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W.M. MURRAY

The Ancient Harbour of Palairos[1]

The ancient city of Palairos — first mentioned in Thucydides' account of 431 (2.30.1) — has been correctly identified with the well preserved remains at Kechropoula in northwest Akarnania. Our knowledge of the city's history is limited, yet detailed enough to reveal that its economy prospered along with the rest of Akarnania during the mid-fourth and third centuries B.C.[2] Although it has long been suspected that this city possessed a harbour, no serious attempts were made to locate it. To his credit, K.A. Rhomaios reported "small scraps of harbour works" (*"mikra leipsana limenikōn ergōn"*) at Pogonia but did not elaborate further[3]. This paper will focus on a description of Palairos' harbour, located by the author in 1980, and will present the evidence for dating its original construction and period of use. Finally the implications of this mole for computing the local change in sea level (relative to the land) will be discussed.

THE REMAINS

One km east of modern Pogonia and some 300 m northeast of the strand known as "Cleopatra Beach"[4] is an ancient harbour mole partially obscured under mud and silt. The harbour site lies exactly where one would expect it — at the terminus of the ancient road leading south from the city (about 5 km away), and in the most sheltered, northwestern portion of the wide bay of Palairos (Figs. 1 and 2).

The likely existence of a road was suggested by the discovery of numerous amphora fragments, most of them from "Corinthian A" and "B" jars of the fourth to third centuries[5]. These pieces littered a field some 500 m north of the mole where a tomb with a sepulchral inscription was found[6]. The tomb is clearly later in date than the third century, so the pottery might be interpreted as garbage thrown to the side of the road near which this particular tomb was constructed at a later date. In fact, what appears to be road metal cuts obliquely across the beach at the logical western end of the harbour mole (it appears on Fig. 2, directly above the legend "sand in pockets"), and just off shore are at least two large rectangular blocks embedded in the silt. A thorough cleaning here could reveal if these blocks are part of the road, or foundations of harbour buildings.

The harbour's placement here is largely determined by the topography and wind patterns of this embayment. Strong sea breezes are generated by the substantial plain running northward, and the southerly or southwesterly winds generated can climb to F 5 or more near the shore by mid-afternoon[7]. I concluded that if Palairos had a harbour, its protective mole must have been constructed in an east-west direction to protect against the northward flow of the waves. I then located the most suitable site given these criteria and was in the water no longer than 15 minutes before locating the ancient breakwater.

The mole extends from the present shoreline in an east-southeasterly direction for a maximum distance of 270 m. The structure itself is obscured in many places by silt, yet a general picture of the harbour mole can be recovered. Considering the nature of its construction, the distribution of the pottery found on it and the bathymetric levels of its surface, it can be divided into three different sections[8].

The first section runs for about 170 m from the shoreline, is composed of small irregular boulders, contains very few sherds and slopes from sea level gradually down to a general depth of 1.5-1.75 m (cf. Pl. 1 and the depth chart, Fig. 3). To the north and south of this section is a thick blanket of mud, which in places has been scoured away by the current to reveal small and

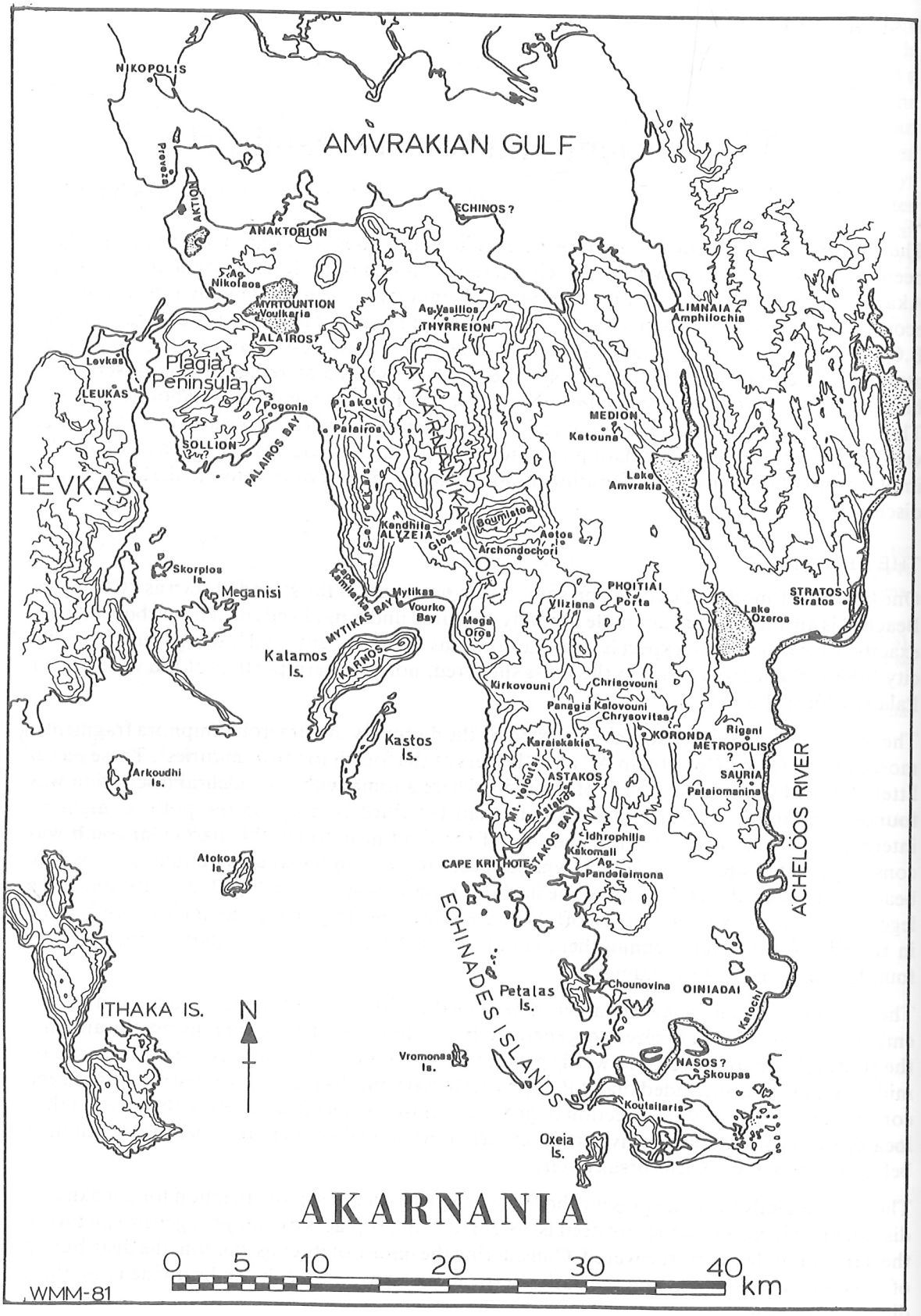


Fig. 1. General map of Akarnania, western Greece.

