# Structural Characteristics of the Ancient Harbours of Lesbos

During the Geometric Period the island of Lesbos was divided into six city-states, presenting the largest insular state division of the ancient Greek world (fig. 1).[1] All of these coastal cities were founded on naturally fortified sites. Every city was also surrounded by a number of small coastal villages developed particularly in the Hellenistic and Roman periods. The harbours of the smaller villages, with or without artificial structures, served for local needs like fishing and transportation of people and goods just as in the modern coastal villages of Lesbos.[2] The wealth and development of the six Lesbian city-states over the centuries were based on their harbours, directly linked to the maritime trade and control of sea routes within the Aegean and Eastern Mediterranean trade network. Mytilene and Methymna became hubs in this trade, which experienced considerable growth, especially in the 7th and 6th c. BCE. Methymna controlled the northern strait on the sea routes connecting the Aegean Sea with the Propontis and Black Sea, while Mytilene controlled the eastern and southern straits to the opposite coast and the mid-Aegean islands.

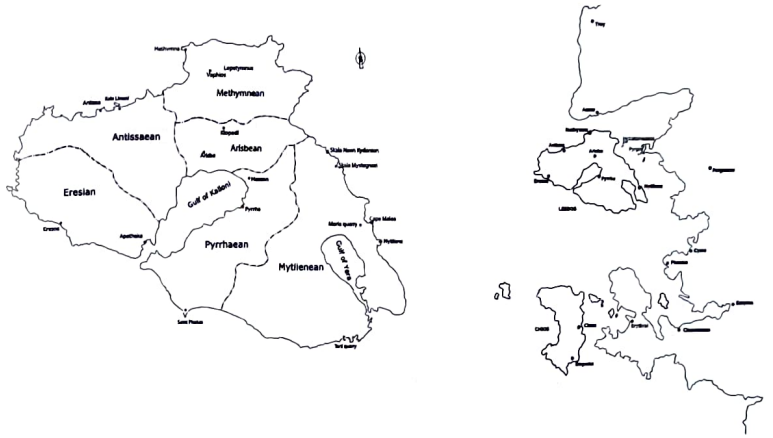


Fig. 1: Map of Lesbos and its city-states during the Geometric and Early Archaic period

Among the trading products of Lesbos, the most important were the famous Lesbian wine,[3] olive oil,[4] seafood (including molluscs), mainly from the Gulf of Kalloni and Methymna,[5] dark-coloured

[1] For the Lesbian cities and their territories: Hdt. 1. 151; Κοντής 1973, 15–23; Κοντής 1978, 125–350; Mason 1993, 225–250; Labarre 1996, 191–201; Spencer 2002, 68–70; Δημοπούλου-Πηλιούνη 2015, 25 fn. 1; 47–55. 307.

[2] For the maritime transportation of marble blocks from Moria quarry, see Millar – Williams 1993, 211–224. See also Αργύρη-Θεοδούλου 2012, 100–109 for minor anchorages around the Gulf of Kalloni.

[3] For ancient testimonies to the Lesbian wine: Clinkenbeard 1982, 254–256; Καλδέλλης 2002, 52–55 no. 29–38; Αχειλαρά 2006, 82–92.

[4] Ioannis Kontis (Κοντής 1978, 40 paragraph 153) remarks that the lack of references to Lesbian olive oil in ancient testimony may be due to the primitive methods used for its production, resulting in low-quality product.

[5] Archestratus in Athenaeus, Deipnosophistae 3.92; Κοντής 1978, 48 paragraphs 188–191 for the species of Kalloni

marble mainly from the quarries at Moria[6] and Tarti,[7] alum,[8] used for pharmaceutical and craft-industrial purposes;[9] and a precious stone unknown to us that Pliny the Elder calls ›Lesbias‹.[10] From the second half of the 8th c. BCE and mostly in the 7th c. BCE the Lesbians, first and foremost those from Mytilene, founded or participated in the foundation of colonies in the coastal zone of neighbouring Asia Minor, namely in the Aiolis and southern and western Troad, the Thracian Chersonese, and even Egypt.[11]

The relationship between colony and mother city must have been quite close, especially with regard to the Aiolian foundations on the western coast of Asia Minor: the ports of mother and daughter cities in some cases were separated by only a few kilometres, allowing close visual contact, as for example with Methymna and Assos.

