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Edited by
AVNER RABAN
University of Haifa

Center for Maritime Studies, University of Haifa, Israel
In collaboration with C.A.H.E.P.,
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WILLIAM M. MURRAY

The Ancient Harbour Mole at Leukas, Greece

INTRODUCTION

Colonized by the Corinthians in the second half of the 7th century B.C.E., Leukas became an important point on the coastal trading route between Greece, the shores of the Adriatic, Italy and ports further west. In this role, Leukas served for centuries as a regional centre of Corinthian influence in the Greek northwest. Because the city's importance was a function of its strategic position on a major trade route, the harbour at Leukas was an important element of the city. Despite this importance, every study of this harbour has been based on information gathered almost a century ago, long before snorkels, masks and fins were commercially available. Before a valid analysis of the harbour can be attempted, therefore, the current state of the ancient remains must be determined. To this end, two snorkel surveys were conducted in 1980 and 1983. They reveal a broad (10 metre-wide), submerged mole running some 600 metres from island to mainland at the south entrance to the Leukas straits. The placement and mass of its structure indicate its function as the main breakwater and loading dock for the southern side of Leukas' ancient harbour. Blocks still preserved in situ on the mole's surface suggest the sequence of construction and indicate that since its original construction, sea-level has changed relative to the mole +3.35 m ($\pm$ 0.85 m). Pottery found along the sides of the mole, as well as historical and meteorological considerations, indicate that the structure was built before 428 B.C.E. and continued in use for many centuries. Even so, the latest pottery found here (dating to the 4th-6th centuries C.E.) may come from ships that ran aground on the mole after rising sea-levels put it out of use. If the South Mole at Leukas originally dates to the 7th century, it ranks as one of the earliest large harbour installations from ancient Greece and antedates the famous mole of Polycrates by more than 50 years. If excavation eventually proves that it dates to the 6th or 5th centuries, it will still remain one of the most impressive harbour moles of ancient Greece and a tribute to the skill and sophistication of the harbour engineers who built it. We are now in a position to reconstruct more accurately the true nature of Leukas' ancient harbour.

THE HARBOUR AT LEUKAS

A narrow, shallow, 6 km.-long stretch of water separates the island of Leukas from the northwest shore of the Plagia Peninsula on Akarnania's western coast (see fig. 1). These shallows extend from the northern sand spit past both the modern and ancient sites of Leukas and end at a submerged bank running from island to mainland (Fig. 2). This is

Figure 1: General map of Akarnania, western Greece.

referred to here as the South Mole; on many maps and charts, this submerged bank is called the "Corinthian Mole."

The history of the Leukas Straits is closely tied to its topography (Murray, 1982). When the shallows here were navigable, a safe shortcut existed inside Leukas for coastal traders, and offered a lucrative site for the growth of a city with a two-fold economic base -- agriculture and mercantile trade. According to the geographer Strabo (10.2.8), who lived during the time of Augustus, the Corinthians perceived the value of this site during the tyranny of Kypselos (657-625 B.C.E.) and settled it along with two other nearby sites (Anaktorion and Ambrakia). The compiler of the 4th century periplus (Ps. Skylax 34) adds that the Corinthians were called in by an earlier Akarnanian community to settle internal strife, but in the end, expelled the Akarnanians and held the site for themselves. These same Corinthians, according to Strabo, were the first to cut through an isthmus joining the island of Leukas to the mainland, and by inference, were also first to construct a harbour in the sheltered water east of their settlement. Even though Strabo does not mention the construction of a harbour at Leukas, it would be difficult to explain the considerable labor invested on opening the shipping canal if a harbour for the adjacent city was not also part of the plan.

Although the precise details of the pre-existing settlement, the nature of the isthmus, the canal cut through it, and the exact date of the Corinthian foundation come mostly from late sources and are impossible to verify, the general tradition of a Corinthian colony here is an undisputable historical fact (Oberhummer 1887). The site was well chosen, and the city prospered well enough to send 3 ships to fight the Persians at Salamis in 480 B.C.E. and in the following year 800 hoplites (including men from Anaktorion) to Plataia (Hdt. 8.45.1; 9.28.31). Compared with contingents from other Greek states, these contributions were not large, but nevertheless represent a degree of prosperity and commitment unmatched elsewhere along this coast except for the nearby Corinthian colony of Ambrakia (which sent seven ships; Hdt. 8.45.1).

Subsequent history shows that Leukas' prosperity continued to grow and that the city served for centuries as an important base for Corinthian influence in the Greek northwest (Rondoiannis 1980). Of all the site's advantages, the existence of a large protected harbour contributed most to its prosperity. The importance of Leukas lay mainly in its strategic position on the coastal route between the Corinthian and Ambracian Gulfs, and more than that, in its control of the Leukas straits. When this canal was navigable, a route existed inside the island of Leukas that was safer than the outer passage along the windward shores of the island's west coast (Murray 1982). Without its harbour and navigable canal to foster commercial development, it is likely that Leukas would have remained as it was before the Corinthians arrived -- a small insignificant coastal community.