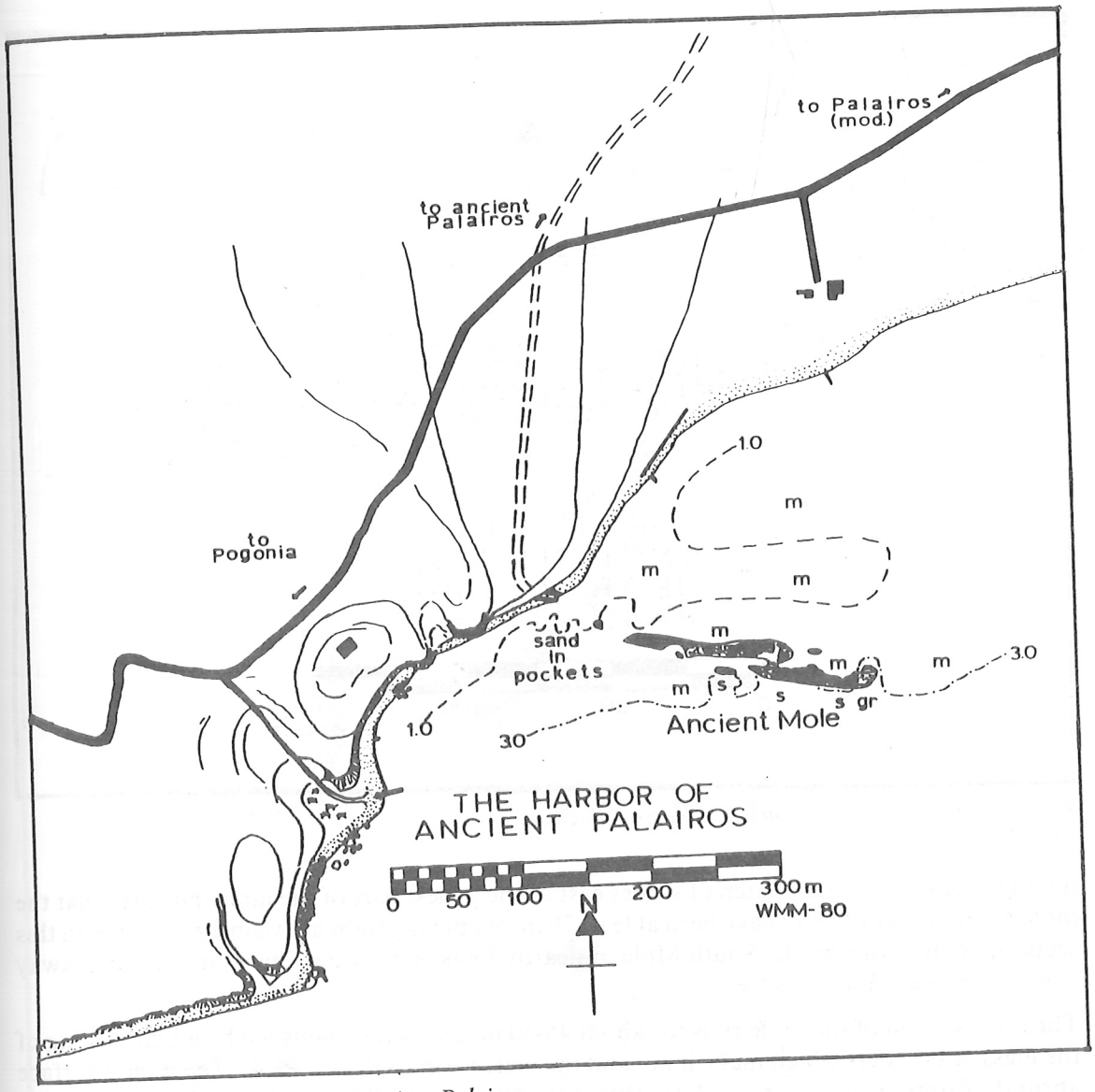


Fig. 2. Plan of the harbour of ancient Palairos.

medium-sized boulders (Pl. 2). Perhaps the total width of the mole at section one is equal to the width of the area where sections one and two overlap. Due to the almost complete lack of sherds, the smaller, less heavy appearance of the stones utilized and the fact the 50% of this section is above the general level of the mole (i.e., it is more shallow), section one probably served as the substructure of a solid road built at the water's edge, and perhaps even out into shallow water, to link the mole proper and its loading platform to the shore. It was probably leveled with packed earth and rock, and covered with paving slabs such as the ones which are still *in situ* in the mud bank just under water, adjacent to the road which apparently cuts across the beach.

Section two begins at the thickened middle area of the mole and extends eastward for about 50 m. Its general depth is 1.6-1.75 m and it rises 2.0-2.4 m above the ocean floor on its south face (Pl. 3). It should also be noted that the mole's southern edge is piled up into a mound in this section — the difference in depth between the southern and northern margins of the mole's surface being about 0.75 m. This mounding makes perfect sense as the battered remains of a rough sea wall meant to limit the resultant water surge and spray from oncoming waves as they hit the seaward face of the mole. This technique is generally employed today throughout the world, and numerous examples of it can be found in the harbour moles along Akarnania's coast and in the offshore islands. The actual inner face of the mole is unobservable, concealed under a

