

EXCAVATIONS AT PORTO CHELI AND VICINITY, PRELIMINARY REPORT, I: HALIEIS, 1962-1968

(PLATES 80-92)

THE southern end of the Argolic peninsula (Fig. 1) is cut off from Epidauria and Troizenia to the north by a range of mountains running east-west. In antiquity the chief town was Hermione and the area may be referred to as the Hermionid. The site of the ancient city of Halieis, in low, rolling country to the west, escaped the fate of its better known neighbor, which now lies under a small town of the same name, since the modern village of Porto Cheli grew up on the opposite side of its spacious harbor. The city site has been visited by various travellers over the past two centuries. In addition to brief published reports, the chart made by the British Admiralty (No. 1502, "Port Kheli"), as a result of the visit of H.M.S. Beacon to the harbor of Porto Cheli in 1838, deserves mention as it gives some indication of the condition of the city walls at that time. Unpublished notes were made by A. Frickenhaus and W. Müller in 1909, W. Wrede in 1926, and by the writer and his wife in 1950 and thereafter on a number of visits, aided since 1954 by copies of the notes of our German precursors, which we owe to Wrede's courtesy. Excavation, other than clandestine, was confined to some brief tests in 1909 for the Archaeological Society of Athens by Alexander Philadelphus (who kindly entrusted his notebook to us in 1954) and to salvage work on a number of graves in the necropolis of the ancient town in 1958 and 1959, under the supervision of the late Nicholas Verdelis, then Ephor of Antiquities for the Argolid-Korinthia.¹

The city site itself and the remains in the waters of the harbor remained untouched until September, 1959, when the University of Pennsylvania was invited by Dr. Verdelis to collaborate in a survey of the walls of the city.² Charles K. Williams,

¹ Alexandros Philadelphus, *Πρακτικά*, 1909, p. 182. A. Frickenhaus and W. Müller, *Ath. Mitt.*, XXXVI, 1911, p. 38. For other literature on Halieis prior to excavation, see Bölte in *R.E.*, s.v. Halieis, cols. 2246 ff.

² Work at Porto Cheli has been conducted for the American School of Classical Studies in Athens, under the directorship of Professor Henry S. Robinson, by the Department of Classical Studies and the University Museum of the University of Pennsylvania and by the Department of Classics of Indiana University. Supervision, guidance, and assistance have come from the Ephorate of Antiquities for the Argolid-Korinthia, under the lamented Doctors Nicholas Verdelis and Seraphim Charitonides and currently Mrs. E. P. Protonotariou-Deilaki, and from the directorate of the Archaeological Service of the Kingdom of Greece under the late Dr. Ioannis Papademetriou, Dr. Ioannis Kondis, and the Inspector General, Professor Spyridon Marinatos. To all named we are deeply indebted and grateful, as also to Mr. Ioannis Nikolopoulos and Mr. M. Frangopoulos of the topographic department of the ministry of Public Works for their help in obtaining aerial

II (presently Field Director of the excavations of the American School at Ancient Corinth) joined Dr. Verdelis and a plan of the walls was made. Pressure of other commitments prevented Dr. Verdelis from taking an active part in the study of the area thereafter, though his continued interest and advice were much appreciated. In the summer of 1962 the University of Pennsylvania, on behalf of the American School of Classical Studies, carried out test excavations at several points within the city walls, with Professor John Young of the Johns Hopkins University serving as Field Director. As a consequence of these tests land was purchased on the ancient acropolis and on a lower terrace near by where excavations continued in 1965 and 1966 under the direction of Mr. Williams. Excavation in the upper sector of the city was substantially complete in 1966. In the two following seasons, 1967 and 1968, pending expropriation of land within the city walls, work was largely confined to exploration and excavation in the shallow waters of the harbor off of the city site, and at the cave in the headland known as Franchthi, across from the village of Koilada. Brief examination was also made of the remains of a tile kiln on the shore of a small bay known as Lorenzo (1967) and of a field adjacent to the city wall, at the request of the Ephor of Antiquities for the Argolid-Korinthia, Mrs. E. Protonotariou-Deilaki (1968).

Since 1967 Indiana University has been jointly responsible with the University of Pennsylvania for the excavations and research in this area, and excavation on land in the season 1967 and 1968 has been under the direction of Dr. Thomas W. Jacobsen of Indiana University. Excavation at the Franchthi Cave has continued in 1969 under

photographs. Financial support has come from our universities, from generous friends, and in 1967 from the National Endowment for the Humanities. In 1968 the Ford Foundation program for archaeological trainees enabled seven students from the two universities to participate. We are happy to thank the Derbyshire Machine and Tool Company of Philadelphia for the use of dredging equipment and E. I. du Pont de Nemours and Company for supplying us with "Cronaflex" drafting film for drawing and recording in the water. We owe a special debt to the Gorman-Rupp Company of Mansfield, Ohio, for making available a high pressure pumping unit for use in underwater excavation, and to the Esso Pappas Industrial Company of Athens for making it possible to use our machinery to full efficiency.

Excavation supervisors at Porto Cheli, in addition to the directors, have included Dr. Michael Cheilik, Susan Broughton Hussein, Dr. James A. Dengage, Sarah C. Dublin, Phyllis Pollak, and Dr. Peter Smith. Records have been chiefly under the supervision of Miss Dublin with contributing efforts, notably from Kathryn Jacobsen, Miss Pollak, Joanna Fink McClelland, Mary Pope Johns Martin, Marion Symington, Christina Moll Dengage and Karen D. Vitelli, of whom the last two also made many drawings. Marian Holland McAllister shared with and has now succeeded Charles Williams in the duties of staff architect. Photography has been done by various members of the staff, and in 1967 by James Dirksen and in 1968 by Jay Smith. Dr. Robert Giegengack of the Department of Geology of the University of Pennsylvania has given us valuable advice. In 1962 and 1965 Demetrios Papaioannou was foreman. Conservation has been handled by Anastasios Papaioannou in 1962, 1965, and 1966, and by Nikolaos Didaskalou in 1967 and 1968. The writer has represented the University of Pennsylvania from the project's inception. Other members of the project are mentioned in connection with their particular contributions.

his direction, and he contributes the second part of this preliminary report, which will be devoted to the Franchthi Cave (below, pp. 343-381). The first part of the report will summarize the results of work on the city site and its vicinity and will describe at greater length the work in the harbor which, since 1967, has been the particular concern of the present writer.³

IDENTIFICATION AND HISTORY

Pausanias (II, 36, 1) refers to an abandoned town of Halike to the left of the overland route from Hermione to Mases, whence he took ship for Nauplia up the gulf. If Mases were to be identified with the site of Porto Cheli, Halieis-Halike would have to be between Hermione and Porto Cheli, somewhere along the coast where scanty classical remains are to be found at a number of points. If, however, Mases is located in the area of Koilada (Fig. 1), Halieis is probably at Porto Cheli. In favor of the latter alternative is the greater convenience of Koilada for passage to Nauplia and the appropriateness of the size and setting of the city at Porto Cheli for what is known of the history of Halieis. A hoard of rare coins of Tiryns, found in 1863 "an hour and a half from Kranidi," was attributed to Halieis, the settlement of refugee Tirynthians, by Svoronos, but the find-spot of the coins was not located more precisely.⁴ In our three seasons of excavation at the city site 65 coins were found, of which 22 can be identified as "Tirynthian." Pottery finds showed that the city flourished in the fifth and fourth centuries B.C., in which time references to Halieis are found in Herodotos, Thucydides and Xenophon, and in Attic inscriptions, in contrast to their silence on Mases. Thus there is no longer reason to doubt the location of Halieis at Porto Cheli. Mases must be looked for in the region of Koilada.⁵

Literary and epigraphic testimonia indicate the settlement of Tirynthians at Halieis probably sometime after 479 B.C. when Tiryns (presumably "Old Tiryns") was represented at Plataia.⁶ In 460 B.C. the Athenians landed at Halieis and were

³ Reports on work at Porto Cheli have been published by John H. Young, "A Migrant City in the Peloponnesus," *Expedition*, V, 1963, No. 3, pp. 2-11, and Sarah C. Dublin, "A Greek Acropolis and its Goddess," *Expedition*, XI, 1969, No. 2, pp. 26-29. Shorter reports have appeared in *Δελτ.*, XVIII, 1963, *Χρονικά*, p. 74, pls. 89-90; *ibid.*, XXI, 1966, pp. 148-151, pls. 143-145, and are forthcoming in volumes for 1967, 1968 and 1969. See also *Archaeological Reports*, for 1962-63, pp. 16-17; *ibid.*, for 1965-66, No. 12, p. 8; *ibid.*, for 1966-67, No. 13, p. 10; *ibid.*, for 1967-68, No. 14, pp. 9-10. Also, *B.C.H.*, LXXXVII, 1963, pp. 756-759; XC, 1966, pp. 786-791; XCI, 1967, pp. 659-661; XCII, 1968, pp. 799-807. Also, *A.J.A.*, LXXI, 1967, p. 299, pl. 88, fig. 15; LXXII, 1968, pp. 270-271, pl. 93, fig. 24; LXXIII, 1969, p. 238.

⁴ *Journ. intern. num.*, X, 1907, pp. 5 ff. Through inquiry of older residents of the area we have learned that Alexandros Zervas, on whose land the hoard was said to have been found, had property along the north shore of the salt lake at Porto Cheli. But no doubt he owned other property as well.

⁵ On Mases, see *Hesperia*, XXII, 1953, pp. 167-168 and p. 166, note 49; and T. W. Jacobsen, Part II of this report, below, p. 378.

⁶ Herodotos, IX, 28, 4.

repulsed by Corinthians and Epidaurians.⁷ Sometime before 430, when he was executed by the Athenians, the Spartan Aneristos captured Halieis “with a merchantship full of soldiers.”⁸ In 430 and 425 the Athenians raided the γῆ . . . Ἀλιάς.⁹ In 424/23

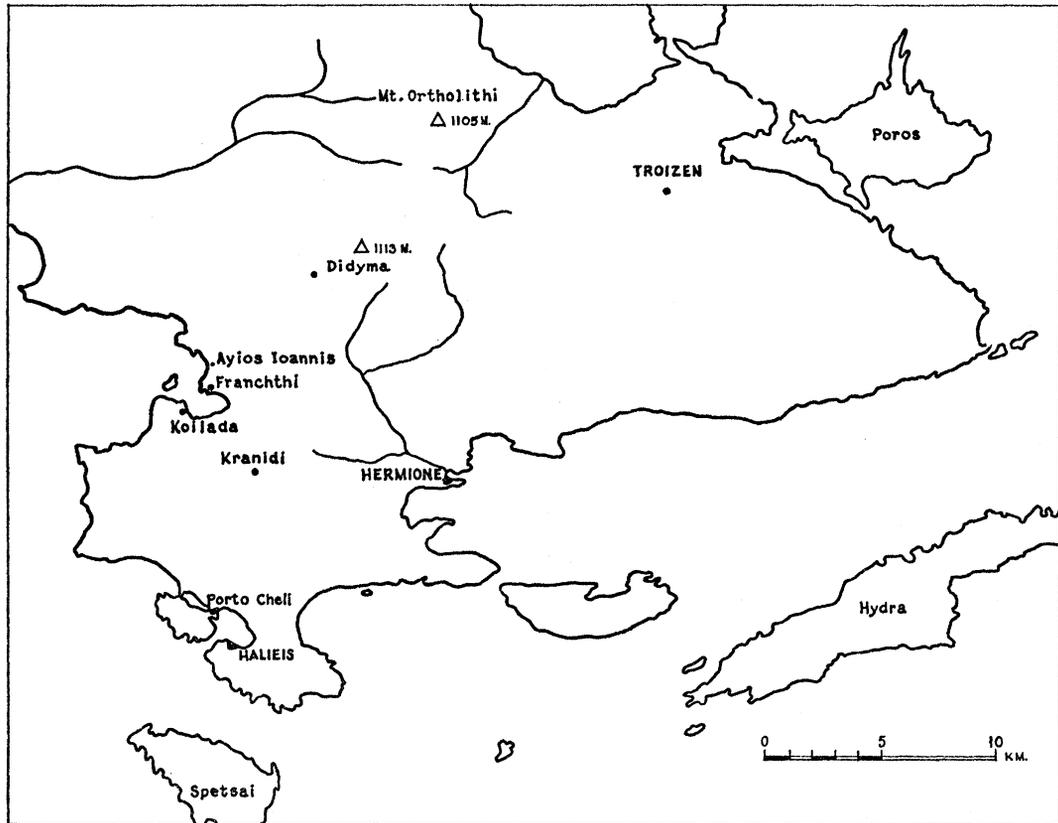


FIG. 1. The Southern Argolid.

Athens and Halieis concluded a treaty probably guaranteeing an Athenian garrison on the acropolis and use of the harbor for the duration of the war.¹⁰ In the fourth century Halieis was an ally of Sparta through the first Theban invasion in 370-369

⁷ Thucydides, I, 105, 1, cf. Diodoros Sic., XI, 78, 2, who gives the victory to Athens, and *I.G.*, I², 929, line 3. For the date 460 B.C., see B. D. Meritt, H. T. Wade-Gery, M. F. McGregor, *The Athenian Tribute Lists*, III, p. 174; cf. Russell Meiggs, *Harv. Stud. Class. Phil.*, LXVII, 1963, p. 2. Probably the earliest reference to Halieis is in Bacchylides, Fr. 4, but whether before or after the coming of the Tirynthians is not evident. On the problem of the date of the expulsion of the Tirynthians, see W. G. Forrest, *Cl. Quart.*, LIV, 1960, pp. 221 ff.

⁸ Herodotos, VII, 137.

⁹ Thucydides, II, 56, 5, IV, 45, 2.

¹⁰ *I.G.*, I², 87, as revised by B. D. Meritt, *Hesperia*, XIV, 1945, pp. 97-105, and D. M. Lewis *B.S.A.*, XLIX, 1954, pp. 23-24 (*S.E.G.*, XIV, 8); cf. Meritt and Gladys Davidson, *A.J.P.* LVI, 1935, pp. 65 ff.

but may have been among the cities of the Northeastern Peloponnesos that yielded to Epaminondas in the following year.¹¹ Halieis and the ethnic Halikos occur in testimonies to Asklepios's cures at Epidauros in the fourth century.¹²

THE SITE

(Fig. 2)

The harbor at Porto Cheli is roughly oval in shape with a diameter at the present time of about 1.5 km. northwest to southeast and a little less than 1 km. northeast to southwest, and is connected to the Argolid Gulf by a channel about 1.5 km. long and, at its narrowest, 250 m. wide. The classical city was located on the south side of the harbor, immediately to the east of the entrance channel (Pl. 83, a). From the innermost promontory on this side of the channel the walls of the city run along a ridge up to a hill, at present 51 m. above sea level, which formed a small acropolis (Fig. 2). From the acropolis a view can now be had up the gulf and of the straits between the mainland and the near-by island of Spetsai (ancient Pityoussai), and of the sea to the northeast in the direction of Hermione and the island of Hydra (ancient Hydrea). More could be seen in antiquity from the top of the towers and walls built at this point. Two ancient towers in the vicinity, one on the highest hill to the east, the other on the north side of the salt-lake beyond the modern village, were certainly in view. Heavy fortification on the south side of the acropolis was also dictated by the gentle saddle running up to it from that direction.

The city walls descend to the east from the acropolis, briefly along a ridge, and then turn northeast at a point marked by a small circular tower to fall sharply into the plain.¹³ The easternmost point of the city is a rectangular tower at which the walls make a 90° turn and run northwest to a gate at present in shallow water.¹⁴ The course of the fortifications on the sea front is described below (pp. 328, 330-331, 333-337).

¹¹ Xenophon., *Hell.*, IV, 2, 16 (394 B.C.), VI, 2, 3 (374 B.C.), VII, 2, 2 (370 B.C.).

¹² *I.G.*, IV², 1, 121, line 120; 122, lines 19 and 69 ff. The ethnic in *I.G.*, IV², 1, 42, line 11 (dated to 221/220 B.C.) is puzzling in view of the archaeological evidence for the abandonment of the city no later than the early third century B.C. Dispossessed citizens of Halieis still claiming to be Tirynthians would be more understandable than Halikoi without a country. However, the Epidaurian inscriber of the inscription (on the side of the Epidaurian *lex sacra*, *I.G.*, IV², 1, 40-41) was not above errors; he wrote *Αικελειεύς* for the Attic demotic *Ἀγκυλειεύς* in line 22.