It would seem, therefore, that as early as the archaic period, the harbour at Leukas was a critical component of an important city on Greece's western coast; and we have every reason to suspect that it

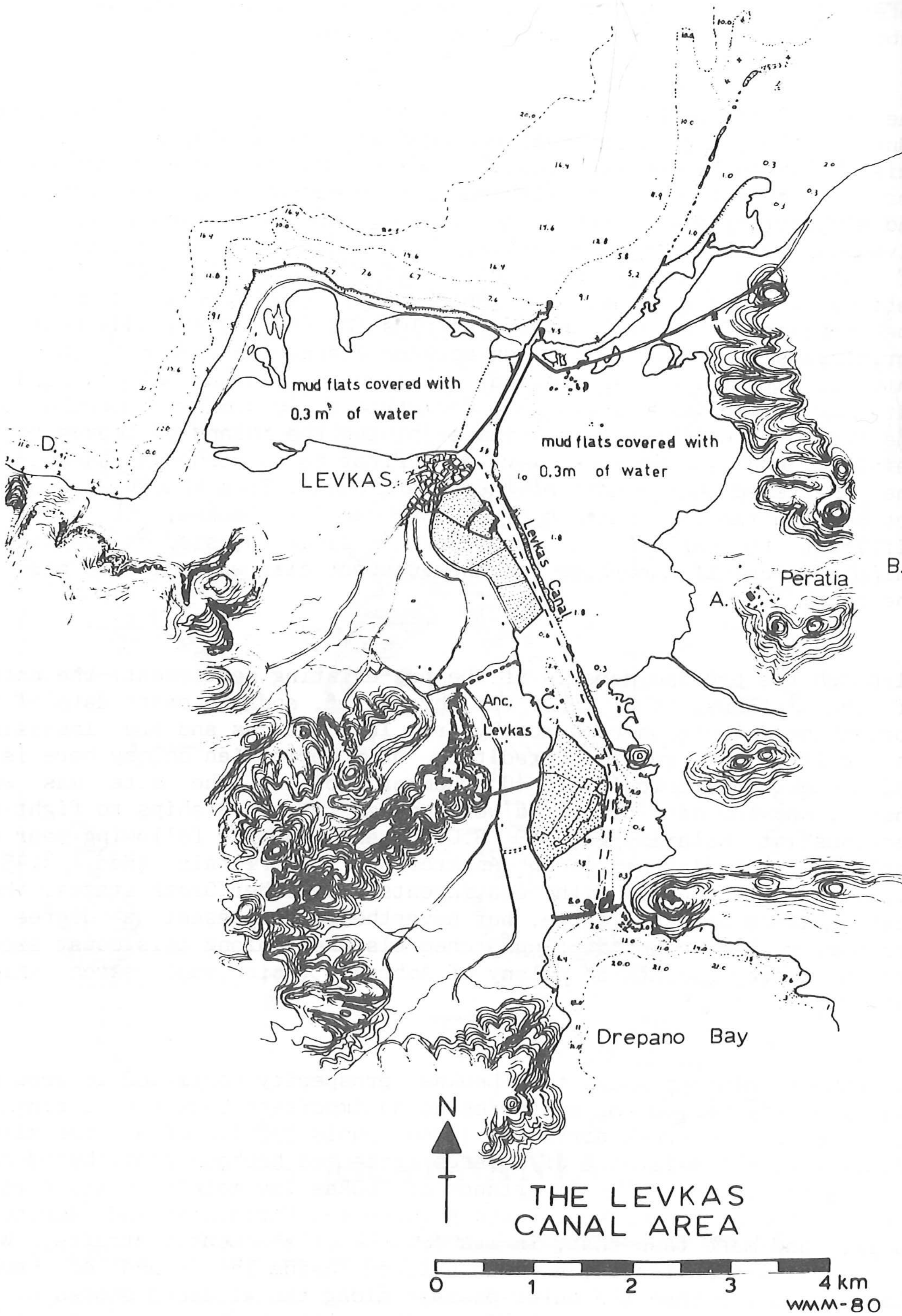

Figure 2: The Leukas Straits.

dates to the original Corinthian foundation of the 7th century B.C.E., or to some time soon thereafter. The South Mole, furthermore, (or a smaller one now covered by it) must have been a feature of this early harbour. There is a simple reason for this. From October to April, the frequency of S and SE winds is significant (Ginis 1974). Without some protective breakwater, any harbour in the straits south of the isthmus would be dangerously exposed during the winter months and potentially at risk for more than half the year. If one assumes that the Corinthians created a harbour when they cut the shipping canal, prevailing wind conditions dictate that a breakwater must have been constructed south of the city as part of their plan. In doing precisely this, we will see that they turned the southern third of the present-day straits into a protected anchorage -- a huge harbour by ancient Greek standards.

MODERN RESEARCH

The "official" rediscovery of this harbour occurred in the 19th century when the British Navy began systematically to survey this coast of Greece. The existence of a submerged bank running from island to mainland must have been known to any who used Port Dhrepano at the south end of the straits, yet it was not until the early 19th century that the mole first appeared on a chart (Smyth 1819?) A half-century later, the mole is mentioned by Captain Mansell who surveyed the straits in 1864 (Mansell 1864), and accordingly, is mentioned in the first edition of the Mediterranean Pilot (Great Britain 1880). A few years later the authoritative German scholar Eugen Oberhummer searched for this mole but wrote that he could not verify its existence (Oberhummer 1887). By 1904, however, the existence of a submerged mole at the south entrance to the Leukas straits was a generally accepted fact. This was largely due to the observations made when the modern canal was first dredged through the shallows here in 1902 (cf. the observations of Sakellaropoulos in Negris 1904; Partsch 1907). The opportunity to examine the lagoon silts to a depth of 5 metres sparked interest in the canal area and in succeeding years, scholars debated the implications of what was (or was not) found. The so-called "Corinthian Mole" at the south entrance to the modern canal occupied a central position in this debate.