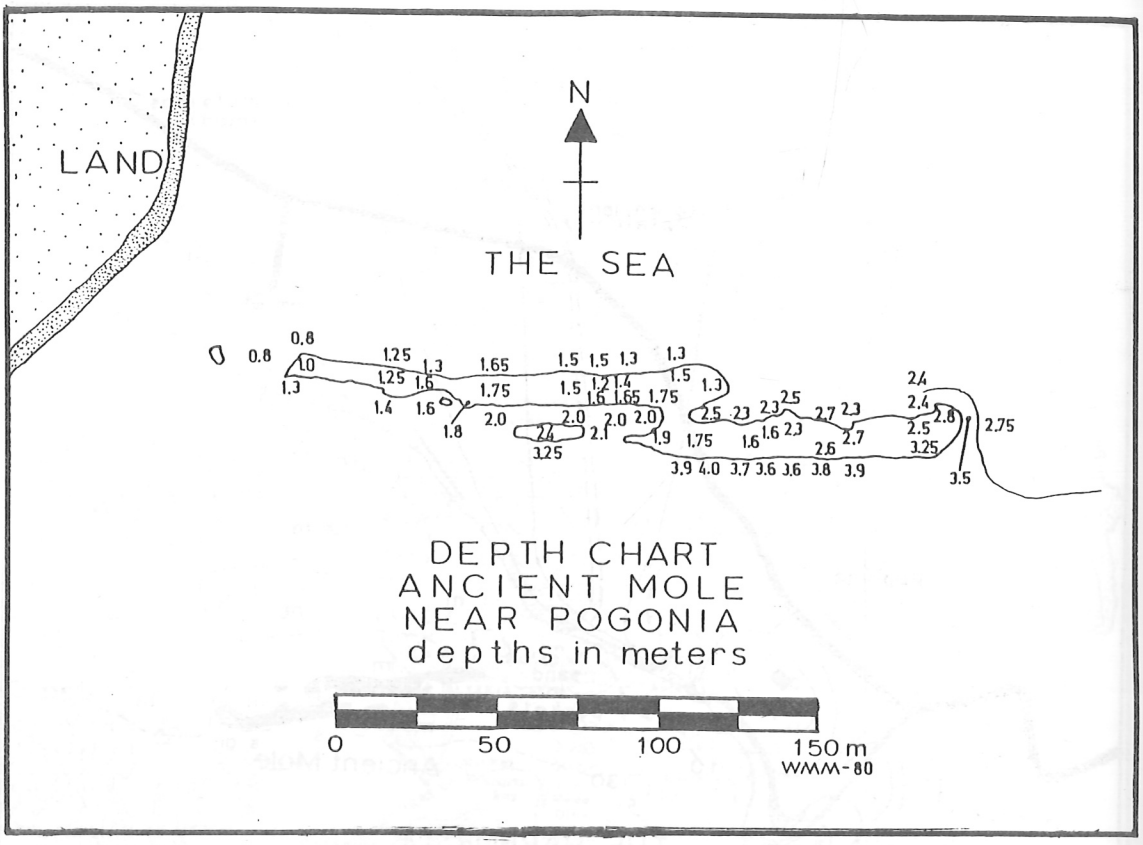


Fig. 3. Depth chart of the ancient mole near Pogonia.

mantle of silt, yet a small patch of stones east of the widest part of the mole indicates that the mole's original width may have been at least 20 m. No paving slabs are visible anywhere on this section, yet to judge by the South Mole at nearby Leukas, they may have been robbed away when the mole fell into disuse[9].

The third section of the mole runs for about 45-50 m, and is distinguished by a diminishing of the mass of boulders which make it up, and the increase in its depth (Pl. 4). The mole's surface abruptly drops from -1.6 to -2.3 m, then continues gradually to -2.8 m. This section also contains amphora sherds, although the frequency is slightly less than in section two. This is clearly the eastern end of the mole. I once thought that there may have been another enclosing arm reaching out from the shore northeast of this mole, but an intensive investigation of this area during the summer of 1983 revealed no such structure. Whether or not the mole is matched by a breakwater running out from the shore on a north-south axis is impossible to determine given the general covering of silt to the north[10].

Due to the amount of silting it is impossible to determine the exact original size of this harbour. The mole has acted as a trap which has resulted in a mound of silt built up behind the mole (note the -1.0 m bathymetric contour indicated on Fig. 2). Most likely, this whole area was utilized and perhaps even dredged along the northern side of section one to increase the capacity of the anchorage for small shallow-draft boats. Now, however, it would take a systematic and expensive program of coring, or a sub-bottom profile made by high resolution, seismic reflection techniques, to recover the original pre-silted bottom contours.

THE HARBOUR'S PERIOD OF USE AND DATE OF CONSTRUCTION

As described above, most of the pottery found on this mole was recovered from section two. These pieces do not constitute chance finds. Some sherds were found wedged between rocks of the mole at a depth of 4 m, a level which was surely under water during the use period of this harbour (see below). A common practice the world over is the disposal of garbage into the

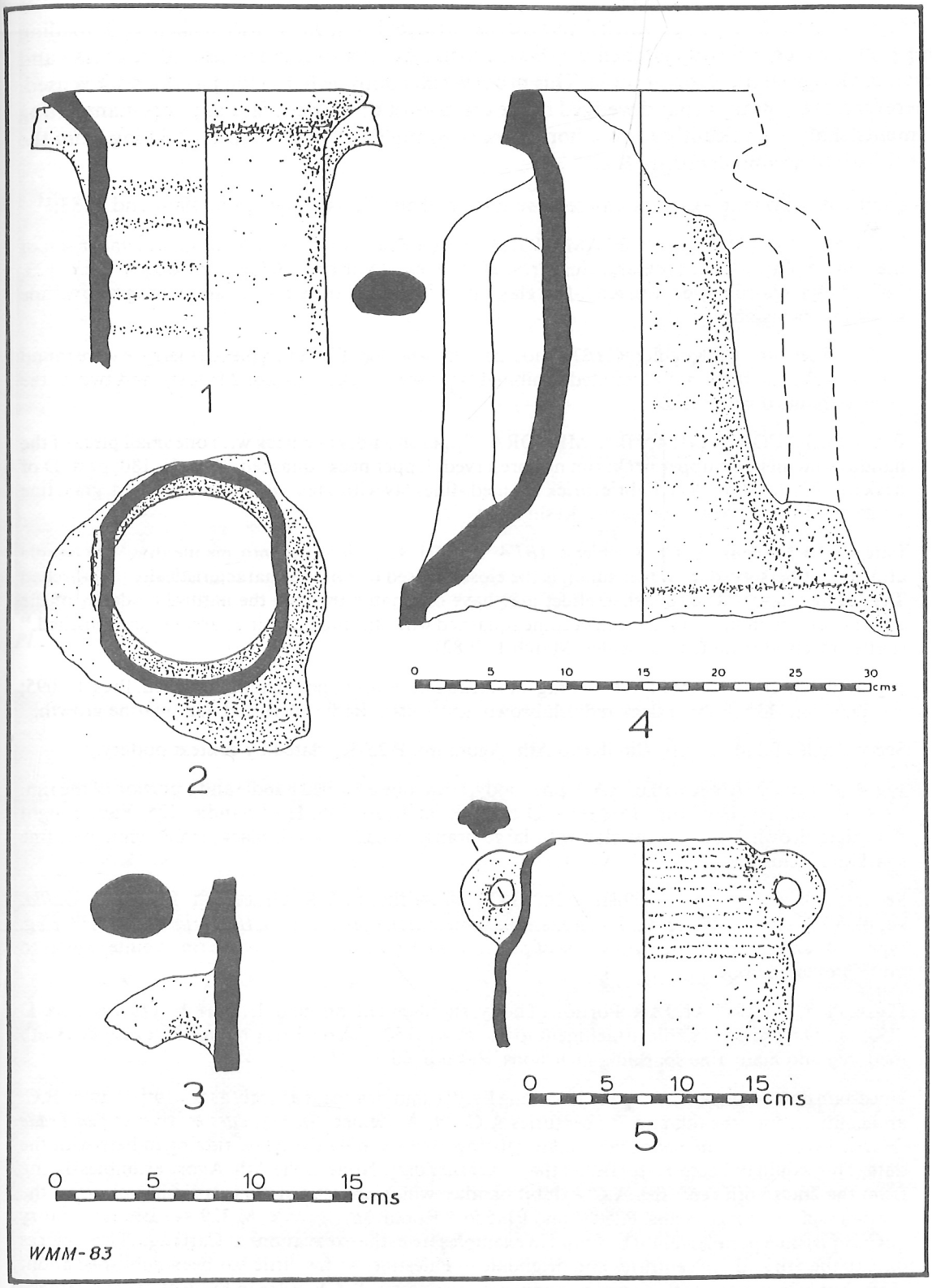


Fig. 4. Selected jars from the ancient harbour (Pls. 5-8).

water, especially the garbage which litters a dock surface. Thus, amphoras broken while loading ships get unceremoniously pitched overboard with a curse and come to rest in the cracks and crevices alongside the dock or mole. This process will continue for as long as the dock is used. Therefore, the pottery I found wedged in the crevices of this mole's face are important dating elements. They significantly form a homogenous group (with one exception) dating from the late fourth to second centuries B.C.