This chapter concentrates on the five major harbours of ancient Lesbos (Methymna, Eresos, Antissa, Pyrrha, and Mytilene) in relation to their urban plan and the development of coastal buildings with an economic, religious or defensive character. Data are integrated from ancient written sources and the results of underwater mapping of ancient harbour structures over three seasons (2007–2009) conducted under the direction of the Ephorate of Underwater Antiquities in the framework of the project: »Recording the harbour network of ancient Lesbos«.[12]

In addition recent archaeological investigations by the local Ephorate at Mytilene, undertaken in conjunction with massive work on the city's sewerage system, have revealed the coastal installations and bridges of the ›strait of Euripus‹. The city's North harbour's installations are specifically studied in relation to the monumental structures that became known along the Euripus with which they were closely interconnected. Within this framework the study attempts an analysis of structural features in order to define a chronological horizon for the installations and their connection to the history of the city, but also possible similarities to other Lesbian harbour works.

Gulf as they are stated in Aristotle (History of Animals 5. 12. 3; 5. 15. 9).

[6] Plin. nat. 36. 5. 44; Kontis (Κοντής 1978, 14 paragraph 48) states that the island's grey-blue marble was not initially used (during the Classical period) in monumental architecture and sculpture. See also Κοκκορού-Αλευρά et al. 2014, 19–21 site 29 fig. 1.

[7] Κοκκορού-Αλευρά et al. 2014, 22 site 37 fig. 2.

[8] Αχειλαρά 1998a, 778 f. pl. 321. Alum deposits in the territory of Methymna are found near Stypsi village. Roman workshops for the processing of alum have also been excavated on the beach of Apotheka close to the entrance of the Gulf of Kalloni in the territory of Eresos, a clear indication of the transportation of Lesbian alum by sea. There is also evidence that the Gattilusio family, sovereigns of Lesbos during the 14th and 15th centuries, took advantage of the precious mineral (Κοντής 1978, 15 paragraph 52). See Archontidou 2005, 85–88; Archondidou et al. 2005, 89–96.

[9] The pharmaceutical and industrial use of alum is known even from Archaic times (Hdt. 1. 180; Strab. 6. 2. 10).

[10] Plin. nat. 37. 62.

[11] Thuc. 3. 50. 3; 4. 52. 3; Alc. fr. 129, fr. 7, fr. 38a; Κοντής 1973, 23–25; Κοντής 1978, 58–67. 76–100. 143–154; Mason 1993, 226–229.

[12] In presenting the harbours, we follow the geographical division of the territories of the Lesbian city-states as established by Ioannis Kontis (1978, 125–365) even though modern research by Lillian Acheilara on ancient towers at ›boundaries of the territories‹ (see Acheilara in the present volume) has come to different conclusions, at least as far as ›land‹ is concerned. Other researchers have also attempted to define the boundaries of the Lesbian territories (Labarre 1996; Green 1982, 210–214; Mason 1979, 149–163; Mason 1993, 225–250; Schaus – Spencer 1994, 411–430). Harbours, however, are located at the central areas of the territories so the Kontis division system is a secure one for the purposes of this article.



## The territory of Methymna

Methymna aggressively incorporated the neighbouring territory of Arisbe at some time between the late 8th c. BCE and the beginning of the 7th c. BCE.[13] The two territories together cover an area of 391 km², extending along a 72 km-long coastline.[14] Methymna is built on a naturally protected strong peninsula with an indented coastline that forms a number of natural bays. Around 700 BCE, according to Herodotus and Strabo, Methymna established the colony of Assos, only twenty kilometres away on the opposite coast of Asia Minor.[15]

The picturesque fishing shelter of Molyvos, the surviving medieval name for ancient Methymna, was identified at the end of the 19th c. by the German architect Robert Koldewey as the ancient naval harbour of the city. According to Koldewey the artificial breakwater of the ancient harbour forms an L-shape to the west and south estimated to have been 175 m long.[16] Koldewey did not identify any fortifications upon the breakwaters that he believed would justify the character of the Classical type of *limen kleistos*.[17]

Today, the well-preserved stone-built breakwater with its inner quay framing the protected basin and its entrance at the west remains undated. Koldewey dated the structures to medieval times, but we cannot rule out an earlier date. Several parts of this breakwater are now covered with a concrete coating. The breakwater stands on a huge rubble stone platform reaching a depth of 25 m at the south. It is quite possible that one part of its core was a natural formation, a cape or reef, which was artificially shaped to accommodate harbour structures (pl. 4).