¹³ See the photograph in *Expedition*, V, 1963, No. 3, p. 10; *Δελτ.*, XVIII, 1963, *Χρονικά*, pl. 89, c.

¹⁴ Jacobsen and Smith were able in the summer of 1968 to clean the southeast and northeast faces of the tower and to dig a trench on each face in the course of testing a large field outside of the city walls. The orthostates of conglomerate (ca. 0.62 m. high) had roughly drafted edges and the eastern corner of the tower was also drafted. The tower is approximately 8 m. square and projects slightly from the course of the walls. On the southeast face six courses of poros foundation blocks, ca. 0.35 m. high, and evidence of perhaps two destructions, both probably in the classical period, were found. On the northeast face there was only one foundation course of poros and a different stratigraphic sequence. The relationship of the two faces to each other and of the tower's construction and history to the fortifications in the upper city await further study.

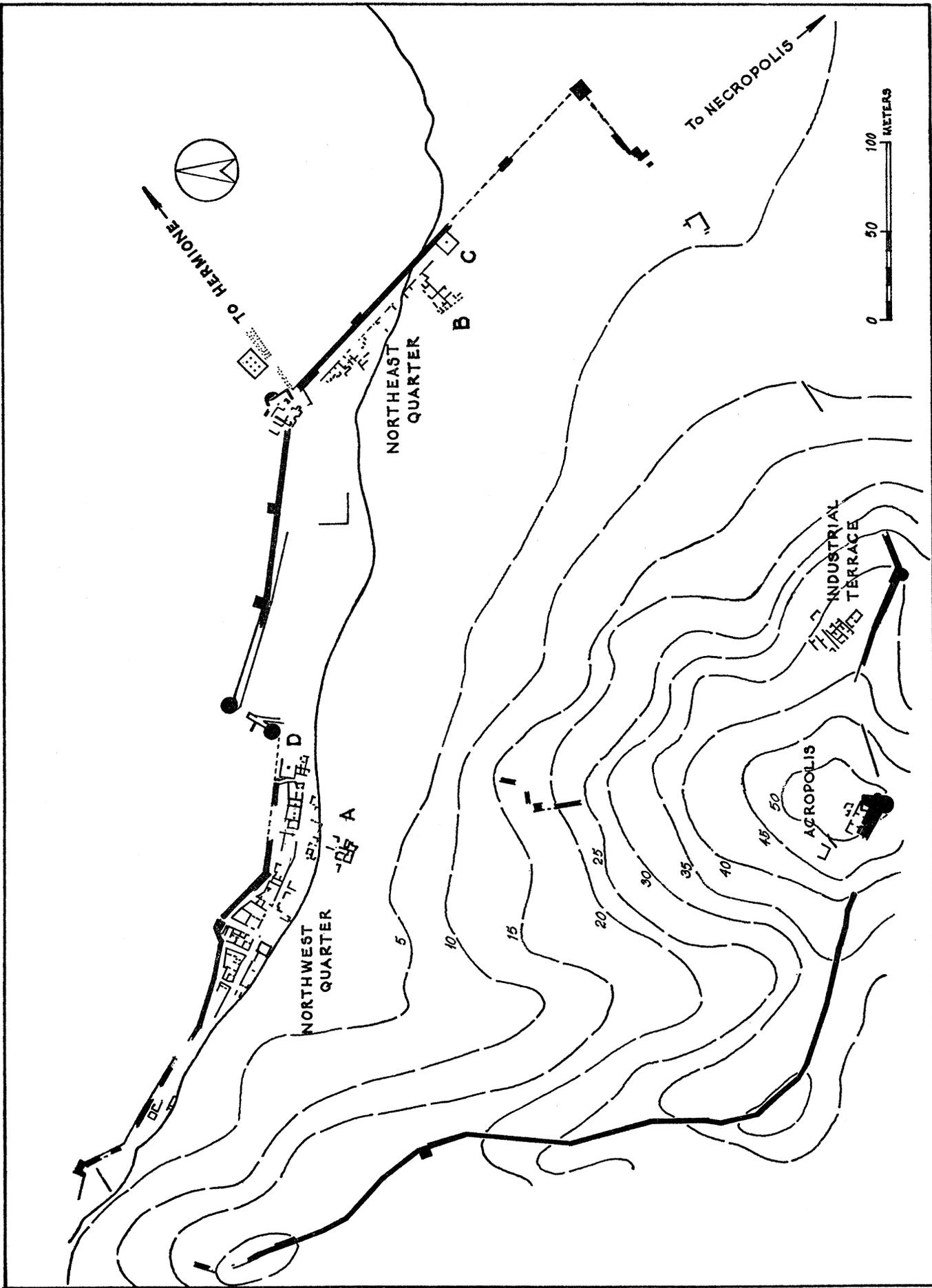


Fig. 2. Halieis.

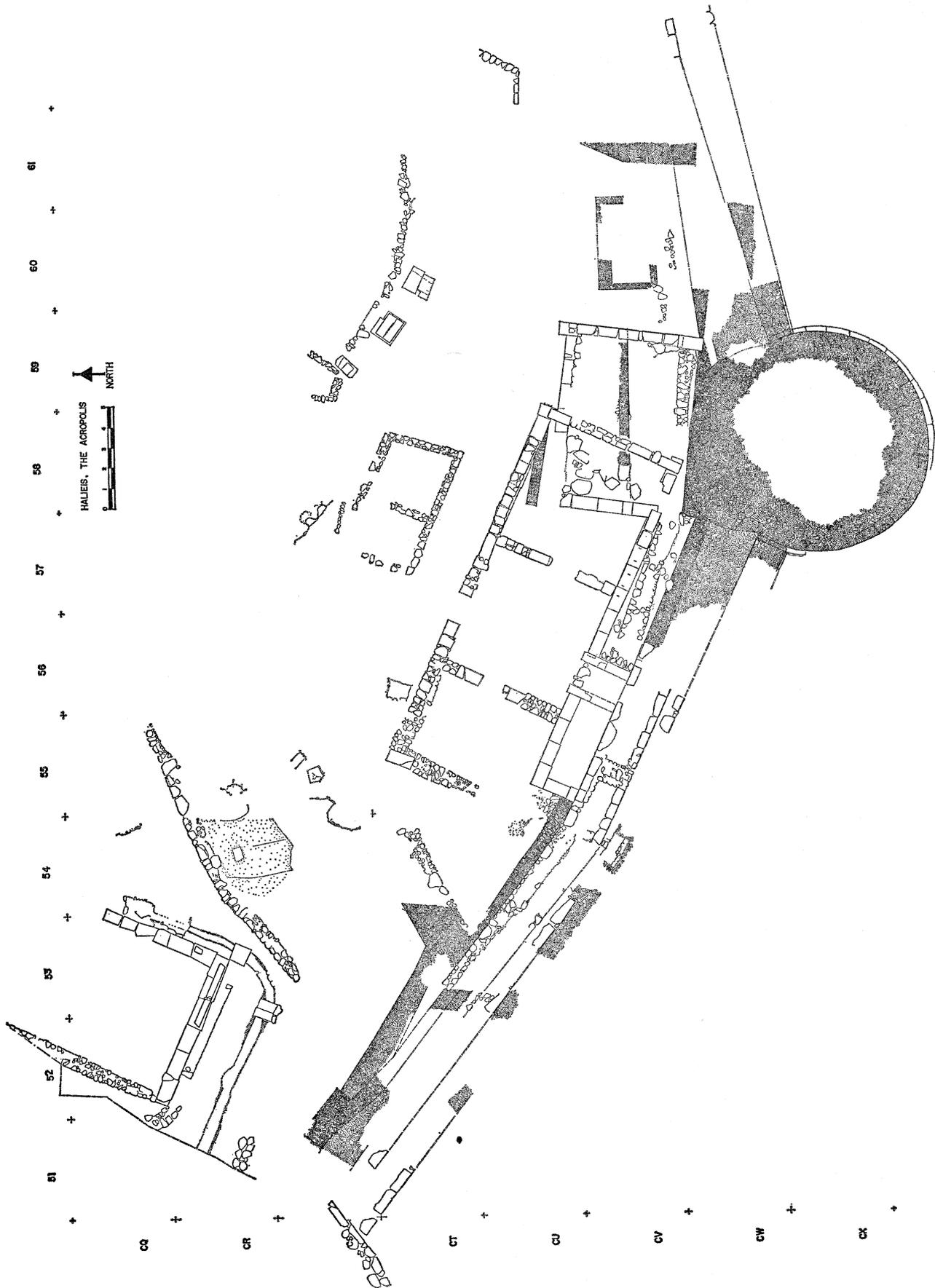


FIG. 3. The Acropolis.

In the western leg of the walls there was possibly a small gate giving access to a small bay on the entrance channel. In the southeast stretch of walls, south of the eastern tower, there was at least one gateway through which passed a road flanked outside the city by a necropolis (below, p. 340). There was probably a third gate on the east side of the circular tower now in the sea, through which ran the road to Hermione (Pl. 90). A fourth gate gave directly on to the shore in a northwest section of the city now under water (Pl. 86).

The walls were constructed, on foundations of poros or on bedrock, of two rows of long ashlar blocks of the native conglomerate in a single orthostate course, forming an outside and inside face about 2.50 m. apart, joined by an occasional cross-piece. Above were courses of mud bricks protected by heavy terracotta roof tiles, and in between was a packing of rubble and earth. Except at excavated points on the acropolis only the orthostates are to be seen today. The combination of a dado of conglomerate blocks under mud brick is characteristic of the city's building.

THE ACROPOLIS

(Fig. 3)

In the northern half of the acropolis bedrock is at or a little below the surface. It is only to the south and especially the southwest, near the city wall, that there has been accumulation of earth sufficient to provide stratigraphy and to preserve constructions. The area may be divided into three parts: i) the city wall and its associated towers and buildings along the southern edge of the acropolis (Fig. 3, CT-CX 51-61); ii) a building and a roadway on the lower, western side of the acropolis (CQ-CR 51-56); iii) a small open area on the east, north of the towers in the wall, and containing an altar and two other monuments (CR-CT 59-61).¹⁵

The phases of occupation on the acropolis can be described schematically as follows:

Late Neolithic and perhaps Early Bronze Age pottery (unstratified aside from some pockets in bedrock). Obsidian blades and chips. Shells found with grooved Late Neolithic pottery yield a radiocarbon date of 3306 ± 74 B.C. (with half-life of 5730).¹⁶

Protogeometric and Geometric sherds, without stratification. Geometric sherds have also been found outside the eastern tower of the city wall, and at the entrance of a large building in the sea, along the Hermione road (see p. 338 below).

¹⁵ The chronology and architecture on the acropolis have been the concern of Mr. Williams, the cult and the remains associated with it of Miss Dublin (*Expedition*, XI, 1969, No. 2, pp. 26-29), the prehistoric remains of Dr. Jacobsen and the coins of Dr. Dengate.

¹⁶ We owe these and the other radiocarbon dates to the kindness of Dr. Elizabeth Ralph of the Applied Science Center for Archaeology of the University of Pennsylvania.

Late seventh-early sixth century (Pl. 80, a, b): Protoattic ΣCΣ amphorae and a Lakonian II cup found under the destroyed mud brick of two walls (the second built inside the first).¹⁷ ΣOΣ amphorae were also used for burial in the necropolis east of the city.

Late sixth-early fifth century (Pl. 80, d):¹⁸ pottery and lamps no later than *ca.* 460 B.C. used in the fill above a third mud brick wall which had been built inside and above the debris of the two earlier walls and also branched to form a terrace along the west side of the upper part of the acropolis. Pottery and votive objects of this period on bedrock, primarily in area iii.¹⁹

Fifth century: Attic pottery,²⁰ graffiti on pottery and on roof tiles (some clearly in the Argive alphabet, also used at Tiryns; Pl. 80, h)²¹ above a fourth wall built over much ash and destruction debris, with a sloping surface (berm) on the inside for swift access to the parapets. In area ii, a lower level on the west side of the acropolis, a rectangular building with an entrance on the east side seems to have been built at this time. A fragment of an inscribed marble perirrhan-

¹⁷ Plate 80, a, Lakonian II ray-based cup (HP 380, H. 0.06 m.). Cf. *Annuario*, XXXIII-XXXIV (N. S., XVII-XVIII), 1955-56, pp. 11 ff., especially p. 17, fig. 10, a. For dating, cf. John Boardman, *B.S.A.*, LVIII, 1963, p. 4. Two excellent examples of undecorated black-glaze Lakonian cylindrical mugs were found in the same context (HP 377, 378); cf. Boardman and John Hayes, *Excavations at Tocra, 1963-65: The Archaic Deposits, I* (*B.S.A.*, Supplementary Volume No. 4, 1966), p. 89, at that time without known counterparts.

Plate 80, b, shows what is possibly an Argive version of a Middle Corinthian kotyle decorated with a lion, goat, and bull (HP 416, H. 0.15 m.). Cf. Humfry Payne, *Necrocorinthia*, Oxford, 1931, Nos. 937-940, p. 308 and note 1. For a Protoattic amphora with graffiti, see *B.C.H.*, XC, 1966, p. 788, fig. 3; *Δελτ.*, XXI, 1966, pl. 143 (HP 298).

¹⁸ Fragment of black-figure oinochoe, Dionysos and satyr (HP 288, H. 0.056 m.), *ca.* 500 B.C.

¹⁹ E.g., Plate 80, c, and e, lead figures (note 26, below) and f, a terracotta face (HC 165, H. 0.07 m.), in style *ca.* 500 B.C., to be associated with the shrine but found in the fifth century building on the west side of the acropolis (area ii).

²⁰ E.g., HP 367 and 372, two joining fragments of red-figure chous of the last quarter of the fifth century B.C.

²¹ Fragment of a black-glazed roof tile (HC 99, max. H. 0.053 m.):

-- EΙΗΘΙ --

]θιον

]φυον

]·υλον

The first line is part of an abecedarium, of which several have been found. In the next lines are probably names. The lambda in the last line is Argive. Also illustrated in *B.C.H.*, XC, 1966, p. 791, fig. 7. I show it for its interest although it was not found in the closed context with most of the fifth century graffiti. This is not the place to discuss the Tirynthian alphabet; suffice it to say that the recently discovered archaic inscriptions at Tiryns (Verdelis, *Δελτ.*, XVIII, 1963, *Χρονικά*, p. 73) show that the inscription published by Peek, *Ath. Mitt.*, LXVI, 1941, pp. 198 ff., No. 5, pl. 70 (*S.E.G.*, XI, 369; L. H. Jeffery, *The Local Scripts of Archaic Greece*, Oxford, 1961, p. 149, pl. 25, no. 8) is not Tirynthian.

terion (Pl. 80, i) may date from this, rather than the previous, period and thus show continuation of the cult seen in area iii.²²

Early fourth century: a reorganization of the acropolis; a rectangular tower (ca. 9 by 7 m.) with poros foundations and a trapezoidal dado of conglomerate was built against the inside face of the mud brick defense system at the crest of the acropolis, cutting into the slope of the berm of the previous period. To the north of the tower, in area iii, a court was laid out above the votive dump, delimited by a thin rubble wall to the north, and containing an altar of two conglomerate dado blocks on a shelly limestone socle (1.16 by 1.34 m.) flanked by two other bases, that to the northwest being a statue base (fragments of lead in a socket ca. 0.50 m. square; Pl. 83, b). A fragment of an inscription from a limestone stele (probably), of the late fifth or early fourth century (Pl. 81, a), and a small marble female head (Pl. 81, b), both surface finds, are perhaps to be associated with the cult area.²³

Later, in the fourth century: a circular tower (ca. 10 m. in diameter; Pl. 84) was applied to the outside face of the acropolis wall, outside of the earlier rectangular tower, consisting of a trapezoidal conglomerate socle and lower courses under mud brick and capped by a coping course of shelly limestone. A terrace wall to the east of area ii may also date to this period.

Still later, in the fourth century: the rectangular tower was cut into on its west side to make room for a structure of three large rooms (barracks?) built against the inside face of the mud brick defense wall and incorporating coping blocks from this side of the tower (Pl. 83, a). To this time perhaps belongs the reinforcement of the outside face of the acropolis wall close to the circular tower with a cruder version of the conglomerate dado and mud brick used for that tower.