I present the following examples as representative of the finds recorded in 1980 and 1983:[11]

1. Fig. 4, Pl. 5. "CORINTHIAN B" AMPHORA. Frag. of neck and rim with the upper attachment of the handle. Cylindrical neck and rim. Pres. H .150; est. D of rim .165; est. max. D of neck .123. Fabric: light chocolate-brown, med.-fine clay with a few small to med. voids and small gray and fine sparkling inclusions.

   Early 3rd century. Cf. Koehler, *CABTA*, nos. 252, 253 and 266. Five examples of this type were found on the mole; the three not illustrated exhibited 'squashed necks' (see no. 2 below), and two of the three were lined with resin.

2. Fig. 4, Pl. 5. "CORINTHIAN B" AMPHORA. Upper shoulder and neck with one small piece of the handle attacment on upper neck; rim not preserved. Upper neck squashed. Pres. H .180; pres. D of neck int. .085 (at shoulder). Fabric: brick red med.-fine clay with a few voids and a few med. gray, fine white and fine sparkling inclusions. Resin lined.

   Late 4th to 3rd century. Cf. Koehler *CABTA*, 255-271. C.G. Koehler informs me that "the handle attachment perserved, however small, is the close-pressed one of the characteristically high-arched Type B handles." "The squashed effect may have originated through the natural tendency of the upper neck and mouth to warp and become squashed when the high-arching handles were attached." (Letter received from C.G. Koehler, March 1, 1982).

3. Fig. 4, Pl. 6. ROMAN AMPHORA. Frag. of rim and neck with upper handle attached. Pres. H .095; est. D of rim .130. Fabric: dark reddish brown, gritty clay. Badly encrusted with marine growth.

   Second half of 2nd century. Similar to Ath. Agora no. P 25797, dated by context pottery.

4. Fig. 4, Pl. 8. ROMAN AMPHORA. Upper body, neck, one attached handle and a portion of the rim. Pres. H .350; est. D of rim .156; max. D of neck (at base) .146; H of handle .225. Fabric: light chocolate-brown, med.-coarse clay with large orange, small to med. black, small white and fine sparkling inclusions.

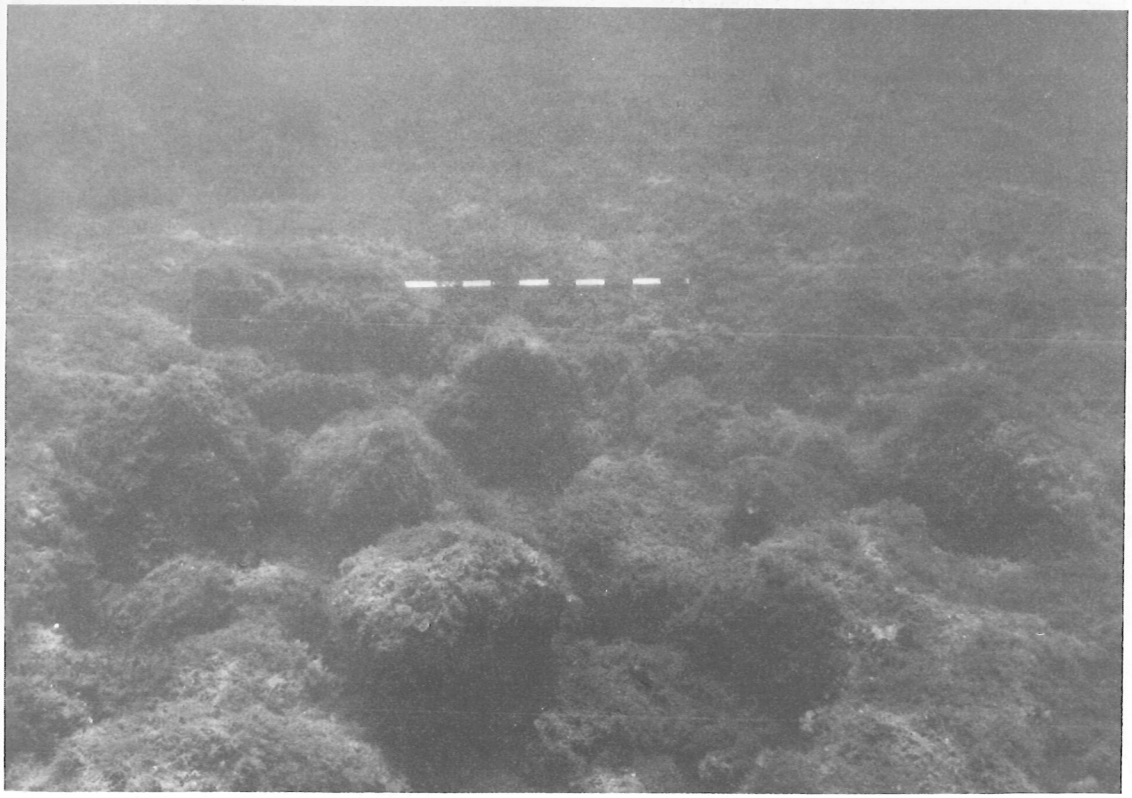
   Second half of 2nd century ("before 100 B.C.", according to V.R. Grace). Cf. F. Benoit, *Gallia*, suppl. XIV (1961) p. 47, fig. 42, for an example similar in size, and E. Will, *Hesperia* 51 (1982) Pl. 85 g, type e, for an example close to this type of piece. Note that the treatment of the rim is quite similar to no. 3 presented above.

5. Fig. 4, Pl. 7. ORIENTAL JAR. Portion of body, shoulder and one handle. Pres. H .170; est. max. D .250; est. D from one handle attachment to the other .150. Fabric: brick red med.-coarse clay with med. red and many fine sparkling inclusions. Resin lined.

