe as photographed by the author in 1991, view from the east.

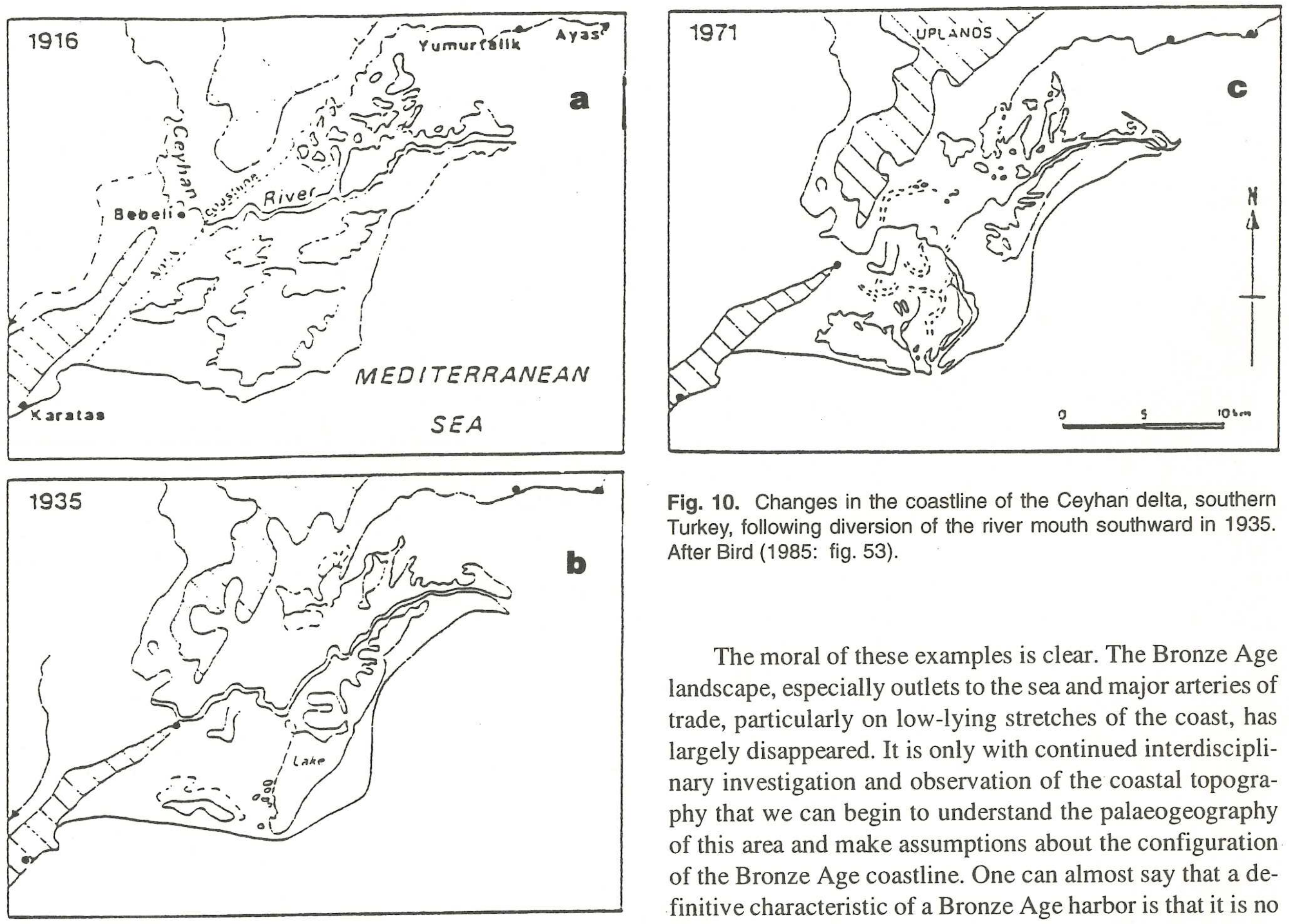

Fig. 10. Changes in the coastline of the Ceyhan delta, southern Turkey, following diversion of the river mouth southward in 1935. After Bird (1985: fig. 53).

The moral of these examples is clear. The Bronze Age landscape, especially outlets to the sea and major arteries of trade, particularly on low-lying stretches of the coast, has largely disappeared. It is only with continued interdisciplinary investigation and observation of the coastal topography that we can begin to understand the palaeogeography of this area and make assumptions about the configuration of the Bronze Age coastline. One can almost say that a definitive characteristic of a Bronze Age harbor is that it is no longer in the same relationship to the sea. In order to identify the location of harbors of this period we have to reconstruct the landscape as it would have been in the Bronze Age.

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