End of fourth-early third century (?): destruction on the acropolis. In the fall from the collapse of the circular tower a little but typical late fourth century pottery including a skyphos of Attic type (HP 212, max. H. 0.10 m.; Pl. 81, c) and a spur-handle kantharos. Destruction of the building in area ii was accompanied by the throwing out of much pottery of the same date on its east façade, along the roadway and in a drain running to the east and south (Pl. 81, d).²⁴ Coins in

²² HS 22 and 33, joining fragments, both surface finds. Width of rim 0.038 m.; max. length 0.26 m.; height of rim 0.04 m. Height of letters ca. 0.02 m. — ΑΔΑΜΟΞΞ— . Cf. Κλένα Δαμόσσο, Aigina, mid-sixth century B.C., according to the excavator, though found with early fifth century pottery (Δελτ., XIX, 1964, Χρονικά, p. 74; B.C.H., XC, 1966, p. 747).

²³ Stele fragment: HS 40, light gray limestone, broken on all sides. H. 0.055 m.; W. 0.06 m.; Th. 0.065 m.; H. of letters 0.01 m. — ΟΣΚΑΙ— / — — ·ΥΤΑ— . Marble head: HS 39, H. 0.078 m.

²⁴ The deposit immediately east, i.e., in front of the door of the building, contained two lamps, HP 201 (R. H. Howland, *The Athenian Agora*, IV, *Greek Lamps and their Survivals*, Princeton, 1958, type 25 A) and HP 202 (Howland, 25A prime), limiting the destruction date to between the second quarter of the fourth century and the first quarter of the third.

the debris of this building, as elsewhere on the acropolis, generally agree with a fourth century date for the destruction. However, one Athenian coin has been dated as late as the first decade of the third century.²⁵

Of unknown date is an isolated small house of two rooms built to the west of the altar area (iii) on destruction debris from the towers.

A note should be added on iii, the altar area. No building has been identified as associated with the cult and there is no reason to suppose the cult was confined to the vicinity of the altar before the late fifth century. The cult was characterized by a variety of miniature pottery vessels; miniature bronze armor (shield, helmet, greaves); miniature bronze axe and mirror; bronze-headed pins and bronze earrings, a silver earring and silver pin; lead figures of Spartan type (including a Poseidon, winged goddesses, wreaths; Pl. 80, c, e);²⁶ terracotta female figurines (earlier, hand-made and of Argive type; later, mouldmade, of Corinthian type), male horsemen, animals and a bird; fragments of inscribed bronze, but unfortunately no name has yet been read to identify the divinity.

It is evident that Halieis was an inhabited place before the coming of the Tirynthians in the early fifth century, although no literary reference to it prior to their immigration has been detected. This was already indicated by the name Halieis, which persisted despite the public efforts to maintain the Tirynthian identity, as shown by the coinage, and came to be used for the city. On archaeological evidence alone we cannot say whether arrival of the Tirynthians was violent or peaceful (which is historically more probable), i. e., whether the destruction of the second quarter of the fifth century was due to resistance to them or the result of the Athenian attack in 460, or even of peaceful reorganization and enlargement. Occurrence in the later fifth century of graffiti in alphabets that could be the local East Argolic rather than Argive-Tirynthian suggests a mixed garrison or population of natives and immigrants (e. g., Pl. 80, g).²⁷ No sure sign of Athenian occupation in the late fifth century has been found. The reorganization early in the fourth century could mark

Illustrated is HP 254, H. 0.192 m., a kneeling Amazon (?), with which compare the plastic lekythoi in *Hesperia*, Supplement VII, 1943, *Small Objects from the Pnyx*: I, pp. 156-165, especially pp. 160-164, nos. 119 ff., figs. 72-75.

²⁵ HN 1965-7, bronze "Eleusinian" coin of Athens AOE. Obv.: Triptolemos seated l. in car. Rev.: pig standing r. on Eleusinian βάκχος. 2.20 gm. Cf. Margaret Thompson, "Coins for the Eleusinia," *Hesperia*, XI, 1942, pp. 220-221, Group II, ca. 294-288 B.C. Excavations at Koroni in Attica, occupied 265-261 B.C., produced an example of the succeeding issue, *Hesperia*, XXXI, 1962, p. 49, No. 93.

²⁶ Winged goddess (HM 356, H. 0.041 m.). Poseidon (HM 142, H. 0.022 m.); cf. R. M. Dawkins, *The Sanctuary of Artemis Orthia at Sparta*, London, 1929, p. 275, fig. 127, f, and *B.S.A.*, XV, 1908-1909, p. 138, fig. 10, 34. For other illustrations of finds from the sanctuary, see Dublin and Young, note 3, above (where the Poseidon is identified as Herakles).

²⁷ Fragment of a traveller's jug, HP 234 ΥΡΕ = χρε vel -η (Θ). The "red" chi could be East Argolic or Lakonian.

the substitution of Spartan for Athenian control. Further elaboration of the fortifications in the fourth century, at a time of Spartan weakness, suggests a change of the dominant power, now probably Thebes or her Peloponnesian allies. We have no clue to the source of the final destruction in the confusion after the death of Alexander. No pre-Christian occupation later than that on the acropolis has been found elsewhere in the city or in the necropolis.

THE INDUSTRIAL TERRACE

(Figs. 2, 4)

The second terrace below and to the east of the acropolis runs for about 100 m. along the inside of the city wall, tapering to the east and dropping off sharply at the

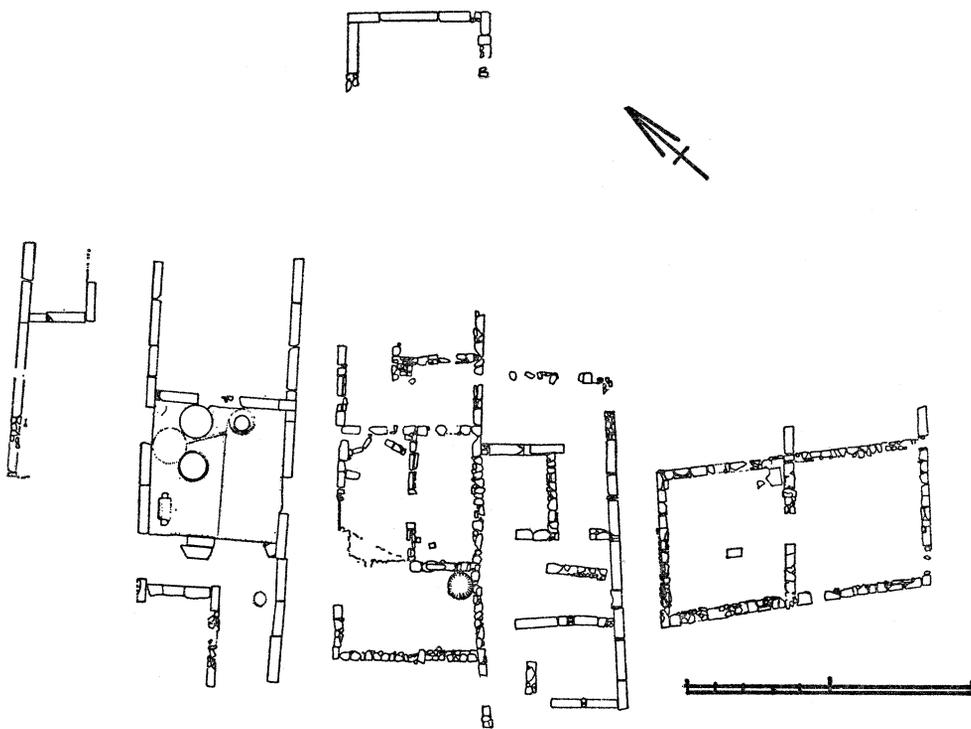


FIG. 4. The Industrial Terrace.

point where the wall turns at a circular tower. Its width, northeast-southwest, is at the most 40 m., but there has been considerable erosion along the northeastern edge. Excavation took place in 1962 and 1965. Three building units separated by two narrow lanes of *ca.* 1.50 m. lie parallel to one another in a northeast-southwest orientation. (Each is 9.75 m. wide and each is divided down the middle by a central wall.)

Of the easternmost unit, two rooms, on the east and west with a doorway between,

are all that have survived erosion. The central unit may originally have been a complex extending about 25 m. out to the northeast where, after an eroded lacuna of some 9 m., foundations reappear in line with but on a lower level than the southwest end. The unit was divided, as were the others, by a central wall down its long axis: to the east, a group of six small rooms; to the west, a series of apartments of one to three rooms, opening on the alley to the west.

The construction of the eastern and central units is flimsy, the poorest yet seen on the site. The single orthostate course consists of miscellaneous small stones and larger blocks apparently re-used from some better construction. The west wall of the eastern building was protected on the outside at ground level by a row of roof tiles lying against the stones, presumably to reduce erosion from rain pouring down the alley.²⁸ In some parts of the building tiles had been laid down on the floor; there were traces of burning in certain spots; storage and household vessels and lumps of lead (one containing half-formed lead pot clamps) were found on the floor. Both the eastern and the central units have the appearance of small workshops and stores, perhaps combined with simple living quarters. A number, if not all, of the rooms on the terrace were plastered and painted red and white.

The third, western unit is better constructed, though again largely of re-used blocks, and is clearer in function. Again there is a center wall dividing the unit into eastern and western halves. On the western side bedrock is close to the surface and the floor level is badly preserved; part of it may, indeed, have been a court and not a room. On the eastern side, the second room from the south (Pl. 81, f) has a strong, well-preserved cement floor on two levels, the western (*ca.* 2.50 m. wide) 0.03-0.06 m. higher than the eastern (*ca.* 2.00 m. wide). A round, shallow depression on the upper level drains by a narrow channel into a sunken pithos on the lower level. On either side of the channel, on the upper level, are two larger pits for pithoi, whose lips were set well above the floor and were thus intended to be kept free of the substance from the depression near by. (The rim of only one was preserved but the pit for the other is identical.) In the southwest corner, on the upper level a rectangular depression in the floor lay between two holes for upright posts, cut in the shape of lewis holes through the cement into a block of limestone placed beneath the floor to permit the secure wedging of the two posts. Clearly this arrangement was for a press operating on material set between the two posts in a container, since there is no channel draining from this depression; any spilled liquid would find its way, along with liquid extracted in the round depression, into the sunken pithos on the lower level.

A doorway opened onto the alley to the east, and another led to a smaller L-shaped room, two steps higher, to the south, in which were fragments of several large storage or water vessels. Mention should also be made of an upended anta capital on the lower level, a piece of millstone, a large conch shell (used today for skimming oil), a pyra-

²⁸ See *B.C.H.*, LXXXIX, 1966, p. 787, figs. 1, 2; *Δελτ.*, XXI, 1966, *Χρονικά*, pl. 143.

midal lead weight (HM 1) and a number of loomweights, both in this unit and elsewhere on the terrace.

It was suggested in earlier reports that we have here a workshop for some stage in the process of dyeing cloth or wool in the purple from the murex shell, but it is perhaps more likely that it is a press room for wine or oil. However, we do not have a floor of the size and shape usually associated with the treading of grapes nor, on the other hand, do the arrangements accord with those regarded as normal for oil presses operated by a lever or beam.²⁹ In the high, breezy location, and in the presence of vats (here pithoi sunk in the floor) and loomweights, there is a resemblance to the dyeworks on the Rachi at Isthmia.³⁰ The purple dye of Hermione had a high reputation.³¹

The plentiful pottery and coins found on the floor level on this terrace are of the final phase on the acropolis. A coin (HN-1962-15) found to the south of the L-shaped room is a silver tetradrachm of Alexander the Great, struck at Sidon before October of 323 B.C. Only occasional sherds from before the late fourth century have been found and are not associated with a discernible earlier architectural phase.

A surprising find in the eastern unit on the terrace, on the floor, was the right-hand side of a bronze dikast's ticket (*pinakion*). The piece (HM 29) has been re-used at least once and the texts are not revealing. Dr. J. H. Kroll informs us that it has many stylistic affinities with Athenian *pinakia*, and may well be Athenian, but he does not rule out a local or an Argive origin.

²⁹ Against the use of a beam are the small size of the room, the presence of a doorway which would have been blocked by a beam, and the absence of posts or a stout wall a little removed from the matter to be pressed. One can imagine here the use of wedges driven between horizontal members attached to the two uprights. R. J. Forbes, *Man the Maker*, New York, 1950, p. 65, speaks of this as an improvement on the beam press but for its use I know only of the perfume press (cf. August Mau, *Pompeji in Leben and Kunst*², Berlin, 1903, pl. 1, p. 352, fig. 185). Here there would be the difficulty in knocking wedges in and out from front and back when the press is less than half a meter from the wall. Weights on a pulley suspended from the two uprights and operated from the right side could have been used. The most appropriate device for the location, a direct twin screw press, is not thought to have come into use until Roman times. In general see A. G. Drachmann, *The Mechanical Technology of Greek and Roman Antiquity*, Copenhagen, 1963, p. 54 (pulley), pp. 55 f. (wedge press), p. 205 (screw press), and *id.*, *Ancient Oil Mills and Presses* (*Archaeologisk-Kunsthistoriske Meddelelser*, Bd. I, 1, 1932) for beam and screw presses.

³⁰ Cf. Chrysoula Kardara, "Dyeing and Weaving Works at Isthmia," *A.J.A.*, LXV, 1961, pp. 261-266.

³¹ Cf. Plutarch, *Alex.*, 36; Alkiphron, III, 46, 4. The murex is still plentiful in the area and shells have been found in the excavation but not in sufficient quantities to suggest extraction in the city, which would not be likely in any case. A pit full of shells has been reported on the coast to the east of Porto Cheli.

THE LOWER TOWN

(Figs. 5, 6; Pls. 85-88)

The hill on which the acropolis sits divides in two the low-lying land by the sea—a smaller valley to the west, and a larger plain with the lower terraces of the hill to the east, on which side the only natural limit was the seasonal stream bed between the acropolis hill and the next hill to the east; an artificial boundary was made by the large right angle of the city wall. There is some suggestion that this division of the town was marked in antiquity by a stretch of fortification wall, traces of which have been found below the acropolis, running north towards the harbor mouth. It is not clear whether the wall reflects an earlier, smaller circuit enclosing only the more easily defended western valley, or was a link between acropolis and harbor (such as the Athenians would have found useful under their treaty with Halieis). The construction is consistent with that of the city walls elsewhere in the city and no dating information was gained in cleaning a short section in 1962.

Many visible conglomerate blocks show that the slopes and the flat land by the sea were heavily built over. The pattern of settlement is still more evident beyond the present shoreline where inundation up to 2 m. has occurred for as much as 50 m. inland from the northern line of the city wall. Excavation on land in the lower town has been confined to tests in the northwest and the northeast quarters in 1962. A survey of the submerged remains was begun in 1965 and was combined with the clearing of an early Byzantine bath and of the circular tower at the Hermione gate on which the bath was built. In 1967 and 1968 the survey was continued in the water and by means of photography from a balloon-borne camera (to be described below pp. 332-333). The results are shown in Figures 5 and 6 which cover the shoreline from west to east.³²

³² The basic survey of the submerged remains was undertaken in 1965 by Dr. Frank Frost and David Owen, using stakes and floats as markers and surveying by tape measurements and triangulation. They were assisted in translating their figures into a plan by the two architects, Mr. and Mrs. R. S. Pratt. The results can be seen in the plan printed in *A.J.A.*, LXXI, 1967, pl. 88, fig. 15. Further surveying and excavation in the water in 1967 were done by Mary Pope Johns Martin and John Wollerton, who was also in charge of equipment. A group of students from the Germantown Friends School (Marion Childs, Alison Dannenbaum, William Donner, Robert Pomerantz, Betsy Rudnytsky, and Choti Weiler) put in two weeks in various wet and useful capacities, under the supervision of Joanne Rudnytsky. In 1968, with expanded operations in the water, Richard Van Berg was in charge of equipment, assisted by Patrick O'Kane, and excavation and surveying were done by Peter Smith, Richard Preuss and Karl Kilinski of Indiana University, and Ian Storey and Christopher McNaught of the University of Toronto. In 1967 and 1968, Richard Platt worked as an assistant to Mr. and Mrs. Whittlesey, and more briefly to Professor Matson, and also worked as a diver. In 1967 and 1968 we used the *kaik* of Dimitrios Tringakis of Porto Cheli who also provided us with his detailed knowledge of these waters. A grant from the Penrose Fund of the American Philosophical Society assisted Jameson and Van Berg to work on the harbor in 1967.