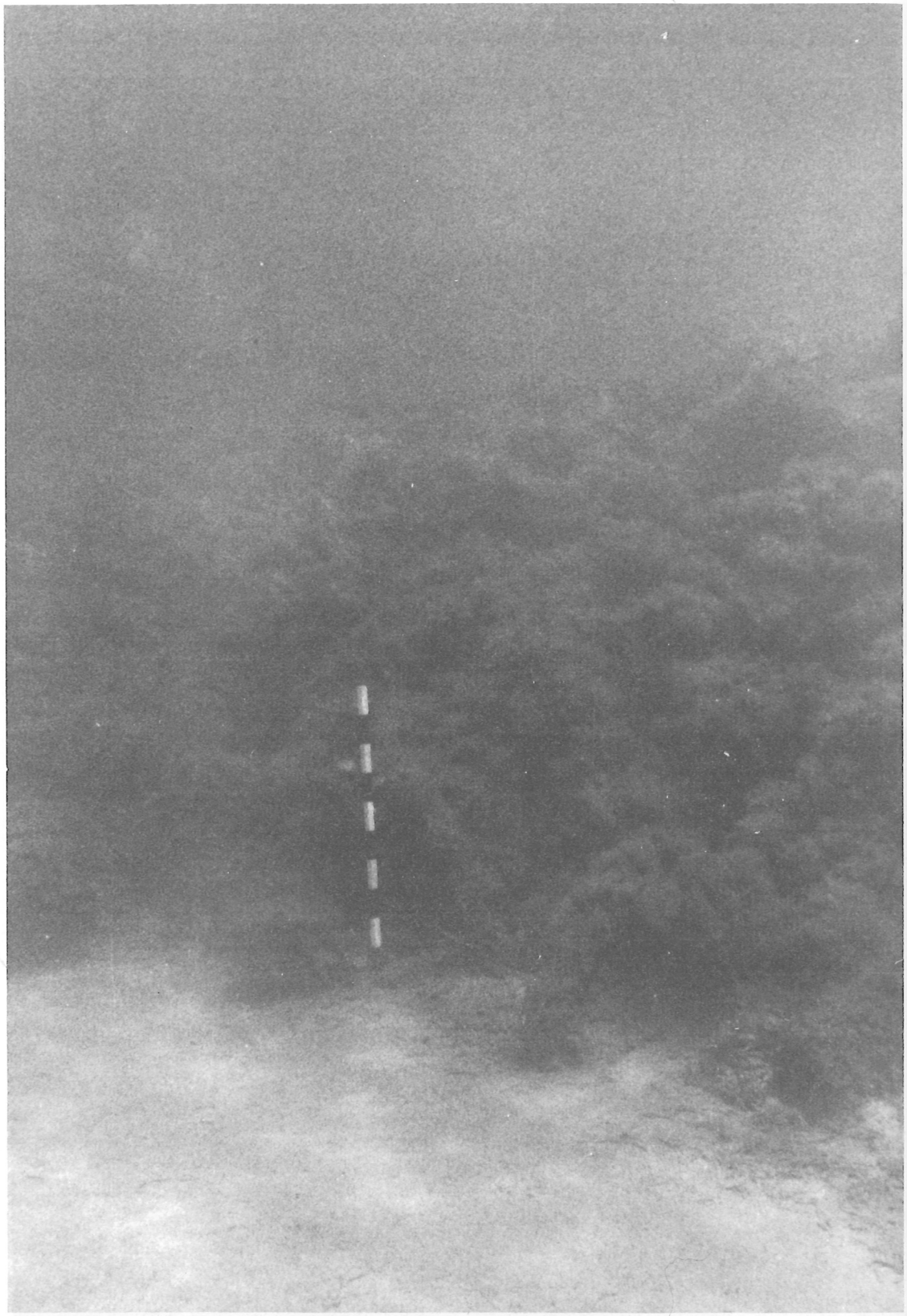
   Uncertain date. This general type of jar is long lived; examples occur as early as the 10th century B.C. and continue into the 6th and 7th centuries A.C.; cf. A. Zemer, *Storage Jars in Ancient Sea Trade* (Haifa, 1977). Since the neck and rim are missing, one has only the wheel ridging to help with the date. This would indicate a later rather than an earlier date. None of the Ath. Agora examples dating from the 2nd to 6th centuries A.C. exhibit handles which are set exactly in a similar place on the shoulder; cf. Ath. Agora nos. P25081 and P11556 = Robinson, *Agora* V, M 329 — early 6th century A.C. A possible parallel might be found in examples from the excavations at Carthage. These pieces date to the 5th and 6th centuries and originiate in Palestine. So far, little has been published about them, but a discussion of these pieces is apparently in press; cf. J.A. Riley in *Excavations at Carthage 1977 Conducted by the University of Michigan,* Vol. IX, ed. J.H. Humphrey (Ann Arbor, Michigan, 1981) 117 and 121, 'LR Amphoras 5 and 6'.

The homogeneity in date of these pieces (except for no. 5) was repeated by the group of amphora fragments I observed in the field some 500 m north of the mole which have been mentioned above. As I suggested previously, these sherds are probably roadside garbage, originating from jars broken en route to the city. Thus, they also probably date to the use period of the harbour.

Pl. 1. Section 1: Mole emerging from mud bank near shore.

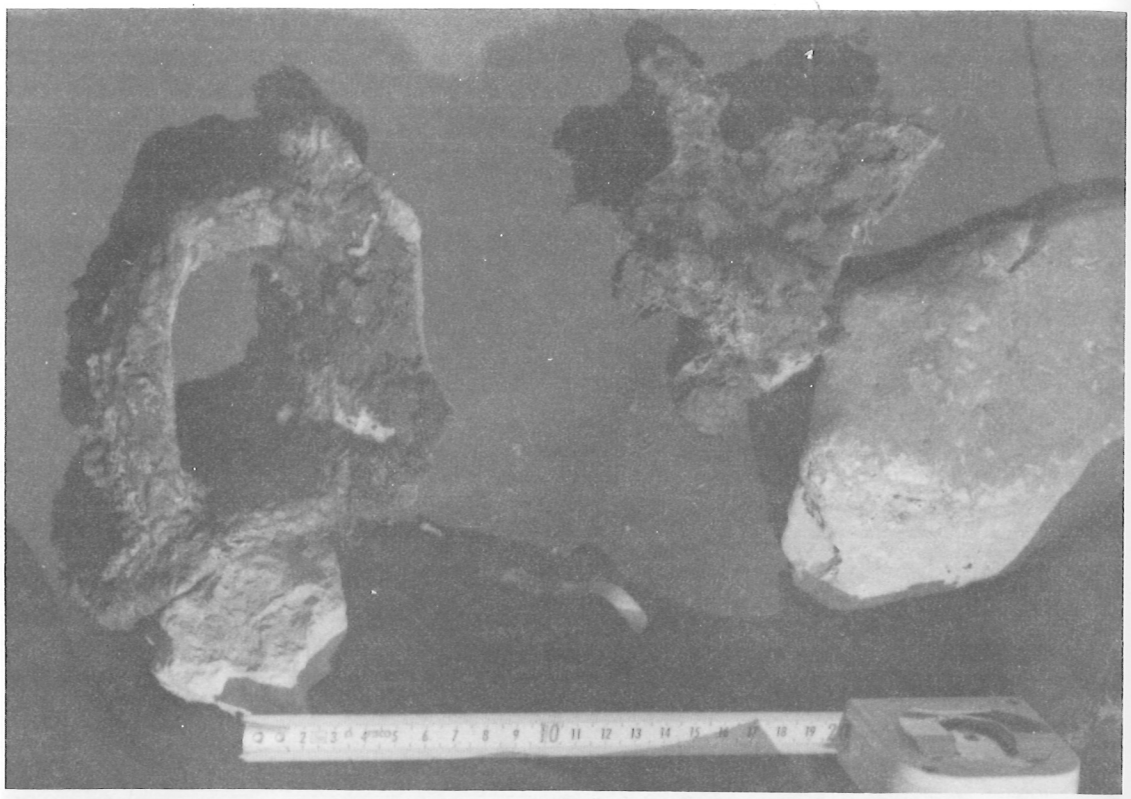


Pl. 2. Section 1: Scoured area revealing small-to-medium sized boulders.