Southeast of the present breakwater at a depth of 0.62 m a surviving part of the tip of an ancient breakwater was located during the 2007–2009 research.[18] This breakwater was erected in an elaborate isodomic building pattern (pl. 5, 1) similar to the structures of the city of Mytilene, especially the northwestern breakwater of the North harbour, but also structures at the sides of the Euripus. It faces northwest and measures 6 m in width by 2.5 m in length, and it is preserved to a height of 1.20 m. At the northeastern side of the structure, a part of an architectural element looking like a mooring stone survives. It projects out of the structure and bears a vertical hole, now broken and looking like a channel. Given that mooring stones usually have horizontal holes and that the stone is located just at the tip of the breakwater, this stone could be interpreted as an installation to hold a kind of a closing device for the harbour entrance. The stone blocks of the upper course bear holes for dove-tail clamps. The construction stands at a height of two courses, founded on projecting, roughly worked, large blocks, at a depth of 1.29 m, where the sea level most probably was located in antiquity. Subtracting 0.62 m, the water height over the surviving structure, from 1.29 m we get 0.67 m, a height not sufficient for a quay. Therefore, we may safely

[13] Methymna and Arisbe are examined as a united territorial case study. Herodotus (1. 151. 2) refers to the violent destruction of Arisbe by Methymna around the end of 8th – beginning of 7th c. BCE (Ρούγγου – Δουλουμπέκης 2014, 24 f.

[14] Κοντής 1978, 264 f. paragraphs 1416–1424. The Methymnean territory has borders to the south with Pyrrha and Mytilene. At the west it had borders with Antissa until 167 BCE when the Romans granted Methymna to the territory of Antissa, so that it acquired borders with Eresos. The Methymnean landscape is mostly mountainous, with Lepetymnus as the main mountain, and some small flat areas near the coast like the one at Petra, where a settlement was established with an inevitably marine orientation.

[15] Strab. 13. 1. 51, 57 f. citing the Lesbian historians Hellanicus and Myrsilus; Κοντής 1978, 267 paragraph 1433.

[16] Koldewey 1890, 17 pl. 4.

[17] For the designation of λιμὴν κλειστὸς in the Archaic Greece, see Frederiksen 2011, 10 f.

[18] Theodoulou 2014, 497–500 figs. 5–7.

assume that the construction is missing the top layer of the dock, covering the whole surface and measuring probably another ~ 0.35 m in height. This assumption is strengthened by the presence of quadrilateral holes for the connection of an upper course or layer. At the southwest of the construction is a later addition of the same building pattern, with vertical sides and a filling of rubble stones, but of quite a modest technique. The highly structured isodomic shape along with the feature of the rounded edges of the corner stones and the similarity to structures in Mytilene can most likely date this breakwater to the 4th c. BCE. The northwestern orientation of the tip's face leads to the conclusion that the ancient harbour had its entrance to the southwest, as opposed to the modern port that faces to the southeast. The harbour definitely had a broader basin and was embraced by two breakwaters. Chunks of conglomerated rubble stones in an imaginary line witness the existence of the second mole, encompassing the harbour basin from northeast. They are probably parts of the filling either of the mole itself or of the city wall that probably extended along it. Northwest of the breakwaters' tip at the area where the entrance of the harbour was to be expected, no rubble stone chunks were traced. The breakwater was 6 m wide and such a width was enough to provide support for a 3 m-wide defensive wall upon it. Relics of a rubble wall in the area where the ancient breakwater and the city wall would have stood are visible in a 1930s photograph, but unfortunately they are not preserved today (pl. 5, 2). Judging from its height as shown in the photograph, and considering the sea level rise, it can be inferred that the nature of the wall could have been defensive.[19] Most of the ashlar blocks of the ancient breakwater were obviously reused for the building of the surviving fishing shelter[20] and the houses of Molyvos.