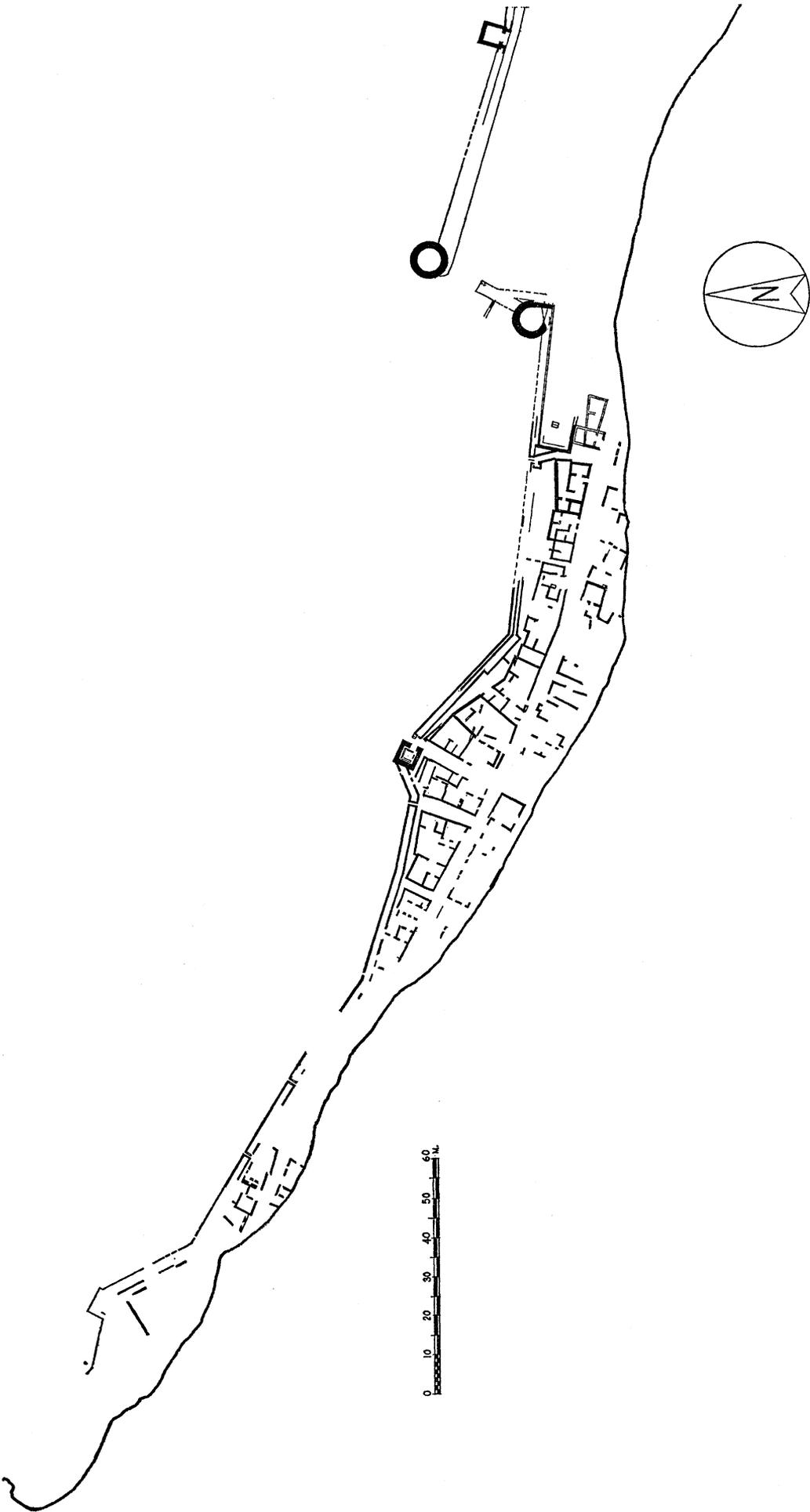
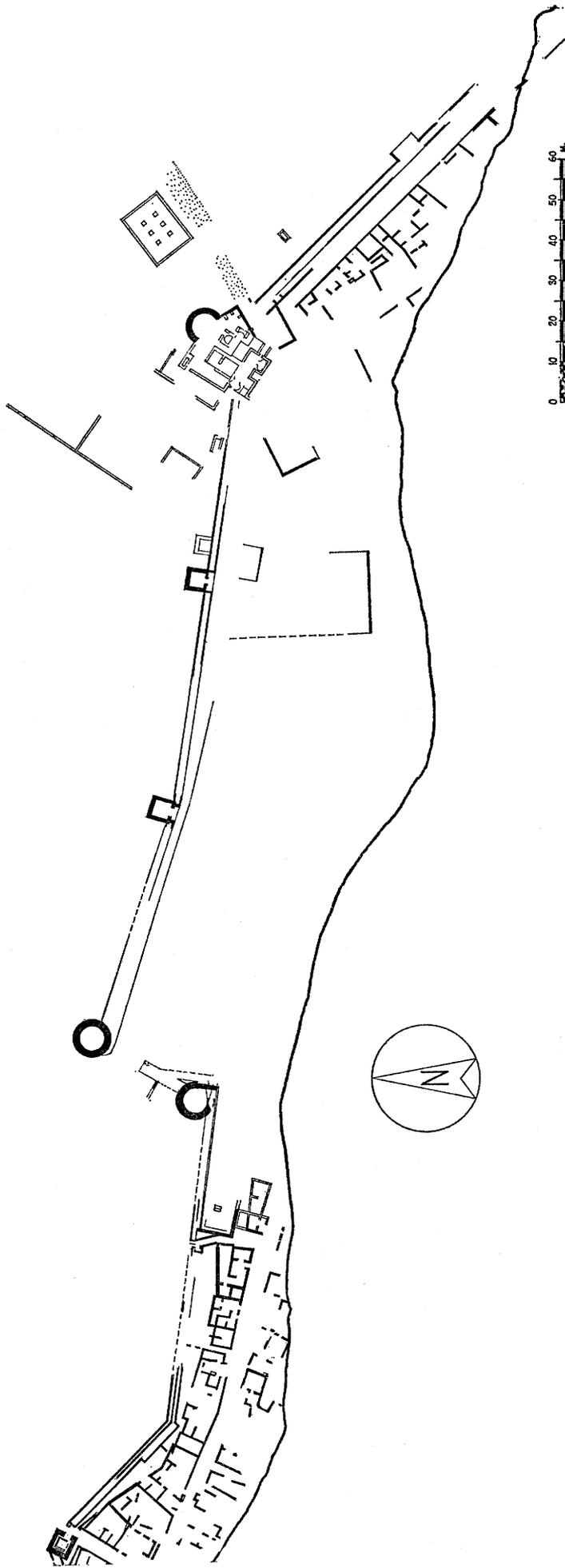


FIG. 5. The Submerged Area, West.



Altitude 1954

FIG. 6. The Submerged Area, East.

The city wall can be followed for most of its course from a rectangular tower on the inside of the wall at the west end of the city to the Hermione gate on the east and thence back to the present shore line. Behind the western stretch of some 300 meters (Fig. 5) lie insulae of modest buildings divided into small rooms. A street leads northeast to a small gate with a tower (in the line of the walls on the west side) and onto the beach, and is crossed by another street lying behind the first row of buildings (Pl. 86).

In this northwest quarter a house on land was excavated in 1962 (Fig. 2, A; Pl. 85, a).³³ It was well preserved thanks to the heavy terrace wall against which it was built. A group of four rooms, all probably with plaster walls, of which the outermost may have been a small courtyard, was flanked to the east by two utilitarian rooms. In one of the latter a wellhead of pottery and plaster with a drip basin for a pitcher was built into a low platform in a corner against the terrace wall; fresh water was reached at about 1 m. below the lip of the wellhead. In the adjacent corner, also against the terrace wall, were traces of a fireplace. In an alcove and extending partly into the room was a slightly raised floor of pebbly cement, perhaps an area for storing oil jars. (A similar alcove and floor were found in the northeast quarter.) In the second of the eastern rooms was a block with a rough oblong basin on its upper surface. A number of these have been seen in houses now under water.

A second wellhead with a drip basin was found in the southwest corner of the next house to the north. It would appear that fresh water was easily available in the classical period. No cisterns have been found as yet. Divers in 1965 noticed a spring of fresh water in the sea in this area. At present the local water of Porto Cheli is noticeably brackish. In a building to the west, separated from the excavated house by an alley, was the circular stone bed for an oil press with a jar sunk into the floor beneath the spout; fragments of a "blister ware" jug (HP 86) and another plain jug (HP 87) were found in the jar. The finds on the floor of the house are of the same late-fourth-century date we have come to associate with the last phase of the city but evidence of Byzantine settlement was seen in disturbance in one of the rooms.

In the northeast quarter (Fig. 2, B, C), near where the northeast stretch of the city wall crosses the present shoreline, test excavations were made in 1962. A broad passage runs inside the city wall from the Hermione gate for almost 100 m. (Pl. 90) until it is blocked by a large rectangular building built against the city wall (Fig. 2, C). This is in contrast to the northwest quarter where, under water, the city wall follows the ancient shoreline instead of running in a straight line, and where the houses are crowded against the wall, leaving no useful passage in between. No doubt in the northeast the city wall faced dry land and, for reasons of defense, a space between wall and houses was more urgent. But one may also wonder if this area with its

³³ Young, *op. cit.*, p. 4; Δελτ., XVIII, 1963, Χρονικά, pl. 89.

more arbitrary line of wall running out into the flat land is a later extension of the town, perhaps at the time of the Tirynthian immigration.

The buildings excavated on land in this area formed part of at least two houses, northwest and southeast of a party wall, lying between the passage along the city wall and a street to the southwest, running from the Hermione gate to the Necropolis (Fig. 2, B). One room (Pl. 85, b) calls for comment:³⁴ a dining-room or *andron* (6.80 m. wide by 5.30 m. deep) on the north side of the party wall with a well-preserved cement floor of which 0.93 m. on all sides was raised 0.035 m. A drain channel ran from the interior rectangle (undecorated with mosaics, as is sometimes the case) under the wall of the room to a passageway on the northwest. The plastered walls were painted red with a white dado below.³⁵ The one remarkable feature of the room was the construction in rubble and plaster against the far wall of the room, facing but a little to the left of the entrance. It had been semicircular except for slight rectangular projections against the wall on either side; next to the rectangular projections on either side were the remains of a "foot" in stucco. Plaster found in this area was painted yellow. We would explain the construction as a *kylikeion*, a cupboard or sideboard for cups which we know was a common piece of furniture in dining-rooms. This, however, may be a unique example of a *kylikeion* in stucco, and perhaps painted the color of wood, rather than made of wood.³⁶

The pottery at the time of the abandonment of the area was of the usual late-fourth-century type. However, excavation near the shore at depths greater than a meter produced fragments of Attic red-figure pottery of the fifth century (e.g. Pl. 81, e).³⁷ As the damp floors of the excavated rooms dried out it became evident that a pattern of construction had existed at a lower level differing from that of the surviving buildings.

The rectangular building, mentioned above as blocking the passage along the inside of the city walls in the northeast quarter, was also examined in 1962 (Fig. 2, C). Built against the city wall it has no connection with the houses in the city. It consists of a single room 10 meters wide and some 11 meters deep, with solid foundations of poros, several blocks of a first course, and a central square base for a column. The entrance was presumably on the southwest, facing into the city; an Ionic capital of shelly limestone (HS 6) for a column of elliptical shape was found near by and may have come from the façade.³⁸ There were passageways on the northwest and south-

³⁴ Young, *op. cit.*, p. 6; Δελτ., XVIII, 1963, Χρονικά, pl. 90.

³⁵ On the *andron*, see J. W. Graham in D. M. Robinson and J. W. Graham, *Excavations at Olynthus*, VIII, *The Hellenic House*, Baltimore, 1938, pp. 171 ff.

³⁶ For the *kylikeion*, cf. Athenaeus, XI, 460D-F, 480B; XII, 534E; Studniczka, *Abh. Königl. Sächs. Ges. d. Wiss.*, Phil-Hist. Cl., XXX, 1915, pp. 162 ff. For stucco constructions in the corner of a room, see *Olynthus*, VIII, pp. 197-198.

³⁷ HP 132. A joining fragment (arm holding a thyrsos) has been identified (Sept. 1969).

³⁸ Young, *op. cit.*, p. 5.

east sides; under the latter ran a storm drain, covered by heavy conglomerate blocks, which discharged outside the city wall.

A notable feature of the building is that it backs up against the city wall without a rear wall of its own. We would connect this with its function and compare it with the three-room structure on the acropolis in its last phase and, more exactly, with another one-room, rectangular structure (*ca.* 8 m. by 12 m.) with a central column base against the city wall in the northwest quarter (Figs. 2, D, 5, 6; Pls. 87, a and 88). It too is clearly not one of the usual houses or shops and is closely connected with the wall. What appears now as a short, angled passageway on its west side, leading to the city wall, may have been the foundation for a ramp for access to the parapets on the wall, with the jog to the west for a landing. (Excavation in the water showed that there had been no building on the outside of the city wall at that point.) We suggest that these are examples of what may have been a number of arsenal or barracks buildings, located at points along the inside of the city wall.

Finally, a surface find from the northwest quarter of the lower town deserves mention: a heavy terracotta mould³⁹ for a relief, showing a youth wearing chlamys and petasos, reaching for a falling girl (Pl. 82). It is comparable to a number of moulds found in the Athenian Agora which were probably for making stucco decorations in houses since no terracotta reliefs from such moulds are known (aside from some which clearly served as matrices for moulds). In our example the mouldings which frame the scene top and bottom argue against its use for a relief on a wall and suggest rather decoration for a chest or for a small altar. Of mythological rapes the most likely is a scene showing one of the Dioskouroi and one of the Leukippidai; presumably there was another mould for the other pair, for use on the other side of the chest or altar.

THE HARBOR

(Fig. 6; Pls. 88, 89)

The survey in 1965 had recorded most of the remains in the sea that were visible to a swimmer equipped with mask and snorkle. Essentially these were the houses and the city wall on the western and eastern sides of the submerged area. There remained a gap of over 100 m. in the center. In 1967, by probing with poles in the mud along the course of the city wall west from the Hermione gate, it became apparent that the wall continued for another 100 m. and terminated in a sizeable tower. This was confirmed by aerial photography, taken by Mr. and Mrs. Julian Whittlesey, which showed traces of the course of the wall under the mud, and also revealed a second tower in shallower water some 20 m. to the south of the first, at the end of

³⁹ HC247. Max. L. 0.253 m., max. W. 0.213 m., max. Th. 0.055 m. I have to thank R. V. Nicholls and Richard Brilliant for suggestions on the mould and on the scene respectively.

the city wall coming from the west. Both towers were cleared of their covering of mud and rubble and the space between the two towers explored. The final results were photographed again from the air. In 1968 there was further excavation in the water and exploration within the apparently empty area to the east of the two towers.

It may be of interest to describe the methods used for excavation in the two seasons.⁴⁰ Divers in pairs used air hoses supplied by a portable compressor on board a thirty-foot *kaik* or on a flat-bottomed, fiber-glass boat equipped with an outboard motor. Because of the soft bottom of the harbor, the absence of a significant current, and the shallowness, disturbance of the bottom constantly threatened to raise clouds of mud and to obscure an area for several hours. As a consequence great care was needed in moving around and rubber fins were banned. The shallower the water the shorter the time in which work could be carried on. For the most part excavation consisted of removing an overburden of mud and rubble without evident stratigraphy. Larger stones and pottery could be removed effectively, but slowly, by filling rubber baskets by hand. In 1967 an adjustable nozzle made by R. Galeazzi of La Spezia, Italy, was used on the end of a fire hose supplied by a pump mounted on the *kaik*. It pushed mud and stones with much force but did not remove them for more than a few feet and unless used with great skill rapidly produced opaque conditions.

In 1968 we used two kinds of portable dredge, operating on the "eductor" principle and powered by portable pumps in the boats or set on a crate in shallow water. The "Taper-jet" of the H. O. Fiedler Company of San Francisco proved to be remarkably useful.⁴¹ It operates by pumping water through a metal pipe to the lower end of which is attached a wide flexible hose. The water passing through and out of the metal pipe draws along with it the water in the flexible hose and whatever else is at the mouth of the hose. Thus the attached hose can be used in effect as a large vacuum cleaner. Stones and pottery up to six inches in diameter, and an infinite quantity of mud, sand, and gravel can be pulled in and deposited however far away the stream of water from the pump is carried by the metal pipe, or extensions

⁴⁰ For methods in shallow water surveying and excavation, see Joseph Shaw, *A.J.A.*, LXXI, 1967, pp. 227 ff. For another excellent example of the study of an ancient harbor, see Helmut Schläger, David Blackman, and Jörg Schäfer, "Der Hafen von Anthedon," *Arch. Anz.*, 1968, pp. 21 ff. Professor Harold Edgerton of the Massachusetts Institute of Technology most generously took time in 1966 to test the use of his subbottom profiler on our submerged area. Unfortunately the remains of Halieis lie in too shallow water and the anomalies detected are beyond the ancient harbor.