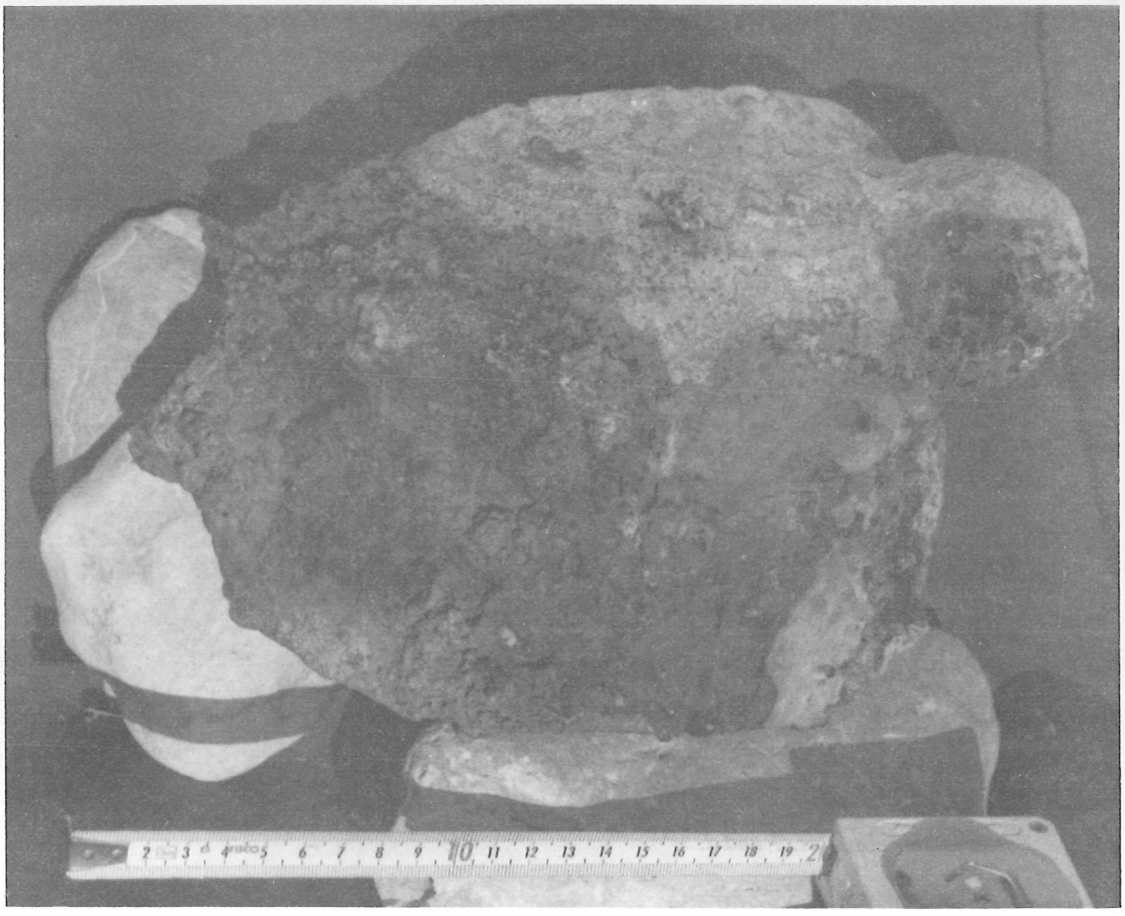


Pl. 3. Section 2: Southern face of mole rising from sea floor.

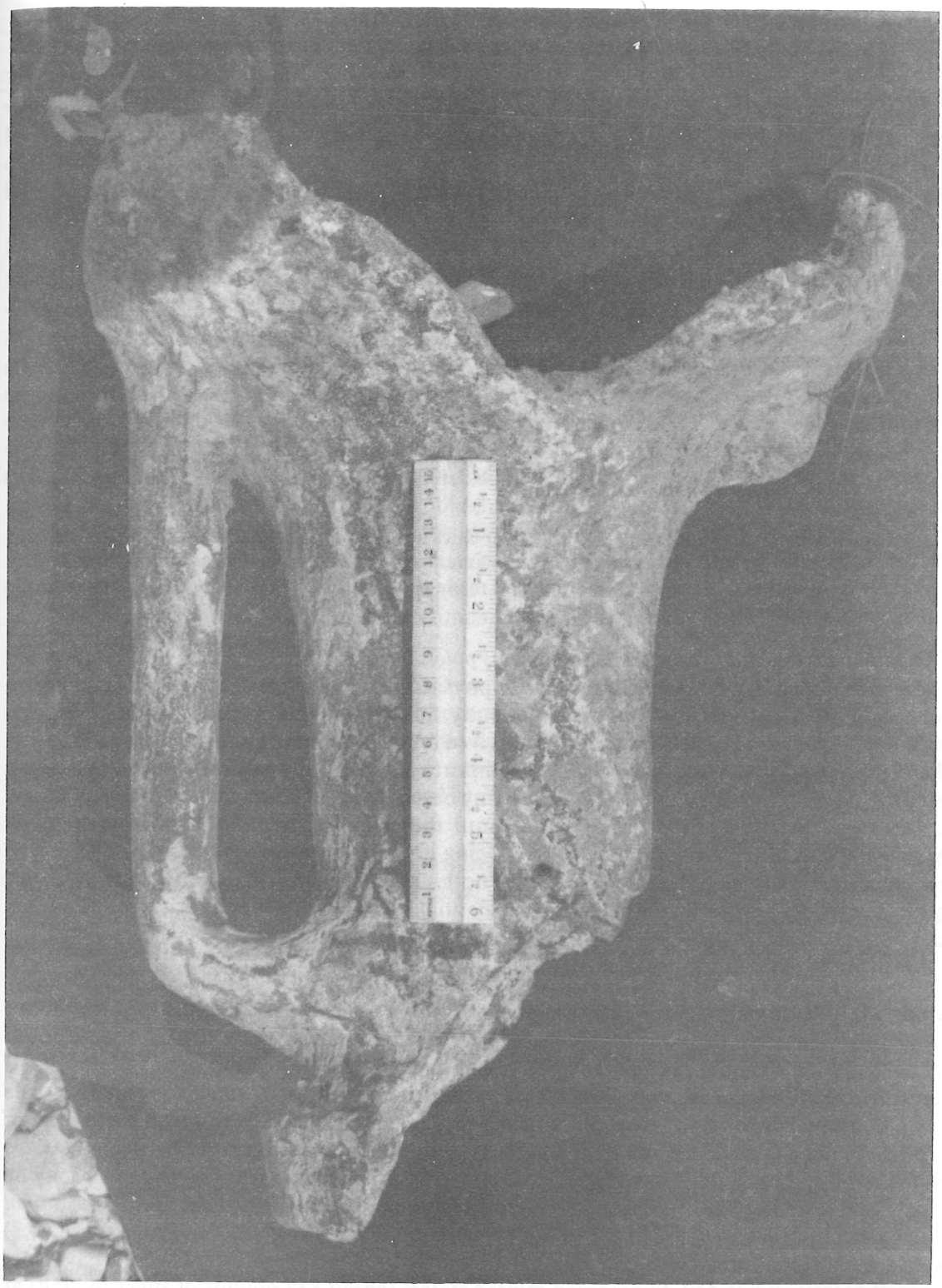
Pl. 5. Pottery examples Nos. 1 and 2.