A Greek geologist named Phokion Negris was among the first to explore the implications of the submerged mole, yet his observations were limited by having been made from a boat without the aid of any device to look under the water (Negris 1904). He therefore reported the depth of the mole as a general 2.5 m but went no further than to suggest a rise in sea-level of at least 3.5 m since its original date of construction (which he placed around 600 B.C.E.) One year later, a German geologist named Walter von Marees carried out a full geological survey of the canal area for Wilhelm Dörpfeld (Marees 1907). He found that the mole did not possess an even surface and reasoned that its blocks had been knocked apart by the waves; he concluded, therefore, that the mole provided ambiguous evidence for any precise change in sea-level.

Marees added a few more details to our picture of the mole (e.g., that its entrance width was 80 metres -- it is, in fact more like 60), but he was not really interested in a comprehensive study of it. The main interest it held for scholars of this period was as an indicator of ancient sea-level. These were the days of the so-called "Ithaka-Frage," that is, whether modern "Ithaki" or "Lefkada" should be identified with Homer's Ithaca, and the mole was examined mainly to provide information concerning the nature of Leukas as an island in antiquity. Thus, no in-depth account of the mole ever appeared and no concrete evidence was ever produced for dating the structure other than its obvious association with the nearby site of ancient Leukas. Indeed, Lehmann-Hartleben, whose discussion of the harbour is the most extensive one in print, concluded from the same evidence (provided by Partsch, Negris and v. Marees) that the South Mole was constructed primarily as a silt barrier in the third century B.C.E. (Lehmann-Hartleben 1923). What, therefore, is one to believe concerning this important harbour on the coastal route between Greece and Italy? Because the true nature of the ancient remains had never been adequately determined, meaningful conclusions were impossible. This gave rise to simple speculation concerning the harbour's period of use, its appearance and the original reasons for the construction of the South Mole.

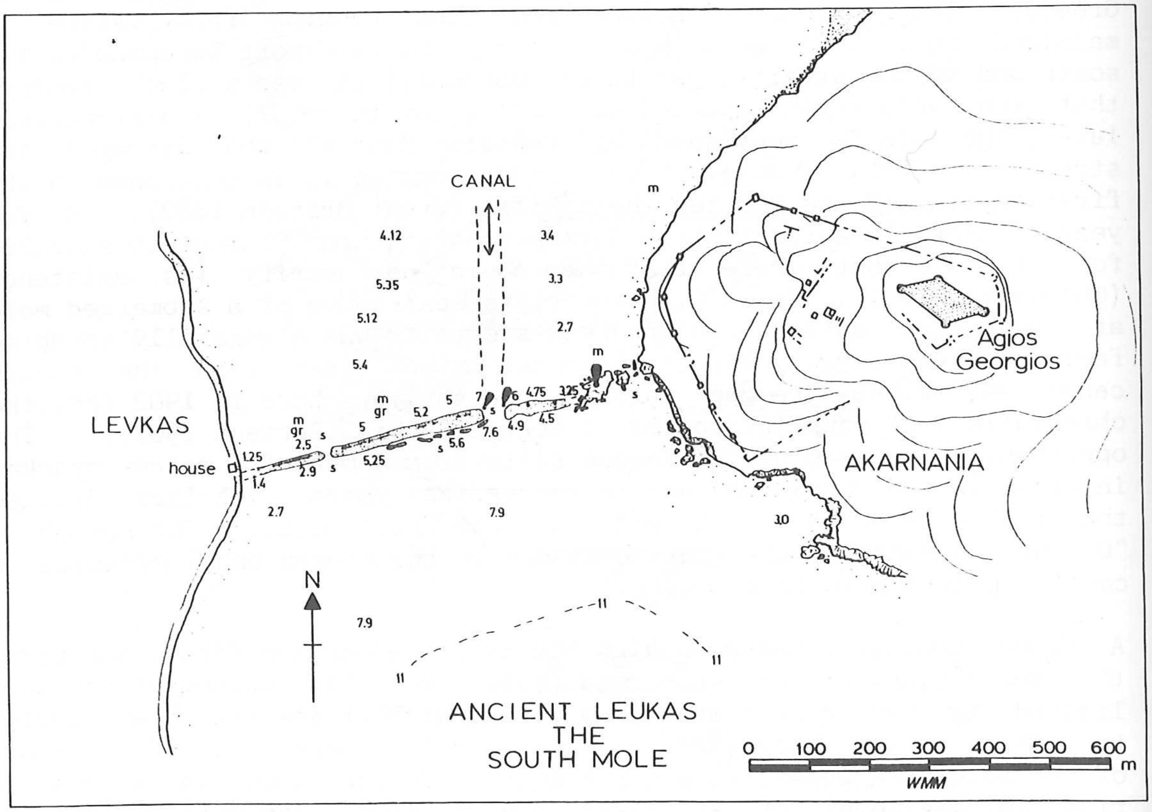

Figure 3: Southern end of the Leukas Straits.