⁴¹ We used a 6" model (G), 77" long, with a six foot length of reinforced suction hose, on which was a steel tip with a short handle. A circular or semicircular ring handle would be useful for excavation, and a device for anchoring the metal pipe to the bottom would make it easier for a diver to work alone in restricted places. However, a second man is useful for controlling the discharge when a long discharge pipe is not used and for moving and assisting in unclogging the pipe. We also had the use of a 4" "Perijet" portable eductor, made by the Derbyshire Machine and Tool Company of Philadelphia. This would be efficient for clearing water of suspended sand and mud; in excavating the heavy deposits which we encountered the restricted throat of the "Perijet" tended to clog frequently.

added to it. In practice, we used a short length of pipe since we needed to move frequently from area to area as the waters became obscured. But it must be said that in the immediate vicinity of the mouth of the hose a zone of clear water could be maintained for longer periods since the obscuring matter was constantly drawn in and carried away. Hand picks and mattocks were used to break up the material to be removed and fed into the mouth of the hose. Where the material was soft the hose mouth could be applied directly to it.

Besides removing accumulation the dredge could be used effectively for digging test trenches into the harbor bottom and, by keeping the water in the trench relatively clear, permit the observation to some degree of stratigraphy and the removal of samples of mud and potsherds from different levels. Lest we give the impression that accuracy comparable to what is possible on land has been achieved in excavation under these conditions, we hasten to say that much has still to be learned before that can be claimed. But we feel that refinements on such portable dredges will permit advances towards this desirable goal, especially if combined with improved methods of surveying. An indispensable adjunct to our work in the water was the aerial photography of Mr. and Mrs. Whittlesey who have kindly supplied the following account of their methods.⁴²

Photographic coverage taken with a camera suspended from a balloon not only served for planimetric measurements, supplementing and checking those secured by conventional surveying methods, but in a number of notable cases identified remains which had escaped detection in previous seasons. A camera suspended high above clear, calm water (i. e., on early, windless mornings as long as possible after excavating has ceased disturbing the water) has considerable advantage over the limited vision of a diver. Forms often meaningless to the diver at close range may, by careful interpretation on the film, lead to identification of significant archaeological remains. The washing of silt or the growth of seaweed in meaningful geometric patterns, however vague, are recorded by the aerial camera though not recognizable by the diver right over them. The diver is then directed back to such places where further probing may prove fruitful. Excavation follows revealing underlying foundation walls. Once uncovered the area may be rephotographed, the film developed and projected to scale directly on the architect's drawing board. Thus the remains may be directly traced, stone by stone, upon the finished drawing.

The foregoing roughly describes the sequence of aerial photographic search and discovery, and of photogrammetric recording, developed at Halieis during the past season. Suspension of the camera was in most cases by a tethered balloon of three meters diameter. Cameras were calibrated for photogrammetric work and controlled

⁴² *Archaeology*, XXI, 1968, pp. 66-67, and for the use of the balloon at Sardis, *Archaeology*, XX, 1967, pp. 67-68. See also "Photogrammetry for the Excavator," *Archaeology*, XIX, 1966, pp. 273-276.

for true vertical alignment. In some instances the camera suspension was by the Jalbert Airfoil, an unstructured kite. This was used in wind conditions, whereas the balloon method required calm conditions. Flying heights varied from as much as 350 meters for wide coverage down to as little as 20 meters for detailed coverage. Film was black and white Plus X Pan Chromatic 6 x 9 cm. format in Graflex Excel camera with Schneider Kreutznach Super Angulon 47 mm. lens. The camera was balanced for true vertical alignment by a very sensitive specially designed gimbel. Shutter release was by short wave radio transmitter on the ground to a radio receiver at the camera. The receiver activated a solenoid plunger connecting to the cable release for shutter. Control of position and orientation of camera, whether suspended from balloon or airfoil, is effected by one or two lines supplementing a tether line; a swimmer with such a control line appears in some of the photographs (Pls. 86-89).

The 1968 season brought further advances in the aerial techniques over both land and water with a radio-operated, motorized repeating camera. Refinements in lenses, filters, and films, designed to detect buried limestone and to secure deeper water penetration, are scheduled for future seasons.

The two large, circular towers, north and south of an opening in the city wall and midway between the east and west sides of the city, mark the end of the city wall, the north tower of the wall coming from the east and the Hermione gate, the south tower of that from the west (Fig. 5, 6; Pl. 89). Both towers are some 9.20 m. in diameter, the size of the tower at the Hermione gate and smaller than the 11 m. circular tower on the acropolis. The visible course of blocks on the north tower lies 2 m. below present sea level and consists of an outer ring of 38 large conglomerate blocks in the shape of segments of a circle arranged around a solid core of the same material. The north face of the city wall coming from the east bonds into the tower, the last block of the wall penetrating 0.20 m. into the ring of blocks. For both tower and wall what is preserved is the topmost level of the foundations. The wall apparently widens as it approaches the tower, from 2.50 m. to over 5.50 m., but after excavation this proved to be the result of a retaining wall of large, rectangular porous blocks, lying about 3 m. south, and so inside, of the city wall and at a level some 0.25-0.35 m. (i.e., one course) lower, appearing to join the south side of the tower as a facing. This retaining wall can be traced for 90 m. to the east. Its presence is of considerable significance since it is unique in the line of walls and has to be interpreted as serving to retain a mole projecting out into the sea on which the city wall was built, and perhaps at the same time as a quay along the north side of the harbor.⁴⁸

As to the north wall running out to the north tower (Fig. 6) it will be seen that

⁴⁸ The two functions of forming a projecting mole and protecting the city wall are shown in the two explanations of the term *χρηλαί* in the Suda, *s.v.* (Adler, Nos. 275 and 276).

not only does its direction as it comes from the Hermione gate prevent its joining the line of walls from the west but that two-thirds of the way along it angles still further to the north. Along its course are two rectangular towers, about 60 m. apart and 60 m. from the gate and the tower at either end. The eastern of these two rectangular towers was clearly visible and was surveyed in 1965 (Pl. 90; the structure built against the wall to the east is post-classical). The western was found by probing along the line of walls in 1967 and was cleared in 1968 (Pl. 87, b). It is immediately to the west of the point at which the wall turns to the north. Both towers are a little over 5 m. wide and under 5 m. deep. Two courses of conglomerate blocks are preserved, the lower forming a polygonal paving of closely fitted, irregularly shaped blocks (0.25-0.35 m. high), the upper of regular, rectangular blocks in two parallel lines around the sides of the towers, the inner row being narrower than the outer. The entrances are through the width of the city wall. The details that follow are for the western tower which was examined more closely in excavation. The entrance is 2 m. wide narrowing to 1.20 m. The polygonal paving extends on the floor level to the south face of the city wall. It rests on this side on at least some 0.40 m. of heavy gravel below which begins gray, calcareous mud. The floor of the tower is at present 2.20 m. below sea level. The entrance was from the mole or quay which at this point was about 3 m. wide. The eastern tower was entered from land.

Of the pair of circular towers the southern is at a higher level than the wall and tower to the north (1.50 m. below sea level on its north side). The visible upper course consists of an arc of some 260° of 15 headers (1.00 m. by 0.50 m.) alternating with 14 pairs of stretchers (the outer stretcher, 1.25 m. by 0.75 m.) on the west and north. The south side continues the line of the city wall coming from the west and forms a right angle with the east side, also constructed of headers and stretchers. Presumably one or more lower courses of the segment-shaped blocks seen in the north tower lie below.⁴⁴

The two circular towers are 20 m. apart, possibly the original width of the opening at this point. But on the north side there are three rows of blocks belonging to the mole or quay described above, and on the south a sizable construction projects north from the south tower for 11 meters (Pl. 89). It is 3.25 m. wide and consists of an upper course of polygonal, conglomerate paving under which lies at least one course of poros foundation blocks. The three blocks at the northeastern end are of particular interest. A hole is cut between two adjacent blocks 0.10 m. from the north edge and 0.50 m. from the east edge, measuring 0.50 m. east to west, and 0.30 m. north to south, and 0.20 m. deep. Two smaller rectangular holes lie 0.25 m. to the south, each cut entirely into a separate one of the same two blocks, one just to the east of the larger cutting and in the same large block that forms the northeastern

⁴⁴ Cf. Agnes N. Stillwell, *Corinth*, XV, i, *The Potters' Quarter*, Princeton, 1948, pp. 56-57, pl. 18 B (dated to the late fifth century B.C., p. 62).

corner of the projection, the other aligned with the west side of the larger cutting. They measure 0.15 m. east to west, 0.25 m. north to south, and are 0.20 m. deep. The large block forming the northeastern corner was fastened to a third block to its west by a double T-clamp (Fig. 7).

These cuttings cannot be for a land gate between the end of this projection and the north tower. There is no trace of a sill or other construction in the space. The top of the upper course is 2.00 m. below sea level. Sherds of early Byzantine pottery can be found for another 0.60 m.; that is, in early Byzantine times the space was open for over half a meter below the cuttings, and presumably for a greater depth in classical times. All sherds stop *ca.* 1.40 m. below that level. We conclude, therefore, that the opening of seven meters was a sea gate and that the cuttings at the end of the projection were for a wooden boom. One possible explanation of the mechanism of the boom has been suggested by Marian and Louis McAllister and is shown in Figure 7. The large cutting held a block of hard, fine-grained stone (such as gray limestone), serving as a pivot block. The pivot was a bronze pin set into the bottom of a vertical post. The smaller cuttings were sockets for two vertical beams running as high as the masonry part of the walls to which they were fastened. (Courses of stone must certainly have gone higher than the usual orthostate course in this exposed location; the alignment of the cuttings suggests that the masonry was flush with their west and south sides.) The top pivot was set in a horizontal beam sandwiched between these two verticals and anchored back into the masonry. The boom was formed of two parallel horizontal members attached on either side of the pivot post near the bottom and bound together at intervals throughout their length (perhaps with bronze straps). The boom was supported in addition by a chain from the top of the pivot post to a point two-thirds along its length. A second chain at the one-third point would further counteract any tendency to sag, and be in accordance with common present-day methods of boom support. The natural tendency of the boom would be to pull the top of the pivot post outward, with an accompanying inward thrust at the bottom. The top is restrained by the horizontal beam embedded in the wall. The bottom is restrained by the socketed pivot block. There is no stress on the relatively weak outer margin of the conglomerate blocks on the northern edge. The pivot block is rectangular rather than square to brace against the masonry to the west, as the boom opens inward to the east, while leaving clearance for the back end of the boom. The offset position of the eastern (outer) vertical provides more stability for the open position. The double-T clamp was an additional special precaution against any outward movement of the corner conglomerate block. The reconstruction suggested here is hypothetical but accounts well for the details of the plan.

The advantage of a narrow opening which would barely admit a single trireme when the boom was opened by a crew protected by missiles from the two towers (and the fortification probably on the projection itself) can be seen if we recall the feat of Aneristos the Spartan who captured Halieis with a single merchantman full of

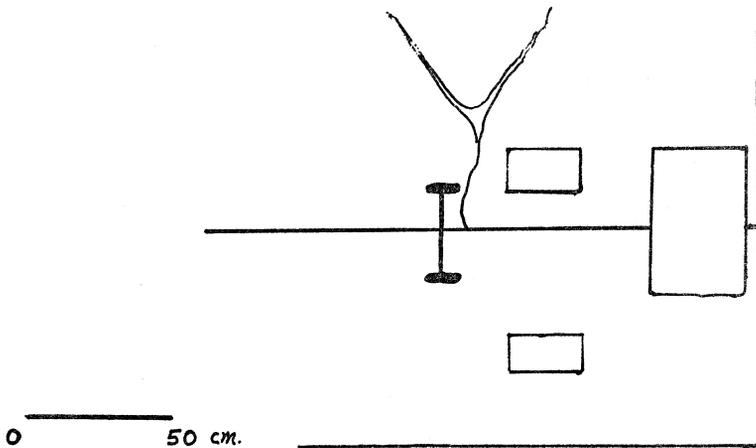
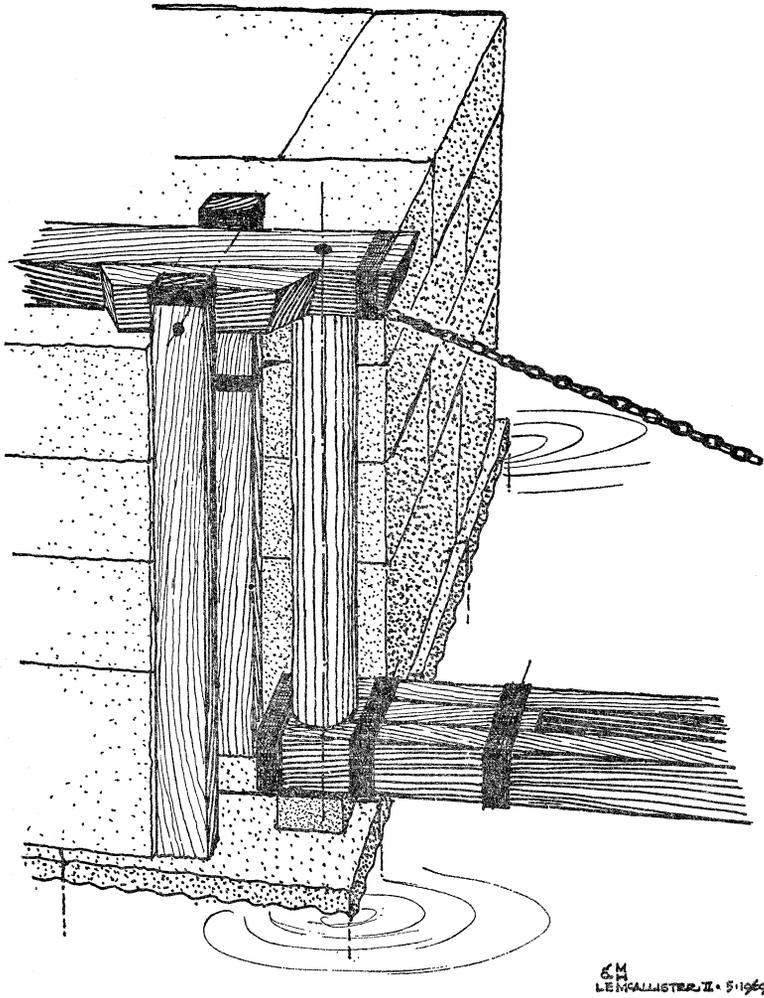


FIG. 7. Reconstruction of a Boom at the Harbor Entrance and Sketch Plan of Cuttings.

soldiers (Herodotos, VII, 137). Can it be that he was admitted into a fifth century version of this enclosed harbor, perhaps before the narrowing of the space between the two towers by the projection we have just described?

A further noteworthy feature of the entrance is a wall of poros blocks which bond into the outer, western face of the projection at 4.50 m. south of the tip, at a depth of 2.25 m. from the surface. It could be traced for 7 m. to the west, two courses deep at the east end, resting on conglomerate rubble, but loss of the upper course and the displacement of the last observed block suggest that the western end has been destroyed. In character and function it can be compared to the poros retaining wall along the side of the city wall inside the harbor. It could have formed a quay below the south tower and at the same time prevented silting of the harbor entrance.

Taking the evidence together, we see a harbor formed by projecting the line of the city wall to the north rather than the south of due west from the Hermione gate. The mole carrying the city wall to the north tower formed the northern limit of the harbor and the projection with the hypothetical boom part of the west side. The eastern limit is not so obvious. No building that is certainly of classical date has been found west of the eastern of the two rectangular towers 60 m. west of the Hermione gate, although 10 m. to its west there runs a north-south line of flimsy wall which joins at a right angle a similar wall close in and parallel to the present shoreline. No buildings of any description have been found west of this line, between the city wall and the shoreline to the south. About 22.50 m. to the west of the same tower the poros retaining wall of the mole comes to an end. We should perhaps conceive of the natural beach as the harbor edge on this side. It is possible that the south shore of the harbor is in fact in the flat field along the shore. The resulting harbor is roughly 100 m., east to west, and a minimum of 40 m., north to south. By any standards this is small, but sufficient to provide shelter for several friendly warships. Halieis's strategic position at the entrance to the Argolic Gulf, across from Lakonian Prasiai and on Athens' route to the west, was probably a major reason for her existence, and perhaps also for her eventual destruction.⁴⁵

No precise evidence for dating the harbor and its surrounding walls has been found. (Re-occupation in early Byzantine times will be discussed below, pp. 339-340). Black-glaze sherds found in packing behind the short poros wall outside of the south tower suggest what we would in any case expect, that the arrangements at the entrance were not built until after the beginning of the classical period. The circular tower on the acropolis, as we have seen, is not earlier than the fourth century B.C. and we may suppose that the round towers in the water are of the same date, though perhaps replacing earlier buildings.