Pl. 6. Pottery Example No. 3.



Pl. 7. Pottery Example No. 4.



Pl. 8. Pottery Example No. 5.

Since it is possible that random selection has provided us mostly with late fourth to second century amphora fragments, it would be hasty to adopt these dates without question as the full use period of this harbour mole. Yet, it is not faulty to conclude that this harbour was fully functional in the late fourth to second centuries.

An interesting passage of Xenophon's *Hellenica* (4.6-4.7.1) allows us to advance this hypothesis a bit further by providing us with an interesting bit of economic information. In 391 or 389, the Spartan King Agesilaos invaded Akarnania at the request of the Achaean inhabitants of Kalydon. Unable to bring the Akarnanians over to the Lakedaimonian alliance by force, Agesilaos ravaged their land, but withdrew his army in time to allow the Akarnanians to plant their grain for the spring harvest of the following year[12]. He returned early the following spring and the Akarnanians immediately capitulated. Xenophon describes why (*Hell.* 4.7.1):

> *"hoi de aisthomenoi, kai nomisantes dia to en mesogeia sphisi tas poleis einai homoiōs an poliorkeisthai hypo ton siton phtheirontōn hōsper ei peristratopedeumenoi poliorkointo epempsan presbeis eis tēn Lakedaimona, kai eirēnēn men pros tous Achaious, symmachian de pros tous Lakedaimonious epoiēsanto."*
>
> And realizing (since they knew that their cities were land-oriented) that they could be besieged by their grain being destroyed just the same as by an army encamped about their walls, they sent ambassadors to Lakedaimon and made peace with the Achaeans and alliance with the Lakedaimonians.

The explanation, *"dia to en mesogeia sphisi tas poleis einai"*, is partly figurative. No one could argue that Astakos, Alyzeia or Palairos were physically inland cities; Xenophon is making an economic, not a physical observation. Apparently, no adequate commercial network existed in Akarnania (such as existed in Athens who survived for years when cut off from her fields during the Peloponnesian War) which was able to import enough grain to offset the loss of a year's harvest. The Akarnanians had a simple economy based on what the land could produce. This is a very important fact, for it implies that until the early fourth century, the economy of Akarnania was largely self-sufficient, there being no need for even a modest importation of goods basic for survival. This of course says nothing about some small scale trade in luxury items, but it does imply that the need for a substantial harbour mole such as exists near Pogonia had not yet arisen.

The poleis of this coast did not engage in large scale trade because the Akarnanian economy produced little of marketable value over and above that which was consumed at home. I have argued elsewhere that this picture changed during the middle decades of the fourth century and that Akarnania's economy experienced a boom in the latter half of the century[13]. This was certainly true for Palairos who developed a sufficient capability for small to moderate scale trade to allow her to negotiate a grain deal with Cyrene in the 320's to offset the effects of drought[14]. On this evidence, the mole was most likely constructed sometime between the 380's and the 330's, thereby being available for use when this grain deal was negotiated. It may be instructive to elaborate on the size of the grain shipment invovled here. The 10,000 *medimnoi* sold to Palairos (not an overly large amount when compared with some of the other purchases) would have filled more than 23 vessels the size of the Kyrenia ship and would have cost somewhere around 36,617 Akarnanian minted staters (about 835 pounds of silver bullion) at the normal price of five drachmas per *medimnos*. The possibility exists, therefore, that grain merchants working out of Palairos were intending to sell a portion of this cargo to buyers all over Akarnania. It is difficult to see how such a deal could have been conceived if this harbour mole had not already been in existence[15].

It is certainly impossible to make any definite statement concerning the nature of Palairos' trade contacts from the few sherds recovered from her harbour, yet the dominant presence of Corinthian examples is interesting. The possibility exists, of course, that all the examples come from two or three cargos, but the likelihood is greater that we have evidence of a general, long term importation of Corinthian wine and/or oil.

The total life span of the harbour near Pogonia is unknown, yet any harbour placed in such a way as to offer a cul-de-sac to silt or sand laden water is going to silt up eventually. The mud bank behind the harbour mole shows that this is exactly what did happen. But whether the city outlived the mole, or the mole the city, is impossible to tell without a full recovery of pottery from the mole itself[16].

EVIDENCE FOR LOCAL CHANGE IN SEA LEVEL

Unlike at Oiniadai or in Mytikas Bay, we possess in the mole near Pogonia a dated structure[17]; we know it was fully functional in the late fourth century. Still, two problems face any interpretation of the data provided by this mole. Even though we do not possess an *in situ* surface as we do in Mytikas Bay and at Leukas[18], we do have the recurring depths of 1.6-1.75 m throughout the eastern half of section one and the full extent of section two. If we assume the top paved level has been robbed away, the restored depth of the mole's surface might be as shallow as 0.75 m[19]. This value is clearly impossible when it is realized that the mole at Leukas (which was also functional during the fourth century) has an average depth more than a meter lower than this. Thus, an allowance for a robbed out paving course as thick as the one at Leukas does not seem reasonable[20]. Actually, the recurring depth of 1.6-1.75 m seems perfectly reasonable as the original level of this mole, although the restoration of a thin paved surface (about 0.25 m thick) would aso be acceptable. The resultant minimum depth of the surface could thus be about 1.35-1.5 m which compares favorably to the depths measured at the submerged dock in Mytikas Bay[21].