In the light of the new evidence and contrary to Koldewey's belief, it seems that the topography and orientation of the harbour of Methymna were quite different from today and the fortification of the city obviously included the city's naval base (λιμὴν κλειστὸς). Although the inner harbour installations have not been identified, they should still be present under the pre-modern buildings around the fishing shelter. This assumption is supported by the documented silting of the basin of the ancient harbour, which reduced its dimensions. In the coastal zone of the modern shelter, which follows the form and dimensions of the harbour of the Ottoman period, excavations of the local archaeological Ephorate have revealed the corresponding quay, in which ancient building material, mostly volcanic stone blocks and drums of non-fluted columns, is incorporated.

Finally, the western Necropolis of Methymna is located west of the harbour and extra muros. A short distance from the harbour (the actual location is unknown) a monolithic sarcophagus was found in the 1960s, containing a rich burial from the end of the 2nd c. BCE or the first decades of the 1st c. BCE.[21] The relation of the harbour to the city wall and the plateau above may well show the close connection of the fortified city with the port, especially with new data generated by underwater research. If the fishing shelter of Methymna was the naval base of the city, the existence of a second harbour located on the large beach south of the settlement to accommodate trading ships during the Classical and Hellenistic periods cannot be ruled out.[22]

[19] For the defensive walls of the city, see Buchholz 1975, 42–46 esp. 56; Κοντής 1978, 274–276; see also Kourtzellis – Pappa in the present volume.
[20] Theodoulou 2014, 497–500 fig. 8.
[21] This necropolis has not yet been systematically excavated: see Petrakos 1967, 459; Buchholz 1975, 60 f.; Kourtzellis – Pappa in the present volume.
[22] Κοντής 1978, 275 paragraph 1467. Most researchers repeat Koldewey's opinion about the existence of a second harbour on the coast of Methymna's valley. However the underwater finds show a different configuration of the shore, with buildings submerged today not indicating a harbour basin (Theodoulou 2014, 500).



During the 2009 mission, in order to document the ancient harbours of Lesbos, submerged structures were located, testifying at least to the ancient use and alteration of this southern coastal stretch in the territory of Methymna.[23] The naval base itself would also offer a refugee at its southeastern site that could operate as an anchorage for merchant ships.

**The territory of Antissa**

The territory of Antissa occupies the northwest part of Lesbos, covering an area of 239.65 km$^2$ extending along 61.50 km of coastline. It is primarily a mountainous region with small plains and rocky coastal sections. Several ancient sources mention viticulture, livestock farming, exploitation of oak acorns, and fishing as sectors employing its citizens.[24] Its harbour would obviously have been the entrance point for every kind of relevant export and import. There is not enough evidence to determine whether the harbour was also used as a naval base, a use which would seem quite reasonable. On the other hand ›Kalo Limani‹ or ›Tsamour Limani‹, located two kilometres to the east, has been proposed as the city's military harbour, an assumption, however, that has been reasonably questioned.[25]

Antissa and its harbour are mentioned by ancient writers in connection with the Mytilenean Revolt against Athens during the First Athenian Alliance (428–427 BCE), the events of 405 BCE, and later in the middle of the 4th c. BCE when Memnon of Rhodes captured the city.[26] The Romans destroyed the city in 167 BCE during the Third Macedonian War as punishment for the ›welcoming‹ of Antenor to the city's harbour. Its territory was then incorporated into that of Methymna. At this time the harbour of Antissa appears to have been destroyed and the settlement started to decline.[27]

At the cove southeast of the ancient city, a breakwater forms a harbour basin. Koldewey has drawn the basin much larger than the one surviving today, depicting it to include the neighbouring low sandy beach, a judgement that appears to be confirmed by satellite images (pl. 6, 1). Koldewey assumed that the harbour was not fortified, although this seems rather improbable.[28]

The harbour basin's depth does not exceed 0.6–0.7 m due to silting. The northwestern segment of the breakwater is in fact a natural rocky formation, which was reinforced at its northern edge and further extended to the northeast by a foundation of rough stones. The two formations possibly functioned as the foundation of a breakwater-quay, an interpretation supported by the presence of ashlars inside the silted basin. The following observations were also made: northeast of the basin, at the starting point of the breakwater, the foundation of a semi-submerged large Lesbian wall, stretching northwest for about 50 m was located. The wall is constructed of monoliths (≈ 1.2 × 0.5 × 0.5 m) facing northeast.It looks like the base of a fortification wall directly connected to the breakwater (λιμὴν κλειστὸς?).