⁴⁵ We know little about artificially enclosed harbors of the classical period and even that needs to be re-studied. Cf. Karl Lehmann-Hartleben, "Die antiken Hafenanlagen des Mittelmeeres," *Klio*, XIV, 1923, pp. 65-74. Larymna, which seemed a possible parallel to Halieis, proved illusory on investigation; see Schäfer, *Arch. Anz.*, 1967, pp. 527 ff.

OTHER REMAINS IN THE SEA

The whole eastern side of the present harbor of Porto Cheli was dry land in antiquity for as much as 225 m. from shore. This is shown by the remains outside the city wall beyond what we have referred to as the Hermione gate (Fig. 6; Pls 90, 91, a, 92). The area of the gate itself is extremely confused because an early Byzantine bath (Fig. 6) has been built on the classical fortification that flanked the gate on its west side. Nonetheless traces of the road can be seen in aerial photographs going out from the city and passing along the east side of an isolated building. The gate was flanked on the west by a rectangular projection from which sprang, four meters farther to the west, the arc of a circular tower of the same character as the two circular towers to the west. Clearing in 1965 uncovered part of a ring of segment-shaped conglomerate blocks like those on the north tower at the harbor entrance and presumably from an equivalent course, at 0.60 m. below present sea level. The chronological and functional relationship of the rectangular projection to the circular tower is not evident nor, because of the late bath, is it clear how the tower and the city wall to the west linked up. On the east side of the gate inside the city wall there was a rectangular construction perhaps open to the roadway which seems to be leading into the center of the town.

At twenty meters outside the gate is the isolated rectangular building, *ca.* 11 m. by 14.50 m., lying along the west side of the road (Figs. 2, 6; Pl. 91, a). There are two rows of three square column bases (of limestone, resting on poros blocks) in the interior, *ca.* 2 m. apart, and beginning 3.25 m. from either end and 3 m. from each side. The floor level is *ca.* 1.80 m. below sea level. The flimsy walls, averaging 0.25 m. in height and resting on rubble foundations, are badly worn. There is heavier construction on the north side, especially at the northeast and northwest corners. Pottery along the foundations is classical and there is relatively little Byzantine pottery even on the floor which lies under a thin layer of mud. There was considerable classical pottery, some of it finer ware, on the north side, and some geometric sherds, perhaps from early graves along the road, disturbed by the building which itself appears to be of fourth century B.C. date. Nothing found suggests the building's function.

In the waters of the northeast side of the bay, some 600 m. from the gate, there is a considerable complex, covering an area of about 120 m. north to south and 40 m. east to west, at a depth of about 1.50 m., and consisting of no less than six sizeable structures (Fig 8, Pl. 92). Particularly noteworthy are a long stoa-like structure of over 26 m. in length with a heavy foundation for its western wall (A); a shorter structure (B) to the south of this with a solid foundation up to five meters in breadth; and a complex of small, rectangular rooms (C) to the east of the last building. The complex would have lain between the sea shore and the road to Hermione, traces of which, detected in an aerial photograph, are shown in Figure 8. (The road would have continued through a low valley to the north and into the plain of

Flamboura, passing graves and other traces of classical construction, using the long, ashlar blocks of conglomerate as their first course.) No excavation or clearing has yet been attempted. The complex itself is of more solid construction than any buildings in the town other than those connected with the fortifications. But there is no evident use of brick or mortar and the complex is probably contemporary with the classical town.

In early Byzantine times the areas of the lower town and the harbor were re-occupied. The characteristic "late Roman combed ware" is widespread in upper strata and in occasional deeper pockets where digging and robbing of blocks occurred

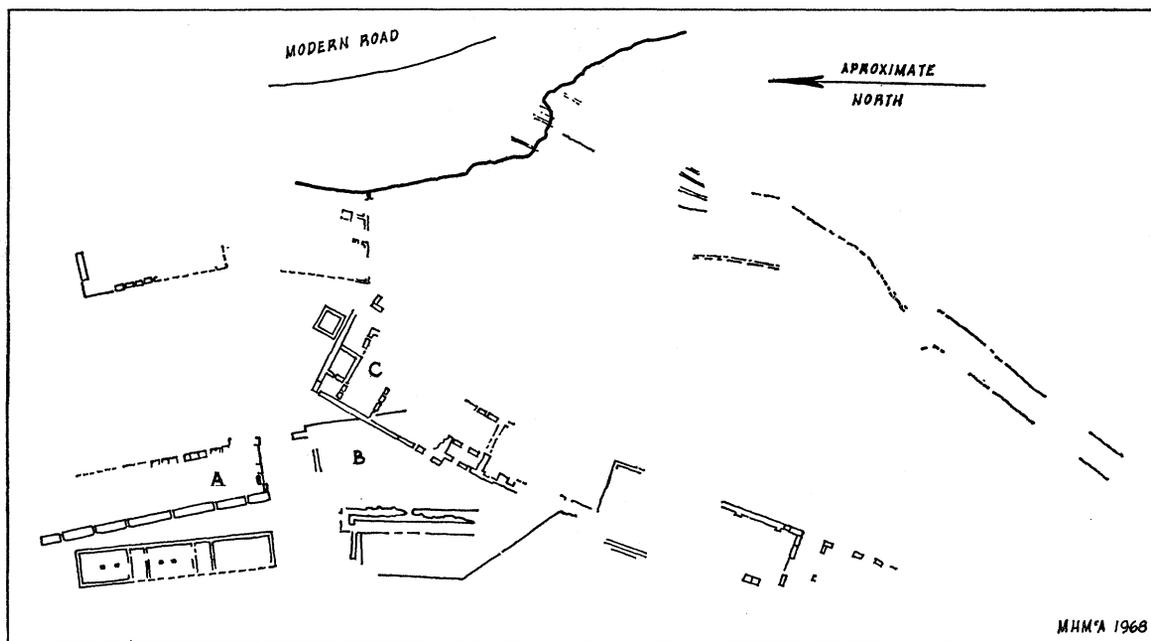


FIG. 8. Remains in the Northeast of the Bay (cf. Pl. 92).

(as in the house in the northwest quarter, above, p. 328). Immediately to the north of the city wall and west of the Hermione gate a number of structures can be seen in aerial photographs (Fig. 6; Pl. 92) and on inspection have proved to be of baked brick and mortar construction. The most conspicuous of these late buildings is the bath complex built on the classical remains forming the west side of the Hermione gate. Some of its remains are above water when the level is low. There are two apsidal-ended rooms, one of which, in the southern corner, was cleared by hand in 1965 and was shown to have been a hypocaust with cement and rubble walls and cement and tile floor. The remains of the circular tile columns that supported the floor of the room were recovered.

In the harbor quantities of early Byzantine coarse ware have been found.

Fragments of large amphorae, decorated with spiral-grooving and well enough preserved to furnish profiles, point to the late fifth and early sixth centuries after Christ (Fig. 9).⁴⁶ This agrees with a broken lamp with a reversed chi-rho monogram found on the orthostates of the city wall in the sea.⁴⁷ Unfortunately these stray finds do not tell us the duration of the Byzantine occupation.

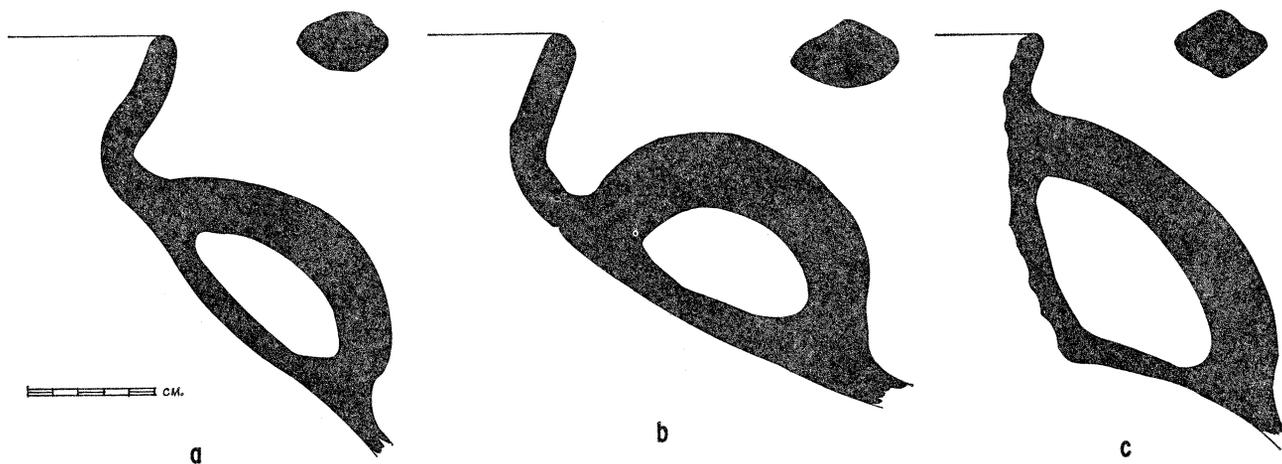


FIG. 9. Profiles of Byzantine Amphorae.

THE VICINITY OF HALIEIS

The ancient road from the necropolis gate on the southeast side of the city goes up the low valley to the east, south of the modern road to Kosta. Its course is shown by cart tracks in rock about 500 m. from the gate and the remains of graves for some 600 m. thereafter. Closer to the city, on the south side of the road on a small north-facing terrace of the hill immediately to the east of the acropolis hill, a number of surface finds point to the presence of a small sanctuary: miniature votive cups and lamps, fragments of terracotta figurines and of marble. The shrine was probably

⁴⁶ With Figure 9, a, and b, cf. I. Barnea, "L'incendie à Dinogetia au VI^e siècle," *Dacia*, N.S., X, 1966, p. 246, fig. 8, #7. The destruction of Dinogetia is dated to A.D. 559. (I owe this reference to the kindness of Dr. John Hayes.) Figure 9, a, was found at 2.60 m. below sea level in the entrance of the harbor. With Figure 9, c, cf. *ibid.*, p. 251, fig. and with 9, b, cf. H. S. Robinson, *The Athenian Agora*, V, *The Pottery of the Roman Period*, Princeton, 1959, pl. 32, Group M. M 326, early sixth century. Figure 9, c, was found at 1.75 m. below sea level, 9 m. north of the city wall in the area shown in Plate 87, a and Figure 5. It should be borne in mind that the sea, whose level rose after the Byzantine occupation, cut through Byzantine levels and into the classical, carrying with it material from upper levels.

⁴⁷ In the same area as the amphora, Fig. 9, a (note 46, above). Cf. Oscar Broneer, *Corinth*, IV, ii, *The Terracotta Lamps*, Cambridge, 1930, p. 110, fig. 52, no. 5; Judith Perlzweig, *The Athenian Agora*, VII, *Lamps of the Roman Period*, Princeton, 1961, pl. 39, 2446. Ours has a knob handle and a row of globules around the rim.

of Demeter, judging by the lamps and by the figurines carrying pigs which Philadelphus found, evidently on this same terrace, according to his notebook of 1909. About 150 m. below and to the west of the terrace a marble cornice block was found built into an abandoned house in 1965 and in 1968 there was found in a near-by farmyard a piece of marble sculpture (HS 211; max. preserved length, 0.18 m.). Dr. Ilse Kleeman who has examined the piece describes it as the elbow and portion of the right forearm of a standing human figure, probably female, with arm extended forward. She suggests it is part of an original work of the fourth century B.C. The material may be island marble.

The necropolis of Halieis has long been known to the local people. Philadelphus in 1909 found many graves rifled. He excavated others and brought their contents to the National Museum in Athens. In 1958 and 1959 bulldozing by farmers uncovered several more graves whose salvage was undertaken under the supervision of Dr. Verdelis. Cleaning and measuring was done by Christina Moll Dengate and Charles Williams in 1966 and Mrs. Dengate has been continuing the study of the pottery.

The earliest burials, probably cremations, in large hydriai and ΣΟΣ amphorae, correspond in date to the earliest architectural phase on the acropolis, i.e., of the late seventh and early sixth centuries B.C. Thereafter, in the sixth, fifth and fourth centuries, there appears to be a continuous sequence of burials in rectangular cists cut from two to four blocks of conglomerate and covered by stone slabs, some at least of the shelly limestone such as was used for the coping blocks of the circular tower on the acropolis. Much of the pottery is Attic but relatively little of what has escaped the grave robbers is figured. A bronze mirror and a terracotta mirror case, a large female protome of terracotta, and a few fragmentary figurines should be mentioned.

Remains have been found all around the outer coast to the south and east of Porto Cheli. On the small bay of Lorenzo facing the island of Spetsai the lower portions of a tile kiln are being uncovered and destroyed by the waves on the shore. Because of his knowledge and interest in ceramic technology Professor Frederick R. Matson gave several weeks of his time in 1967 to cleaning out and studying the kiln.⁴⁸ Although the kiln's superstructure had been eroded by the action of the sea, its lower portions (hearth, two firing chambers and two stoking pits) were well preserved. The kiln was used for firing roof tiles and was in fact built of roof tiles and fired clay bricks faced with an application of clay. Perhaps the most interesting feature of the whole structure is the hearth (ca. 3.50 m. by 3.60 m.) whose upper face is dotted by some 185-190 flue holes. These flue holes permitted heat from the firing chambers to reach the newly made tiles stacked on the hearth itself. The upper

⁴⁸ Plate 91, b, photographed by Julian Whittlesey with the bipod, a device consisting of two legs from which is suspended a camera for continuous photography, including stereoscopic, of excavation in progress. Cf. *Archaeology*, XIX, 1966, pp. 273-276.

walls of the hearth, possibly of mud brick construction, have unfortunately disappeared. The fragments of tile found in the kiln showed that a Byzantine or later date was required. Radiocarbon testing of wood found in the stoking chamber gives a date of 155 ± 43 before the present (with half-life of 5730; 131 ± 41 with half-life of 5568). It is significant that purely in terms of construction no criterion for dating was evident.

Future work at Haliëis will concentrate on the lower town and the remains in the water, and on the relationship of the city to other remains in the region of Porto Cheli.