The next problem is to assign a reasonable height to this mole. I have measured the heights of many docks in the (largely) tideless Caribbean and Mediterranean and found that the heights vary from 0.5 m to 2.0 + m depending on the dock's exposure and the draft of the vessels the dock is designed to serve[22]. N. Flemming's conclusion that if there is over 1 m of water beside the quay, the quay itself will stand *at least* 1 m above sea level generally holds true and will be utilized in my calculations[23].

We concluded above that the minimum restored depth of the mole's paved surface would be approximately 1.35 m. The minimum original height it stood above the water in the fourth century would be 1.0 m. Thus, we arrive at a 2.35 m *minimum* value for rise in sea level since the late fourth century (1.35 + 1.0). Since the dock may have stood up to 2.0 m out of the water (though this is unlikely) and the original surface might never have been paved (giving us a 1.6 m average depth), the reasonable maximum value indicated is a rise of 3.6 m (1.6 + 2.0). The resultant average of these two values gives us 3.0 ± 0.6 m as the sea level change indicated by this mole.

NOTES

1. This paper stems from research conducted in Akarnania during the years 1979, 1980, and 1983. I express here my gratitude to the Greek Archaeological Service for granting the permission to conduct a survey along the western coast of Akarnania, and to the University of South Florida, the National Endowment for the Humanities, the American Council of learned Societies, the Archaeological Institute of America, the American School of Classical Studies at Athens, and the University of Pennsylvania for the financial support that has made this study possible. I also wish to express my thanks to C.G. Koehler and V.R. Grace who kindly helped with the analysis of the amphora fragments presented in this paper.

   Please note the following abbreviations which have been utilized in the text and notes.

   * Koehler, *CABTA* = C.G. Koehler, *Corinthian A and B Transport Amphoras*, Diss. (Princeton, 1978).
   * Murray, *CSWA* = W.M. Murray, *The Coastal Sites of Western Akarnania: A Topographical-Historical Survey*, Diss. (University of Pennsylvania, 1982).
   * *RE* = A. Pauly and E. Wissowa, eds., *Real Encyclopädie der classischen Altertumswissenschaft.*
   * Robinson, *Agora* V = H.S. Robinson, *Pottery of the Roman Period, Chronology*, Vol. V of *The Athenian Agora* (Princeton, 1959).

2. The evidence concerning this prosperity is discussed by the author in Murray, *CSWA*, 464-93. The most concise treatment of the city's history is provided by E.Kirsten's article "Palairos" in *RE* 18.2 (1943) 2455-56. Cf. also Murray, *CSWA*, p. 539 s.v. "Palairos."

3. Rhomaios, *Deltion* 4 (1918) 114, correctly placed Palairos' harbour here, but seems to know nothing of the submerged harbour mole. Since he did not describe the exact location of the remains he does report, I am not quite sure what he saw.

4. "Cleopatra Beach" is the commercial name of a complex of bungalos situated atop the bluff in the lower left of Fig. 2. The gravel beach below has been given this name as well.

5. For a description of these sherds, see Murray, *CSWA*, Appendix B, nos. 20-23.

6. See Murray, *CSWA*, p. 177 n. 13 and Appendix C, no. 6.

7. Force 5 (Beaufort Scale) is equivalent to 17-21 knots. For a discussion of the sea breeze effect on Akarnania's western coast, see Murray, *CSWA*, 404-14 and Fig. 48, p. 417.

8. My assessment of pottery fragments exposed to the moving action of waves might be questionable were it not for the almost complete lack of pottery in section one. The few sherds which were found in this section were never cemented to the bottom, while most of those recovered from section two had to be gently cracked free or pulled from the crevices of the stones they had fallen between. The section two sherds had obviously not moved for some time, while those from section one were of dubious origin.

9. Cf. Murray, *CSWA*, pp. 239-40.

10. It should be noted that an additional mole would be absolutely necessary only during the winter when the eastern wind frequencies rise considerably (see S. Ginis, *"Hai Anemologikai Synthēkai tou Ioniou Pelagous"*. Diss. (Athen, 1974) Table 6). It would be surprising to find the existence of such an extensive harbour here since Palairos is not generally known to have engaged in extensive trading activities. Any ships that citizens of Palairos possessed could easily have been put up for the winter in the excellent harbour at nearby Leukas.

11. As a general rule, I never removed a fragment from the mole if I had to damage it badly to free it from a concretion. And without exception, I returned all pieces to their find spots after they had been sketched and photographed.

12. Xen. *Hell.* 4.6.13.

13. Cf. Murray, *CSWA*, Appendix F, pp. 467-69 and 482-83.

14. See M.N. Tod, *A Selection of Greek Historical Inscriptions*, Vol. II (Oxford, 1948) no. 196 = *SEG* IX, 2. It is interesting that neighboring Leukas is also recorded on this document as an importer of grain from Cyrene.

15. It should be noted here that no other Akarnanian town appears on this document. For a breakdown of how these figures were computed, see Murray, *CSWA*, n. 39, p. 318.

16. The fragment of the oriental jar (no. 5 above), if indeed late, might suggest that the mole was still used in some capacity centuries after the abandonment of the city it was built to service. The latest reference to Palairos is found in Strabo (10.2.2) who mentions that the city was still inhabited at the time Nikopolis was founded in 30 B.C. After this date, however, what few inhabitants had lived there presumably moved to Nikopolis in search of work; cf. Murray, *CSWA*, p. 363.

17. For the harbour remains at Oiniadai and in Mytikas Bay (the harbour of ancient Alyzeia), see Murray, *CSWA*, 32-45 and 114-21.

18. For the harbour remains at Leukas, see Murray, *CSWA*, pp. 226-39.

19. The thickness of the apparent first course of the paved surface at Leukas is about 0.85 m. If we take the general average depth of the middle stretch of the mole under discussion (about 1.6 m) and add a course of 0.85 m thickness, the resulting depth is 0.75 m. Further research conducted in 1983 has suggested, however, that these "paving slabs" at Leukas are not truly used in this manner (i.e., to pave the entire surface), but rather, are facing blocks, utilized at the edge of the mole to present a straight face to the water. Their thickness, therefore, must not be added to the general level of the mole in order to compute the depth of the original surface. A full treatment of the mole at Leukas is currently in preparation.

20. *In situ* facing blocks (see previous note) on the Leukas mole indicate a -1.89± 0.3 m level for the fifth century B.C; see Murray,*CSWA*, p. 240.

21. See Murray, *CSWA*, p. 117, Fig. 17.

22. This agrees with Flemming's maximum and minimum 2.0 m and 0.2 m; cf. N.C. Flemming, *Special Papers of the Geological Society of America* 109 (1969) 8-9. But note that Flemming overlooks the importance of the size of the vessels being serviced.

23. See previous note. General exceptions to Flemming's rule are dinghy docks which can occur where the water is over a meter deep and still stand very low to the water. I have found that true dinghy docks average about 0.5 m in height. For this reason, such docks are generally constructed in very protected places and are thus not an issue here.