THE SURVEYS OF 1980 AND 1983

In the summer of 1980 a survey of the South Mole was conducted as part of a wider study of western Akarnania (Murray 1982). The principal aim was to determine the extent of the ancient remains. I found them to be considerable, stretching from the small islet called Volios near the Akarnanian shore to a small pink house, opposite, on Leukas (Pl.1, Fig. 3). The ancient mole is composed of two sections, the eastern one being the shorter (138 metres from its western end to the islet), the western one the longer (401 metres from its eastern end to the shore), with a gap of approximately 60 metres in between. Though the original surface is largely gone, numerous blocks still remain in situ. These were first thought to be paving slabs from the mole's original surface (Plate 2). A revised opinion of these blocks is discussed at length below. After some 17 hours of investigation, it appeared that too much remained over too wide an area to be recorded accurately without help. Therefore, a methodology was developed for an intensive snorkel survey and the work was completed by a team of divers in 1983. The observations following result from about 250 man-hours in the water.

The team which conducted this survey was composed of Suzanne Murray, John Maseman, Erich Priester, Adam Cohen, and Charles Hedrick; Buddy and Marilyn Baker helped for a few days on the western arm. The following report is the direct result of their aid, and endurance. More work remains to be done on the South Mole, but it would require SCUBA equipment, dive boats and a considerable support team.

THE SOUTH MOLE

The mole is oriented along a more or less straight line running some 600 metres E to W. Measuring such a structure is theoretically simple, but as with all in-water surveys, practical measurement is more difficult to achieve. In order to avoid wasting a lot of time while in the water, a strict procedure was worked out on land and then applied first on the simpler eastern arm. By the time the western arm was reached, our routine was well established. Efficiency was necessary here because our base camp was located hundreds of metres from the mole on the Akarnanian shore and the commute time increased as we proceeded westward.

Our method involved first laying a continuous baseline along the surface of each arm. For this purpose, a bright yellow, light-weight line was laid along the top of the mole and weighted down with rocks to diminish the inevitable dislocations caused by fishermen's hooks. Buoys placed at points along these baselines allowed their positions to be recorded with a transit from the shore and plotted on a 1:4000 survey made by the British Navy in 1904 (Aylmer 1904). This provided us with the backbone upon which all additional measurements could be placed.

Our next task -- the measurement of each arm's length -- was made quite easy by the existence of the continuous baseline. Starting from the eastern shore, we laid down a 50 metre line marked in metre intervals. Unfortunately the line used floated, so that it had to be weighted with stones. To ensure that the line did not stretch, we checked it repeatedly with a 50 metre tape (made of fibreglass). Every 5 metres, long nails were driven into the mole's surface to which bright yellow tags had been affixed, clearly marked with the distance from shore (5,

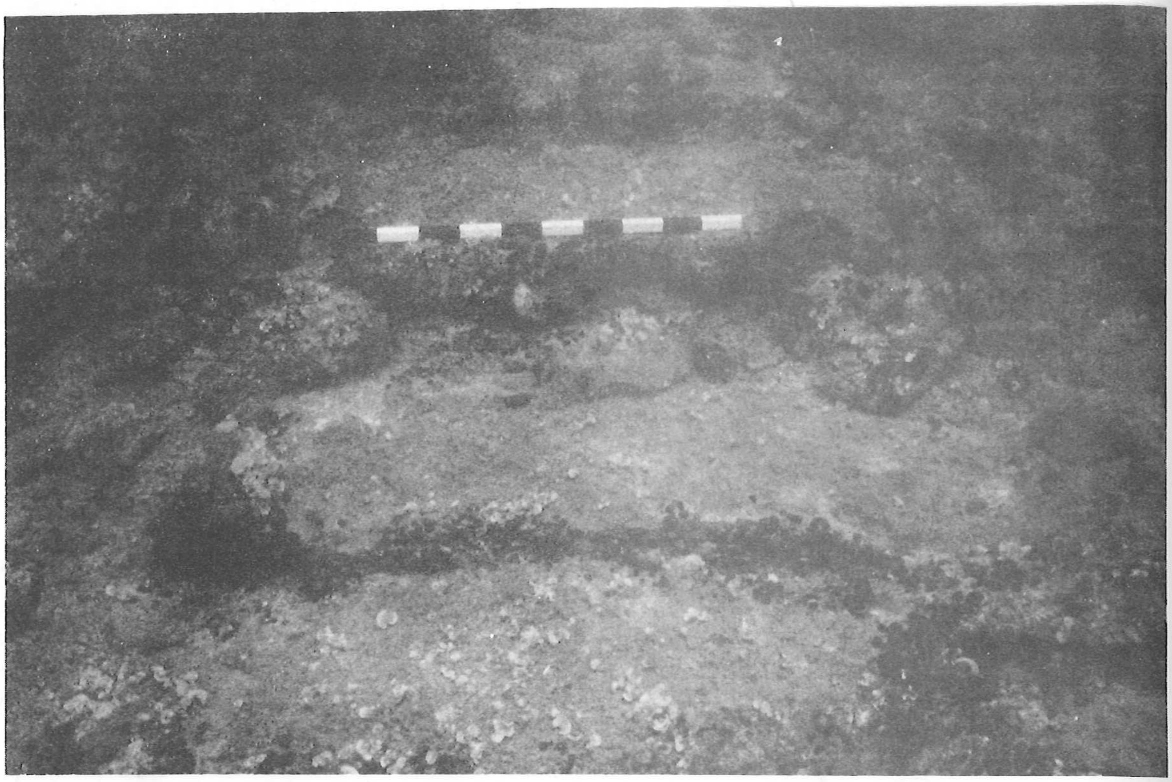

Plate 1: Area of South Mole from the East

Plate 2: <u>In situ</u> blocks of South Mole, western arm.