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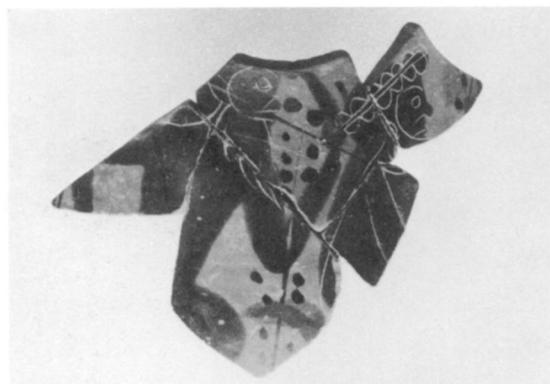
a. Lakonian II Cup



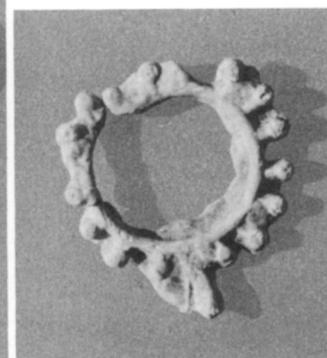
b. Argive-Corinthian Kotyle



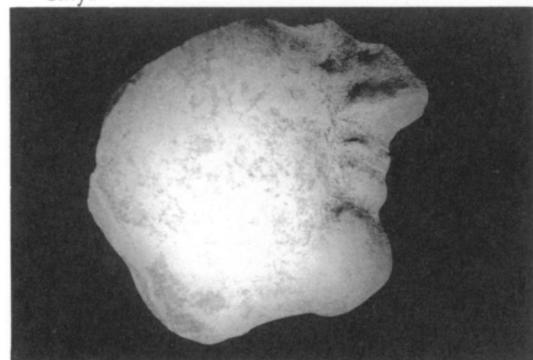
c. Lead Figure of Poseidon (3:2)



d. Black-figure Oinochoe Fragment, Dionysos and Satyr



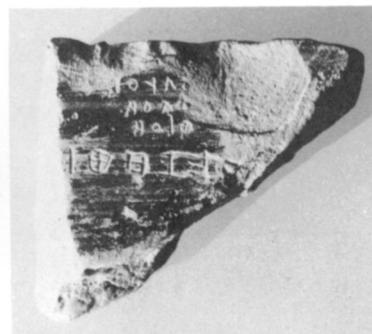
e. Lead Goddess and Wreath (3:2)



f. Terracotta Head, *ca.* 500 B.C.



g. Graffito on rim of Cup



h. Graffito on Roof Tile in Argive Alphabet



i. Inscribed Rim of Perirrhanterion



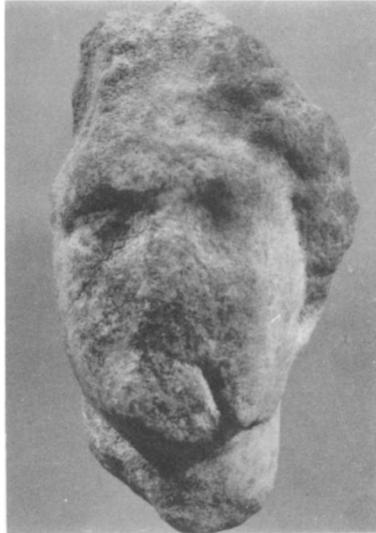
a. Fragment of a Limestone Stele



c. Fourth Century Skyphos in Final Destruction of Circular Tower



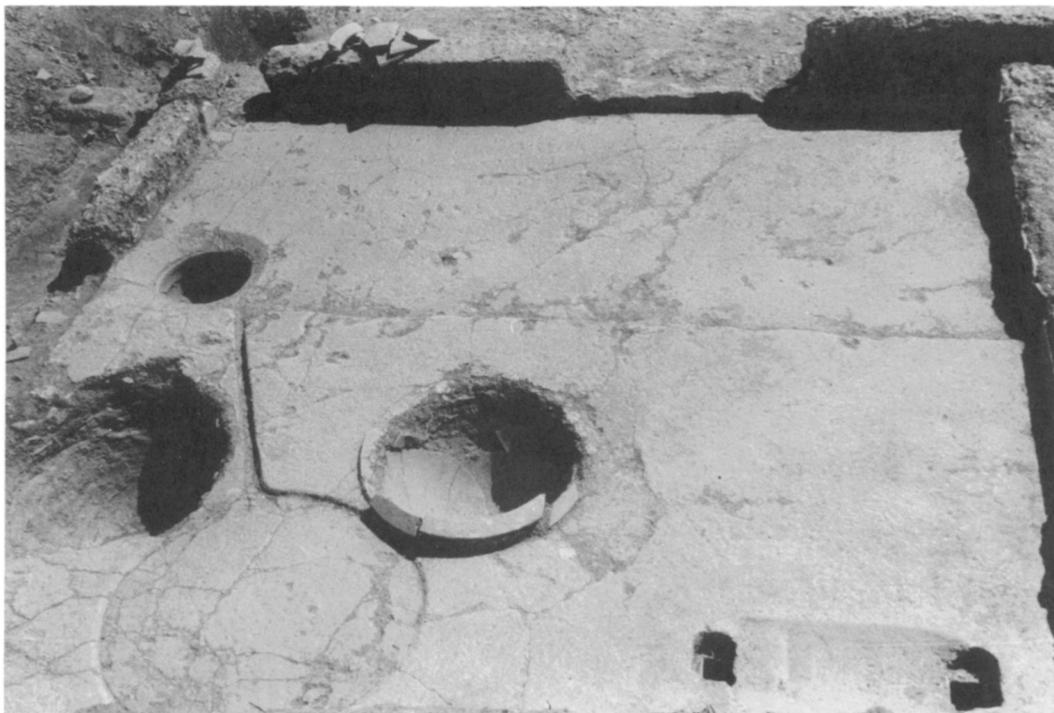
d. Plastic Vessel in Final Destruction



b. Marble Head



e. Red-figure Fragment from the Lower Town



f. Room with Press

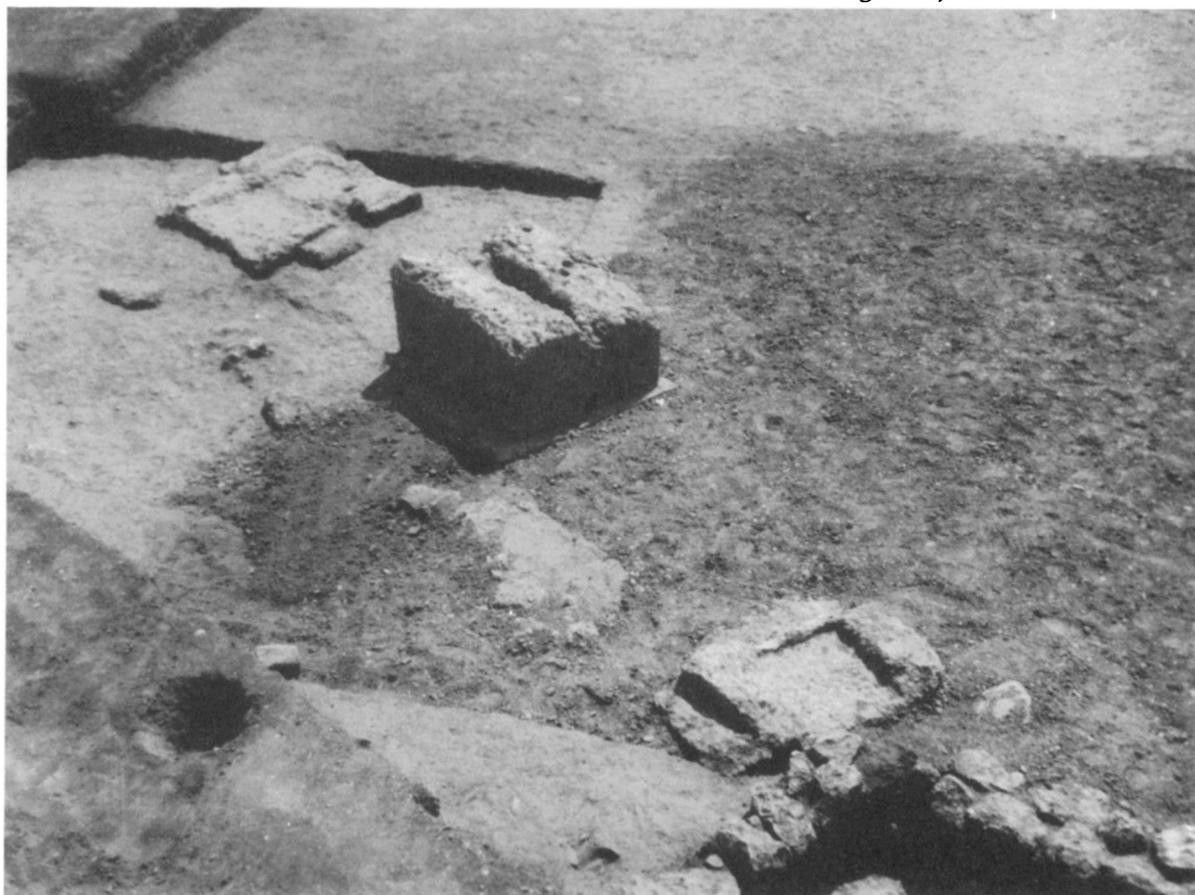


Terracotta Mould from the Lower Town

MICHAEL H. JAMESON: EXCAVATIONS AT PORTO CHELI AND VICINITY, PRELIMINARY REPORT I:
HALIEIS, 1962-1968



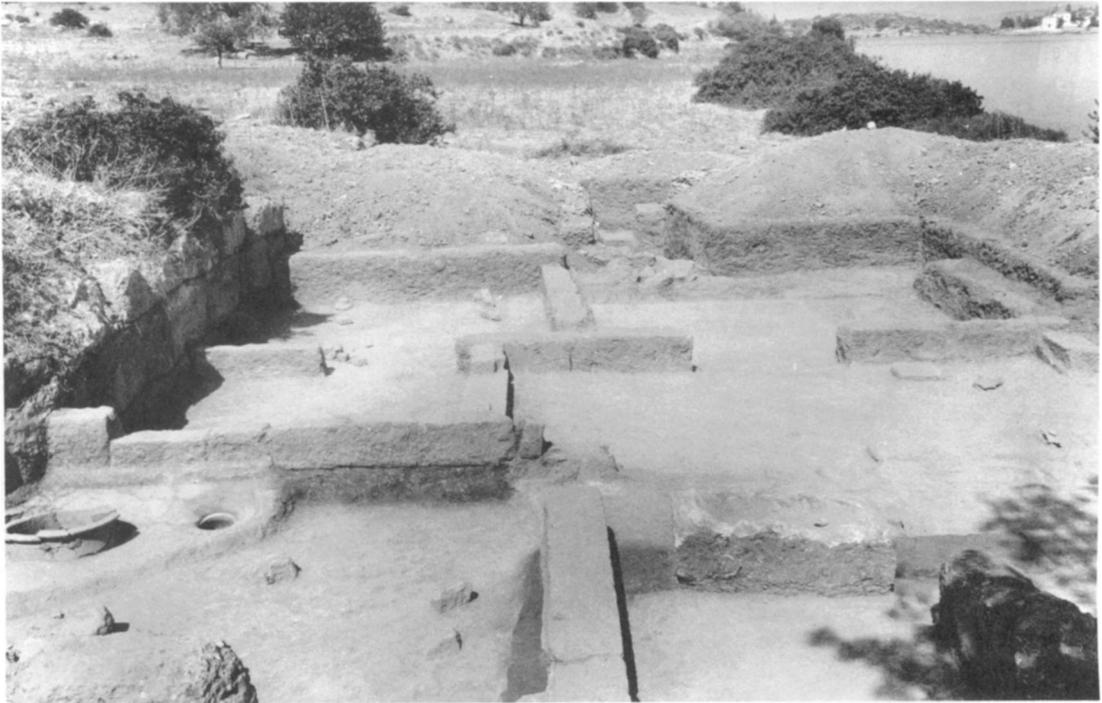
a. Entrance to Porto Cheli Harbor from the Argolic Gulf, seen from the Acropolis (Three-roomed Structure of the Last Phase of the Fortifications in Foreground)



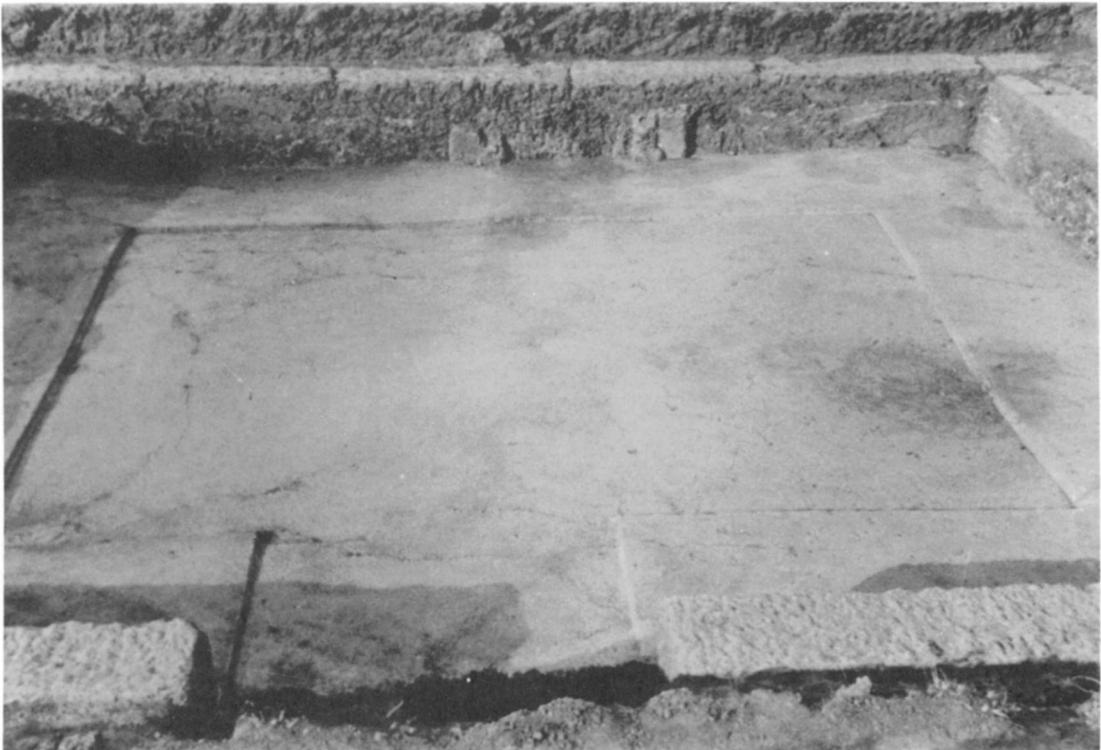
b. Altar Area on the Acropolis, from North