[23] Theodoulou 2014, 500.
[24] Κοντής 1978, 300–302. Ancient sources with direct or indirect reference to Antissa's maritime activities and harbours are: Liv. 45. 31.1 3–14; Pseudo-Skylax, Periplous 97; Ov. met. 15. 28. 7; Strab. 1. 3. 19 (60), 13. 2. 4 (618); Thuc. 3. 18. 2; 3. 28. 3; Diod. 14. 94, 7. 29; Myrsilus (FGrHist 477); Plin. nat. 5. 39. 139, 2. 90. 204.
[25] Σίμωσι 2000, 147–156; Williams 2007, 107–116.
[26] Κοντής 1978, 305 f.
[27] Liv. 45. 31. 13–14; Plin. nat. 5. 139; Mason 1995, 399–410.
[28] Koldewey 1890, 19–21 pls. 6–7.

The harbour's entrance was situated to the southeast. Similar structures, surviving in two courses, were also located at the two sides of the cape upon which the Genoese ›Ovriocastro‹ was built and the narrow hill where the city of Antissa extends. Winifred Lamb's excavations there in the 1930s uncovered traces from the Late Bronze Age to the middle of 2nd c. BCE when the city was destroyed by the Romans. On the other side of the hill both the Lesbian city walls of the 6th c. BCE and the later isodomic additions, dated to the 3rd c. BCE, were uncovered.[29] Hence the submerged walls found here can be attributed to Archaic fortifications, which were extended into a larger area that later decreased due to the rising sea level.

In the area southwest of the castle, the located submerged structure turns to the west and then to the north, suggesting a tower (without any continuation as would be expected if it had been a city wall). The structure, with a width of 8 m and encompassing an area of 4.500 m², could be a breakwater for a harbour basin. Therefore, the site could have operated as the Archaic protected harbour (*limen kleistos*) of the city. If it was really a mole and not just a tower belonging to the city wall, then this could have been one of the earliest constructed harbours on the island and in the Aegean in general.[30] Systematic excavations were not carried out in the coastal zone of the city, resulting in a foggy picture of the city's development through the centuries. But the salvage excavation in the area of Saint Varvara chapel, south of the harbour, has revealed clay Klazomenian sarcophagi, burials in pithoi, and secondary cremation burials in large vessels and plain burials.[31] The grave goods include locally produced and imported vessels dated to the 6th c. BCE. The specific finding is particularly interesting because it reveals the direct relationship of the Archaic harbour to the necropolis located to the south and east of the harbour, thus confirming the findings of earlier scholars.[32] If the presence of Archaic tombs at the area means that it was *extra muros* at that time, then the above interpretation of a harbour basin *intra muros* closest to the fortified Archaic city becomes more reasonable.

**The territory of Eresos**

The territory of Eresos,[33] the birthplace of Sappho and Theophrastus, lies to the southeast of Antissa. Some researchers have suggested the location of the city's agora to the western side of the acropolis, an uncertain theory despite the lack of sufficient systematic excavations.[34] In the coastal zone east of the acropolis, apart from the Hellenistic city extension, lies the sanctuary of Athena Polias, known as ›Athenaion‹ in the inscriptions of Eresos.[35] The shift of the shoreline and current coastal road projects have altered the image given by the ancient authors for the acropolis of Eresos and its relation to the harbour. Unfortunately the current fishing shelter has overlapped a big part of the ancient harbour. To the south the harbour basin was sheltered to some extent by rocky islets, while the construction of an L-shaped jetty, binding a rocky islet to the coast, protected it from northern and northwestern winds. The L-shaped jetty is reminiscent

[29] Lamb 1930–1931, 172–174 pl. XXVII No. 3, fig. 4; Lamb 1931–1932, 41–42; Κοντής 1978, 310; Spencer 1995, 62 f.
[30] Theodoulou 2014, 500–502.
[31] Αρχοντίδου 1996, 602 pl. 183 α–γ.
[32] Koldewey 1890, 21 pl. 6; Lamb 1930–1931, 173–177; Lamb 1931–1932, 63–67.
[33] Ancient sources of nautical interest with direct (or indirect) references to the harbours of Eresos: Thuc. 3. 18. 3, 3. 35. 1, 8. 100. 3; Strab. 13. 2. 4; Archestratos in Athenaeus (3. 111 f. and Athen. 1. 29b); Diod. 14. 94.
[34] Λάσκαρης 1959, 67–74; Αρχοντίδου 1986, 200 and 204 plan 6 (for the coastal defensive wall with 3 m width); Schaus – Spencer 1994, 421–424 figs. 6–8 no. 69; Zachos 2010, 222–229 fig. 1b.
[35] IG XII2, 529, Zachos 2010, 226; Δημοπούλου-Πηλιούνη 2015, 340. 358. 361.