10, 15, 20 etc.). These immovable points allowed us to orient ourselves quickly wherever we were on the mole and were necessary during periods of low visibility. Ironically, a modern harbour mole was under construction at nearby Lygia on Leukas, and when the tidal currents flowed northward, the area of the South Mole was inundated with silt. On a few days, we were forced to stop working because of low visibility. Fortunately for us, an ancient amphora was recovered near the site of the new mole; work there was temporarily suspended and the water cleared up markedly.

When the visibility allowed, a fixed number of width and depth measurements was taken at each of the 5 metre intervals designated by a distance marker. Our aim was to define the overall shape of the mole, to record a rough depth profile of the submerged structure and to measure the relative positions and depths of all worked or in situ blocks preserved on its surface.

Furthermore, most of our depth measurements were taken early in the day when the sea surface was flattest. Once these measurements were completed on a segment, the 50 metre line was repositioned along the baseline toward the west and the process of measurement was repeated. Since we also wanted to date the mole's period of use, we kept an eye out for fragments of discarded transport amphoras. Broken during the process of transfer from ship to shore, and kicked into the sea with a curse, these discarded fragments provided priceless information on the life-span of the harbour mole. Diagnostic fragments were noted on the survey before removal from the water and after being drawn and photographed were returned to the places where they were found. The mass of information resulting from this routine enabled a fairly clear picture of the mole to emerge. The information related to its original appearance, the methods by which it was constructed (and later dismantled) and its long period of use.

The Western Arm. Clearly, the most important information comes from the western arm of the mole where long lines of worked blocks remain seemingly in situ on the north (Pl. 2) and a "distinct face" (see below) is discernable along the south side of the mole's surface. When the positions of the individual in situ blocks and sections of distinct face are plotted in relation to the baseline, it is clear that both features run more or less in two straight lines 10 metres apart and form the approximate north and south edges of the mole's original surface (Fig. 4). It is clear that on its north side, the mole presented a straight face to the water. On the south, the evidence is less clear and requires some interpretation.

Here, a curious scatter of rubble and worked blocks between the 200 metres mark and the end of the western arm provides telling evidence. Too deep to be a wave-catcher or prokymia of the type seen at Caesarea Maritima (Oleson 1984), this spill of rubble looks more like the refuse from those who quarried away the surface of the mole in late antiquity. The presence of numerous worked blocks in the spill indicates that this side of the mole also originally exhibited a perpendicular face, either descending into the water as on the north, or set back from the water as some sort of sea wall. At some time, however, this side was systematically quarried for its rectangular blocks, which were all wrenched from their original positions. This would explain two features of the south side: (1) the distinct drop at the edge of the mole's surface -- what I call a well-defined or distinct face, and (2) the current haphazard positions of numerous worked blocks along the south flank of the mole and in rock spills to the south, separate from the mole's main mass. Similar rock spills are not apparent on the eastern arm because the area is more silted-in and the region adjacent to the mole is covered with thick grass. But worked blocks scattered haphazardly along its margins hint that the eastern arm originally looked like its partner to the west. The following reconstruction of events is likely:

<u>The Sequence of Destruction and Construction.</u> At some point after rising sea-levels put the mole out of use, masons with hammers and chisels removed the central, paved surface of the platform on both arms of the mole. Evidence for this surface can still be seen in a few large paving slabs dumped well to the north of the worked-block line at the 298 metre mark on the western arm; another slab is located at the 237 metre mark. Relatively speaking, these slabs are huge, measuring roughly 2.0 x 1.6 metres, and it is hard to imagine what purpose they might have served other than as paving slabs. By chiselling them free, the masons were then able to get at the facing blocks along both margins. The numerous blocks now scattered along the south side of the mole imply that they were removed in this direction, i.e., toward the south, at least on the western arm. Boats or barges anchored along this side might then have winched them into the water for transport to shore. Easier to move once in the water, but less easy to control, some blocks may have slipped from their ropes and now lie where they fell to the bottom along with the rubble chipped from the mole's interior. At a later time, sand filled the cavity between sections of the spill and the mole's south edge and now gives the impression, in some places, of a structure separate and distinct from the mole's south face. If I am correct, the cavity exists because the boats' tackle swung the blocks away from the south face. More than likely, if the sand were dredged away, a continuous rock spill would be visible, thinning as it continued to the south.

As for the mole's north face, numerous blocks are preserved on the western arm in their original positions (cf. Table 1 and Fig. 4); two courses are visible in the 148-239 metre section and it is even possible that a third can be unravelled from the measurements recorded at the 51-59 metre section. Here, the depth is on average 1.4 m, as opposed to 2.1 m for the upper course at the 148-239 metre section. Are these blocks from a third course, or was the original surface of the mole simply higher out of the sea near the shore? Excavation of the mole's face here might allow us to say for certain. It is curious, however, that these blocks near the shore and at a higher level were not robbed.