Circular Tower and Mud bricks

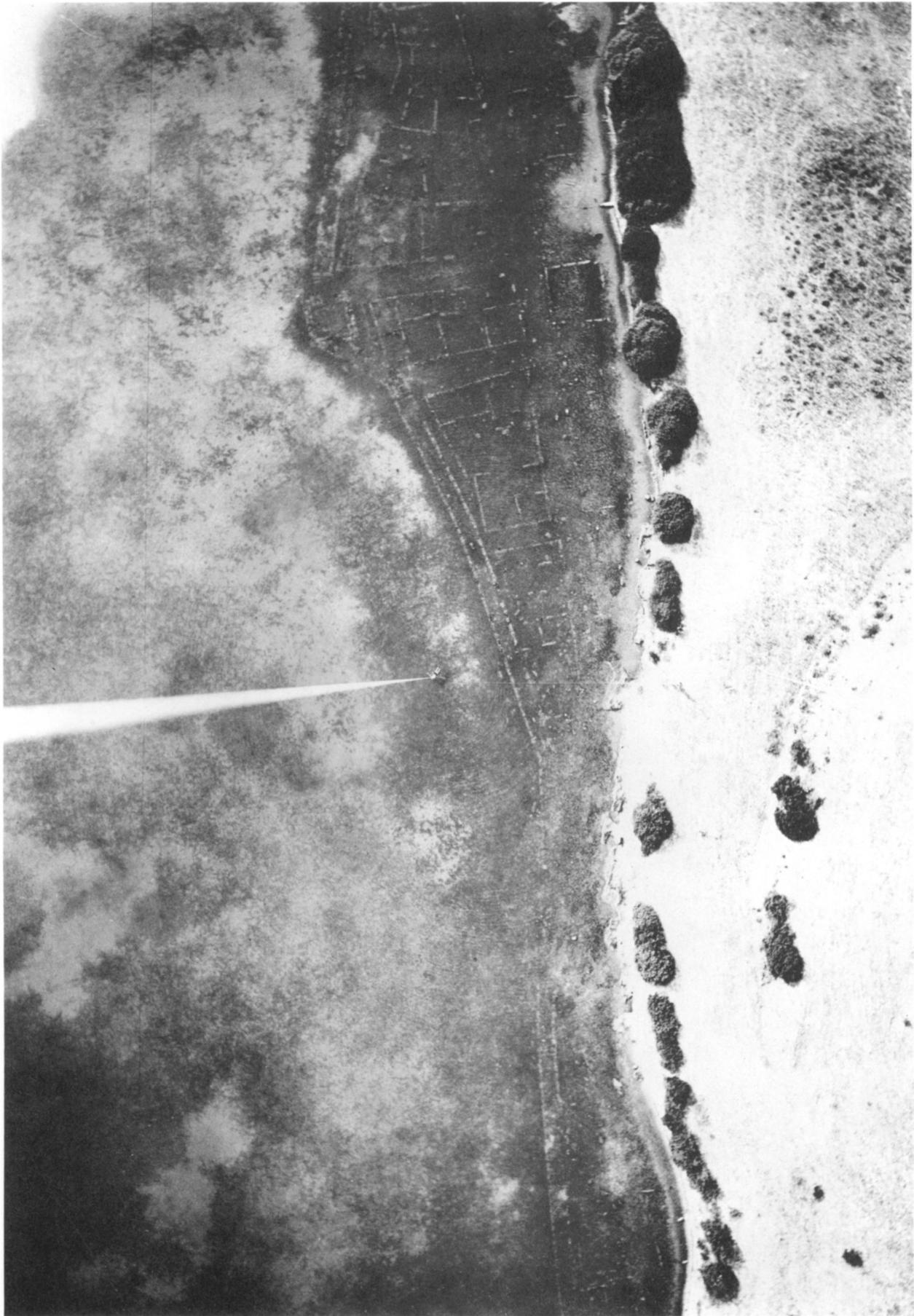


a. House in the Northwest Quarter

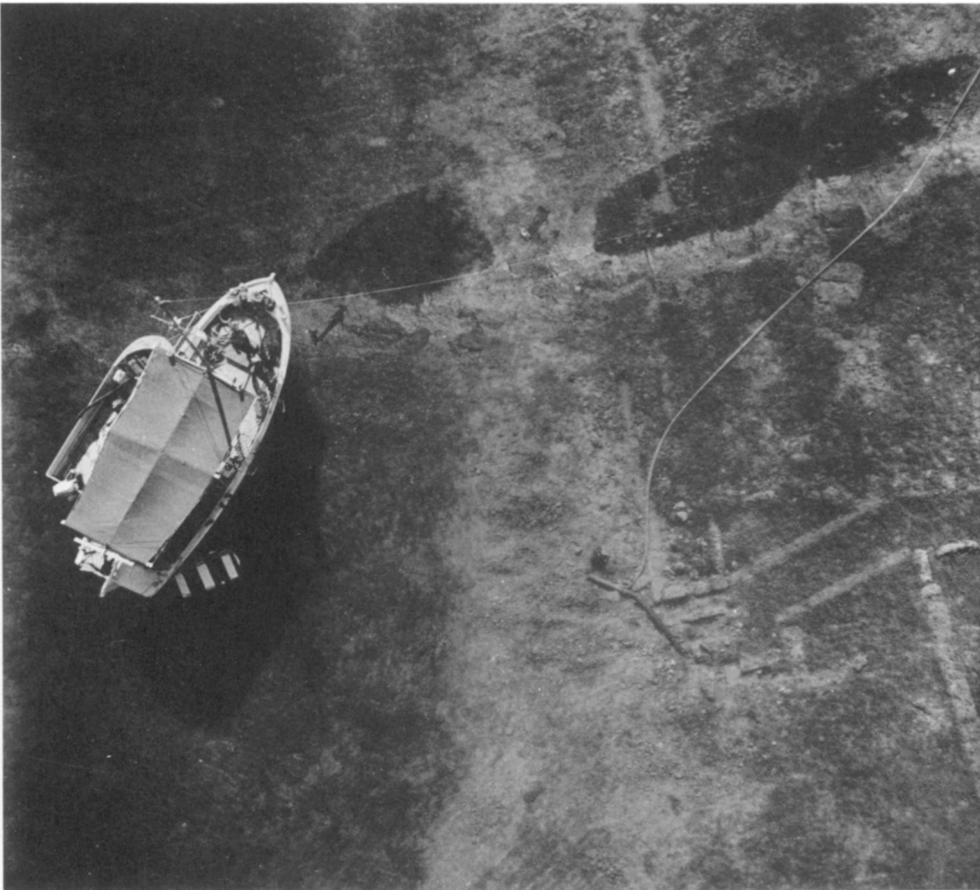


b. Dining Room in Northeast Quarter

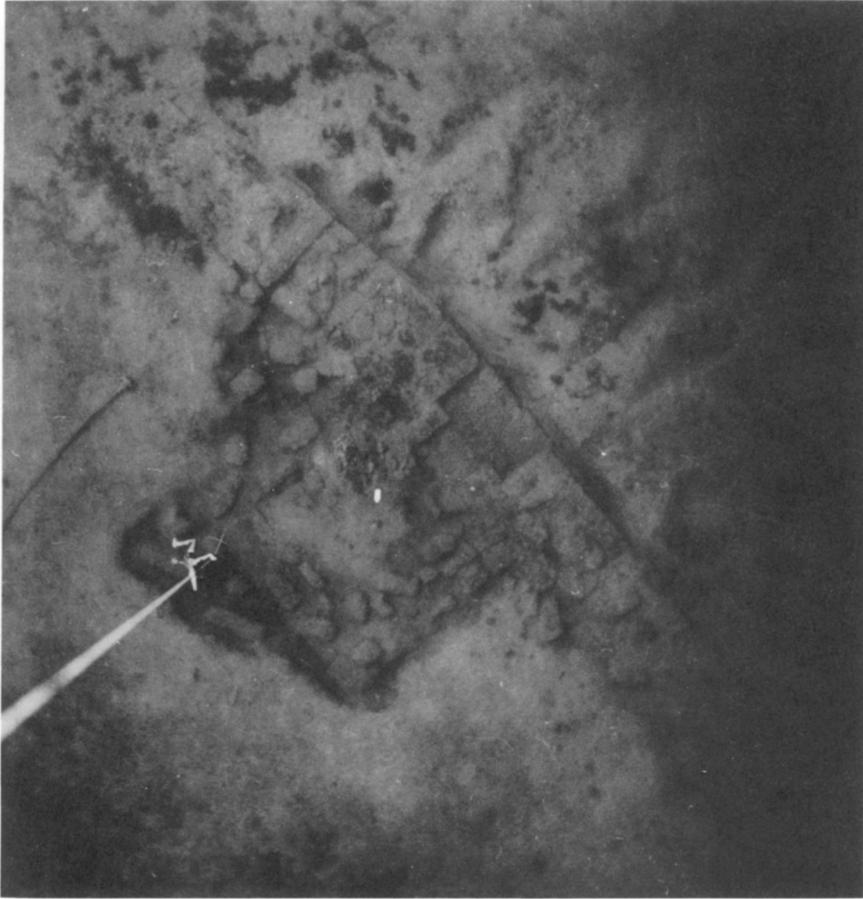
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HALIEIS, 1962-1968



Northwest Quarter from the Air
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HALIEIS, 1962-1968



a. Northwest Quarter: City Wall, Barracks (?) Building, and Dredge



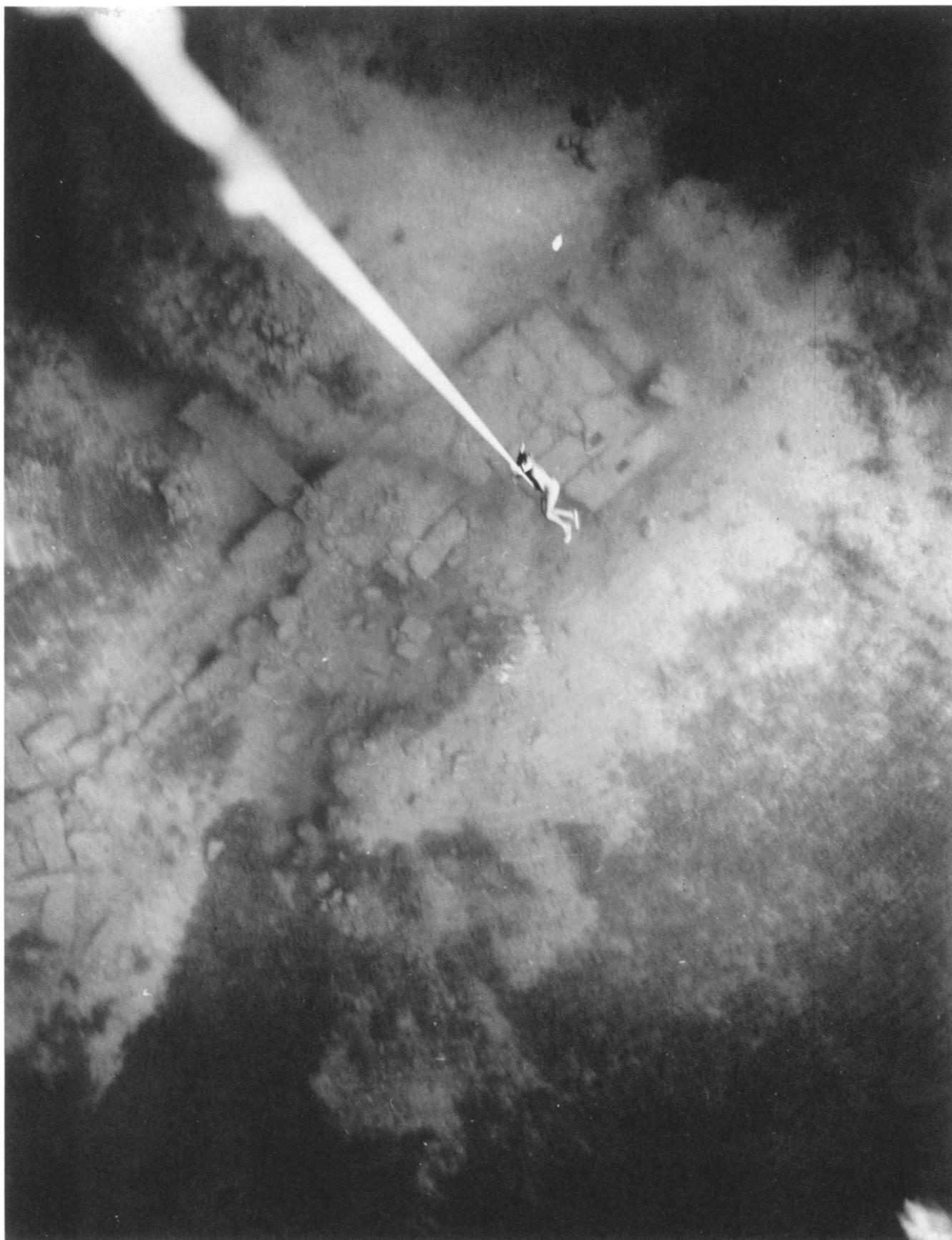
b. Western Rectangular Tower on the Mole

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HALLEIS, 1962-1968



Entrance to the Harbor (1967)

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HALIEIS, 1962-1968



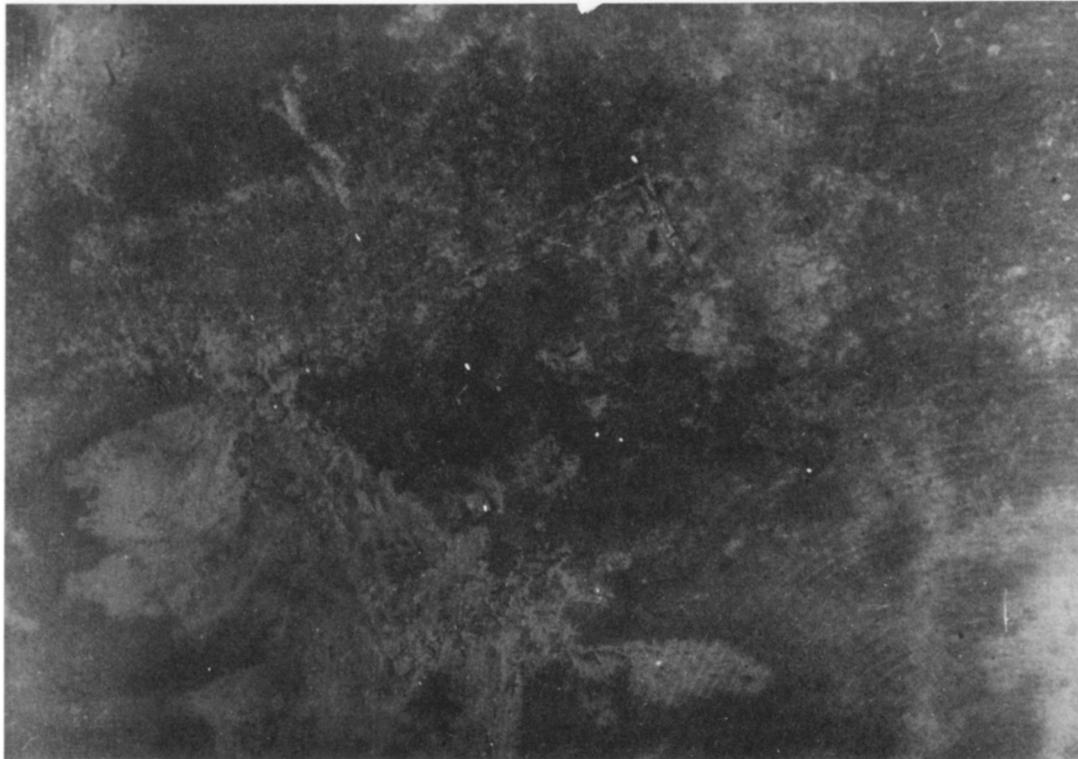
Projection at Entrance to the Harbor (1968)

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HALIEIS, 1962-1968

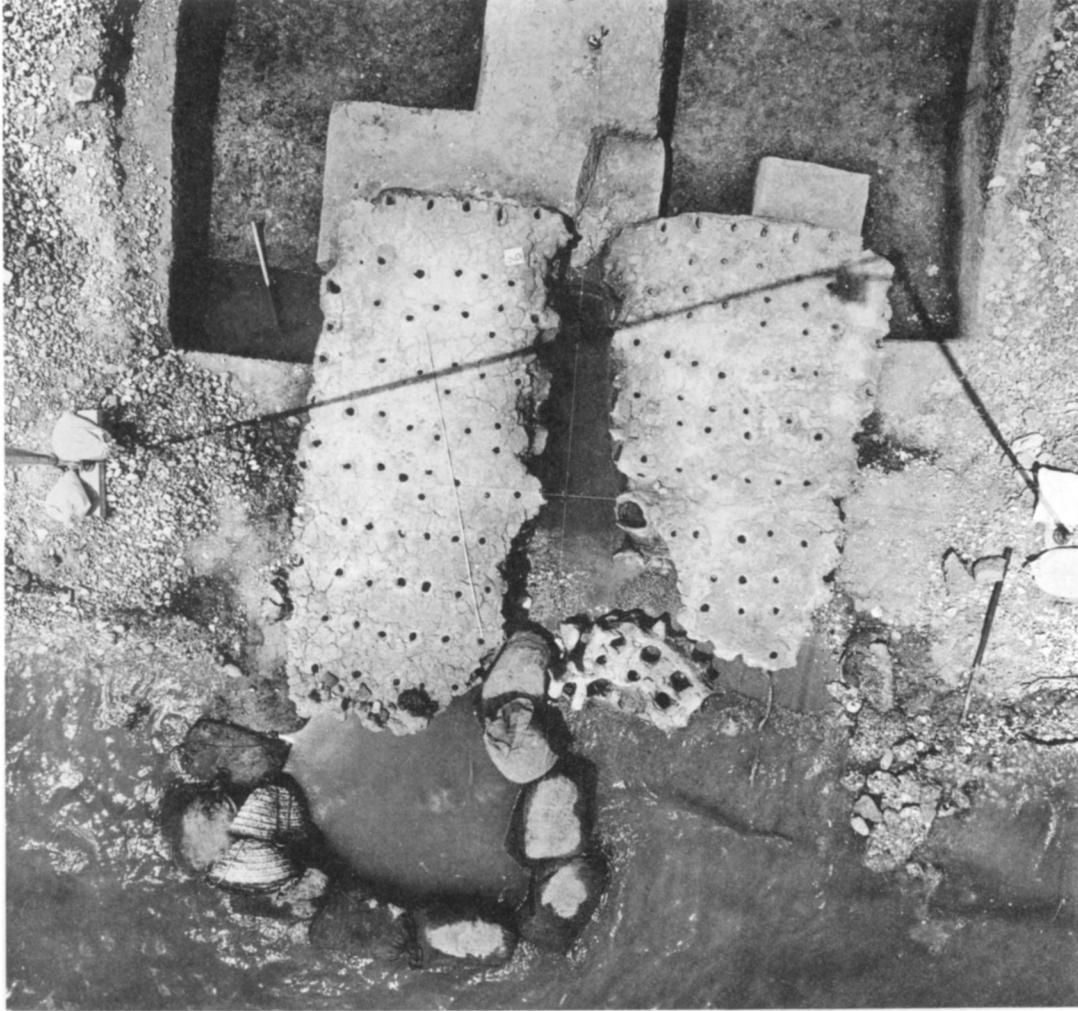


Northeast Quarter from the Air

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HALIEIS, 1962-1968



a. Building outside of the City Wall, on way to Hermione



b. Tile Kiln at Lorenzo, photographed from Bipod

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HALIENS, 1962-1968



Remains in the Northeast of the Bay (cf. Fig. 8)
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HALIEIS, 1962-1968