of the similar one that might have operated as a breakwater during Archaic times in Antissa. The surviving jetty has an average width of 7.3 m and a maximum length of 140 m (pl. 6, 2). The length is measured from the rocky edge of the seashore, now submerged in the modern fishing shelter basin, and towards its southwestern end. Koldewey suggested that the outer part of the jetty functioned as the defensive wall and the inner part as a quay, as he had proposed for the North harbour of Mytilene.[36] However this interpretation seems weak for Eresos because of the big difference in height between the rest of the city and the harbour.

The jetty is erected on a rough rubble stone base, clearly visible at its northwest side, starting from –2/2.5 m and reaching the sandy bottom at –4.5 m. The maximum preserved height of the jetty is 2.5 m. The construction pattern looks more or less like Lesbian masonry (pl. 7, 1),[37] witnessing a similarity between this structure and the remnants of Antissa and date both harbour structures to the Archaic period. Remains of the city walls, built with Lesbian masonry dated in the Archaic period, are still visible around the acropolis, while isodomic remains are mostly related to the southeastern extension of the city dated to the Hellenistic period.[38] At the same time the mere existence of a jetty, which does not form a harbour basin, as well as the absence of an organic connection of the harbour with the fortified hill, suggests more a commercial than a military use.[39] This can also be assumed by the absence of signs of a superstructure among the surviving upper course of the jetty. This evidence suggests that the naval base of Eresos, if there ever was one, has to be traced elsewhere. The shoreline has certainly changed since antiquity and there are indications that some harbour installations may have existed where the village now stands.[40] On the other hand, according to Diodorus Siculus in 389 BCE, the Athenian general Thrasybulus who conquered Lesbian cities »sailed from the Hellespont to Lesbos and anchored off the coast at Eresos. Strong winds however arose and twenty-three triremes were lost«.[41] This passage clearly describes the strong south winds and the absence of a well-protected harbour, at least at the time of Thrasybulus.

**The territory of Pyrrha**

The territory of Pyrrha occupied the major part of the Gulf of Kalloni (east and north side). In the north it had direct borders with the territory of Methymna and in the east with the territory of Mytilene.[42] The city was founded along with the other cities of Lesbos at the end of the 2nd millennium BCE on a well-protected hill. Later, presumably in the Archaic period, a defensive wall built with Lesbian masonry was constructed.[43] References to the harbour are found in the text of Pseudo-Skylax (mid. 4th c. BCE).[44] It has been suggested that the city's harbour would have served, inter alia, as the worshippers' transition to the nearby sanctuary of Messon.[45]

[36] Koldewey 1890, 24 f.; Κοντής 1978, 327 f. paragraphs 1713–1715 plans 56 f.; Lehmann-Hartleben (1923, 76–78 plan 13) first claimed the existence of a second artificial harbour to the north of the known one. Kontis did not accept his proposal because in this case both ports would have to deal with the strong regional south winds.
[37] According to the investigation of Lesbos's harbours (2007–2009): Theodoulou 2014, 502 f. figs. 11–12.
[38] Κοντής 1978, 328 f.
[39] IG XII Suppl. 124: ἱδρύ][σα]το δὲ καὶ ἐπὶ τῶ λίμενι τῶ ἐμ[πορί]ω [να]ῦον τῶ Σεβάστω θέ[ω Καίσαρι]. Δημοπούλου-Πηλιούνη 2015, 358. 382. 557. 611. 615.
[40] Schaus – Spencer 1994, 421–424 figs. 7–8.
[41] Diod. 14. 94. 3; Schaus – Spencer 1994, 424 no. 71.
[42] Κοντής 1978, 340 f.
[43] Koldewey 1890, 27–29.
[44] Pseudo-Skylax, Periplous 97.
[45] Williams 2007, 107–116. In addition, for small-scale coastal remains of a quay at the cove Mesintziki, which lies