One final observation should be presented before turning to the mole's sequence of construction. A significant mound of rubble is deposited north of the worked block line on sections of the western arm. If this

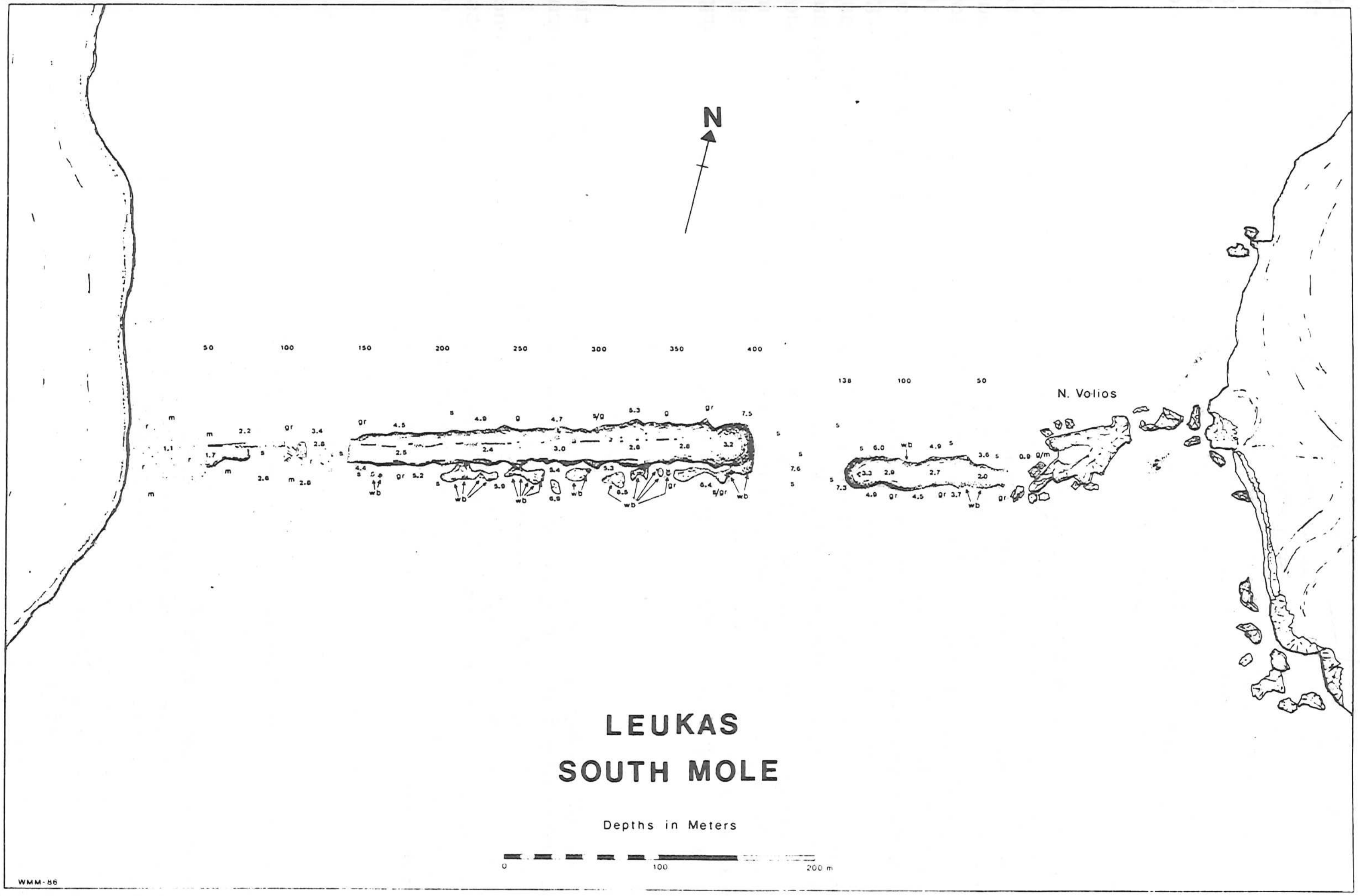

Figure 4: The South Mole at Leukas.

line is correctly interpreted as the original northern edge of the mole's surface, the considerable mound of rubble currently located to the north of these blocks must be explained. That the general depths to the north should be less than those to the south is not surprising. The mole hinders the southward flow of silt, washed from the nearby mountainsides, which has accumulated over time along the mole's north side, but this does not explain the mass of rubble which continues far north of the worked block line. Perhaps those who robbed the south face were responsible for this debris. If barges aiding in the mole's destruction were anchored to the south (as is implied by the rock spill), one might expect most of the rubble taken from the surface and interior of the mole to be dumped off its north margin.

Working backward from the destruction process, two distinct steps in construction can be noted. First, a substructure of rubble composed of rock and earth was dumped into the water at the southern entrance to the straits -- a simple technique, still in use today throughout Greece. A 60 metre gap was left between the arms of the mole to allow passage into and out of the harbour. Once a flat platform some 10 metres wide was achieved at the surface, the north and south margins of the mole were cut back or notched just below sea-level to receive large rectangular blocks, laid end-on to the force of the waves in at least two courses. This technique, well known in the eastern Mediterranean, added strength to the platform and gave the dock a face that descended straight into the water allowing ships of appropriate draught to tie up close alongside. The interior surface of the mole was built up to the upper level of the blocks along the margins and then paved with large slabs.

Evidence for Change in Sea Level. The following table presents the depths recorded from *in situ* worked blocks located on the western arm. An analysis of these data follows Table 1. The depths are listed in sequence from west to east. Thus, the first value given in a sequence of numbers is the western-most of a series of depth measurements. Unless otherwise noted, all worked blocks are located to the north of the baseline.

TABLE 1. Worked blocks locations and depths.

Abbreviations used in Table 1:

D from L	= distance in metres along baseline from Leukas
D to BL	= distance in metres from worked blocks to baseline
wb	= worked block
wbs	= worked blocks
i.s.	= *in situ*
n.i.s.	= not *in situ*
a of t	= measurement taken from the centre point of the block's axis of tilt
(S)	= block located to the south of the baseline
2c	= second course
1c	= first course

D from L	D to BL	Depths
51-60	at BL	1.4, 1.3, 1.37, 1.37, 1.37, 1.35 1.4, 1.4, 1.37, 1.4, 1.45, 1.4; blocks i.s.
65-66	1.7	1.6, 1.67, (a of t); blocks i.s.
68		1.7 plus two more wbs n.i.s.
68-88		a loose line of wbs, greatly disturbed
88	at BL	1.95; i.s.
93-101		disturbed line of wbs
110	at BL	2.35
111	at BL	2.35
148-51	1.0	2c: 1.78*, 1.7 (S), 1.75@, 1.83, 1.73, 1.7 1c: 2.4*, 2.32@; i.s., but slightly disturbed
		* and @ indicate blocks set on top one another
151	1.0	1c: 2.45 i.s.
153-58	1.0	1c: 2.55, 2.65, 2.7, 2.52, 2.5; blocks i.s.
155-58	1.0	2c: 1.82, 1.85 (a of t), 1.75 (a of t), 1.93 (a of t), 2.0; blocks i.s.
160	1.0	1.87 i.s.? wbs on both sides; wbs to south, n.i.s
162-63	at BL	1c: 2.3, 2.25, 2.4; blocks i.s
163-67	at BL	2c: 1.85, 1.85, 1.77, 1.77; blocks i.s.
167	at BL	1c: 2.13; i.s.
169-71	at BL	2c: 2.3, 2.12, 2.3; blocks i.s.
171	at BL	1c: 2.23, i.s.?
180-82	c 1.5	2.7, 2.67, 2.7, 2.65 (a of t); blocks i.s.
182-91		disturbed surface
187		2.8; i.s.?
188		2.6; i.s.?
191-99	at BL	2c: 2.17, 2.2, 2.17, 2.2, 2.2, 2.12, 2.15, 2.25, 1.9; blocks i.s.
201	1.9	1c: 2.55, 2.55, 2.5, 2.55; blocks i.s.
201-209		disturbed line of wbs; general depth between 2.9 and 3.0
210	2.0	1c: 2.75; i.s.
210-14	2.2-2.3	2c: 2.3* (a of t), 2.5 (a of t), 2.57, 2.57, 2.5 (a of t), 2.6
		* this block definitely from the second course, i.s.
214-26		jumble of wbs located north of the BL
227-30	2.1-2.3	2c: 2.45 (a of t), 2.35, 2.37, 2.35; blocks i.s.
230-33	2.3	1c: 2.9, 2.95, 2.8; blocks i.s.
233-39	2.3-2.1	2c? 2.1*, 2.3, 2.4 (a of t), 2.4, 2.3 (a of t) 2.15, 2.15, 2.2; blocks i.s.
		* this block displaced on its side, but otherwise i.s.
241-42	2.4	2.7, 2.55; blocks n.i.s.?

243-45	3.0	six wbs, n.i.s.
250	4.5	a few wbs, n.i.s.
251	just south of BL	2.35; i.s.?
265-67	3.8	2.45 (nis), 2.7 (a of t), 2.65 (a of t), 2.5 (a of t); three wbs in a row, i.s.?
271	4.71	2.8; one wb under a jumble of disturbed blocks (i.s.?)
275	5.0	2.8 (i.s.?); a jumble of wbs surround it
276	c 10.0	a small, round, flat worked stone
282-87	2.8	a jumble of wbs
287-90	2.8	2.5, 2.35, 2.5, 2.45; four wbs in a line (i.s.?)
290	3.6	one wb, n.i.s.
290-302	4.0	2.75, 2.8, 2.73, 2.65, 2.65, 2.6 (a of t), 2.65 2.5, 2.65, 2.7, 2.65; blocks slightly tilted, but i.s.
306	7.7	2.95; one wb, i.s.?
309	4.1	2.55, 2.7, 2.7; other wbs jumbled nearby
314		two large wbs, n.i.s.?
316	4.2	2.45 (a of t), 2.45; i.s.?
	5.8	2.6 (a of t); i.s.?
327	4.2	2.6, 2.5, 2.4 (n.i.s.); two wbs i.s.? jumbled wbs to the north
332	4.5	2.5, 2.6, 2.5; i.s.?
	8.0	2.55 (a of t), 2.2; n.i.s.?
338-46	4.8-5.1	2.45, 2.4, 2.55, 2.6, 2.55, 2.45; more than six wbs; those recorded here are i.s.
339	8.5	2.5; one large wb, n.i.s.
349-51	4.9	2.6, 2.7, 2.7; three wbs, i.s., but askew
355	6.0	2.8; one wb, i.s.?
373	5.9	2.75; four wbs, i.s.?
374	c. 4.0 m (S)	one wb, n.i.s.?

Analysis of Table 1. The mass of depths presented in the above table can be separated into three different levels. Because in situ blocks remain in two superimposed courses at the 148 metre mark, we can be fairly certain that the varying depths correspond to different courses. Generally speaking, the depth of the lowest (or first) course ranges between 2.3 and 3.0 m, while that of the second course is between 1.7 and 2.5 m. In the section where the two courses overlie one another (148-51 metres), the depths are approximately 2.4 and 1.8 m. Elsewhere, where two different levels of blocks can be discerned in the same area, the average depth of the lower course is about 2.5 m, while that of the upper one is approximately 2.1 m. The last value can be interpreted as the approximate level of the mole's original surface, unless there was a third course as indicated by the 1.4 m depths close to the Leukas shore (in the 51-60 metre section).

It is unlikely that the surface of such a dock intended to service medium to small-sized "coasters" stood at less than 1.0 m, or more than 2.0 m above the water. Using the values discussed above for the original surface of the mole, the maximum and minimum change in sea level can be computed as 2.5 m and 4.2 m respectively. The minimum value stems from the depth of the topmost course -- 1.4 m -- plus 1.0 m, plus 0.1 m (for variations in depth values caused by tidal changes). The maximum value stems from the depth of the second course -- 2.1 m -- plus 2.0 m, plus 0.1 m for tide error. The average of these two values gives us the change in sea-level indicated by this mole as +3.35 m ($\pm$ 0.85 m).

The Date of Construction and Period of Use. The end result of the construction process was a solid structure that served the harbour area a long time. If we judge from pottery found alongside the mole (to be discussed in a separate article), the harbour at Leukas was in use for about a millennium, from the 5th-4th centuries B.C.E. to the 4th-6th centuries C.E. (Murray 1982). This evidence, however, must be used with caution for it applies primarily to the harbour and not necessarily to the South Mole. Since the mole is clearly a man-made structure, no one can doubt that pottery found on the mole's surface provides us with a *terminus ante quem* for its date of construction and consequent use. And since the earliest evidence would have been covered over by later deposits, we might also expect the mole to antedate the earliest surface pottery currently visible. Only excavation of the deposits along the mole's surface and sides, therefore, can provide conclusive evidence for the mole's original date of construction. We can assert on this evidence, however, that the mole was built and in use at least as early as the fourth century B.C.E.

Historical considerations lead to the conclusion that the South Mole was constructed even earlier than the surface pottery indicates. An examination of the hill adjacent to the mole's eastern end (cf. Fig. 3) reveals the poorly preserved remains of a fortified settlement (Murray 1982). Today few of the blocks from the settlement's fortification wall remain *in situ*, but its plan was fortunately recorded by Dörpfeld who carried out excavations here in the early 1900's (Dörpfeld 1927). Considering the position of this town adjacent to the South Mole, it was probably fortified by the Leukadians to protect the mainland side of the mole from the Akarnanian descendants of those driven out when Leukas was colonized in the 7th century. There can be no other reason for this town's existence. Indeed, such an interpretation fits perfectly what we know of a town called Nerikos, first mentioned by Thucydides in 428 B.C.E. (Thuc. 3.7.4; Murray 1982). If correct, the placement of Nerikos proves the existence of the South Mole during the Peloponnesian War. It would also support what the prevailing wind conditions and the early prosperity of Leukas have already suggested concerning the harbour here, i.e., that the South Mole was probably built at the same time as (or soon after) the shipping canal was cut through the isthmus. On the evidence of this town, therefore, it appears that the mole was constructed by the last third of the 5th century at the very latest.

As for the date of the mole's abandonment, pottery evidence is less informative. The harbour adjacent to the mole was clearly in use for more than a millennium, but the mole is a different matter. It would seem inconceivable that this structure could have remained in service for nine or ten centuries without needing major repairs. And yet, our survey turned up no clear evidence for such repairs. One might have suspected that the third course at the 50-59 metre section represents some sort of repair, or perhaps even the raising of the mole's surface to offset rising sea-levels. Yet this course is composed of blocks made of similar stone and cut to similar sizes as those found elsewhere in the first two courses. Without more evidence, it must be concluded that if there were repairs, either they were not extensive, were robbed out themselves, or were executed in a manner similar to the original method of construction. Stylistically, what remains of the mole today appears to be from one construction phase. It is this fact, above all else, that leads to the conclusion that the mole must have been abandoned by the date of the latest pottery.

When rising sea-levels put the mole out of use as a dock, it increasingly became a hazard to navigation. As eventually happened with Herod's great mole at Caesarea Maritima, the South Mole began to act more as a reef and less as a breakwater. Some of the latest pottery must have come from unfortunate ships driven onto the mole and holed. This would help to explain the incredible span of time indicated by the pottery found along the sides of the South Mole. It is thus impossible to determine from pottery evidence alone the precise date when the mole itself was finally abandoned. We can be fairly confident, however, that by the date of the latest pottery found here (4th-6th centuries C.E.), the surface of the South Mole was close to the water or just awash.

CONCLUSION

With a total length of some 600 metres, and a surface width of 10 metres, the South Mole at Leukas ranks among the most extensive harbour installations of ancient Greece. It compares favourably with the archaic moles at Delos (280 m long, 4-5 m wide, in 2-3 m of water), Eretria (600-700 m long with 20 m of water at its end), Eleusis on Thera (south mole 360 m long; north mole 110 m long). Only the south mole at Samos (370 m long, but reportedly in 40-60 fathoms of water at its end = 73-110 m!) and the mole at Histiaia (c 900 m long) are demonstrably more massive (Lehmann-Hartleben 1923). If dated originally to the period of Corinthian colonization in the 7th century, the South Mole at Leukas would rank, therefore, as one of the earliest and largest examples of harbour works in Greece, antedating the famous mole of Polycrates at Samos (cf. Hdt. 3.60.3) by more than half a century. Even if future excavation reveals the mole to be younger, the South Mole at Leukas will remain an impressive example of Greek harbour engineering which withstood the sea for centuries before rising sea-levels put it out of use. The results of the 1983 survey provide new information concerning this harbour which will enable a more accurate assessment of its role in the history of an important Corinthian colony.

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