Pyrrha always had friendly relations with the city of Mytilene. Its political and administrative development was sharply terminated in the Hellenistic period and its territory was incorporated into that of Mytilene. According to Strabo the settlement continued as a small village or a *proasteion* (=suburb) with a harbour on the southern side of the hill: »Pyrrha is in ruins. But the suburb is inhabited and has a port«.[46] While Strabo (1st c. AD) referred to the destruction of the ancient city, Pliny the Elder remarks that the city was overwhelmed by the sea.[47] Pliny's references has had many interpretations because it seems impossible for a city built on a hill to experience such a fate. Some scholars believe that Pliny is confusing his sources for Pyrrha[48] and that the city was more likely destroyed by an earthquake.[49] The rise of sea level in combination with the silting of the city's port infrastructure and the subsequent shift of the shoreline, mainly on the northern side of the hill, have contributed to the perpetuation of the myth that the city was submerged under water.

The city's harbour most likely was located north of the city's hill in the area that today is the mouth of the river Vouvaris. The harbour has not yet been sufficiently studied (pl. 7, 2). Only Koldewey has described a few structural remains close to the chapel of Saint Foteini north of the city, mainly two parallel rows of ashlars inclined forward to the sea with a preserved length of 20 m and a width of 6.50 m. The structure was interpreted as the remains of shipsheds for the accommodation of warships.[50] The existence of shipsheds testifies to a well-organized artificial harbour, but the backfills have changed the ancient basin. After the city's destruction the north harbour seems to have been reduced and the settlement moved to the south of the hill in the area known as the ›suburb‹ mentioned above. Previous scholars refer to the existence of an artificial breakwater in this area, but the 2007–2009 research came to the conclusion that there are not any harbour installation remains but only submerged buildings, bringing in mind Pliny's words.[51] Basileios Petrakos tried to reveal these structures and found a woman's head of a terracotta figurine and a bronze coin of Constans II. (641–668 AD).[52]

**The territory of Mytilene**

The Mytilenaean territory covered an area of 464.9 km² and occupied the entire south and the east part of the island. In addition to the two main harbours of the city, a number of small coastal villages developed in the territory, particularly in the Hellenistic and Roman periods, enjoying seaborne communications with the coast of Asia Minor.

halfway between Pyrrha and the sanctuary of Messon, see Αργύρη – Θεοδούλου 2012, 100 f. figs. 3–5; Theodoulou 2014, 506 f. fig. 15.

[46] Strab. 13. 2. 4.

[47] Plin. nat. 2. 94: »The sea near the Palus Mæotis has carried away Pyrrha and Antissa...«, and 5. 39. 1: »But Lesbos, distant from Chios sixty-five miles, is the most celebrated of them all. It was formerly called Himerte, Lasia, Pelasgia, Ægira, Æthiope, and Macaria, and is famous for its nine cities. Of these, however, that of Pyrrha has been swallowed up by the sea«.

[48] Mason 1987, 176–185.

[49] Paraskevaidis 1963, 1403–1420. The theory that the city of Pyrrha was destroyed by an earthquake is solely based on the passages of Pliny the Elder. The date of the earthquake in 231 BCE is an arbitrary but increasingly accepted view, which had been adopted by M. Paraskevaidis and other scholars. However, it was proposed first by M. Michaelides 1909, 43. For the most recent criticism see Stantsanoglou 2019, 200 fn. 16, who also suggests a date for the earthquake between 334 and 167 BCE. following the view of the prominent philologist-archaeologist and Koldewey's partner Habbo Gerhard Lolling (Koldewey 1890, 28).

[50] Koldewey 1890, 27 f. pl. 11.

[51] Theodoulou 2014, 506; Αργύρη – Θεοδούλου 2012, 103 f. figs. 6–7.

[52] Petrakos 1967, 459.



The city of Mytilene, the most important of the six city-states on Lesbos, had two harbour basins, a military harbour in the south, which has undergone major modifications mostly after the 18th century,[53] and a commercial harbour in the north (pl. 8, 1).

The strait of Euripus, a natural sea channel about 780 m long and 30 m wide that connected the two harbours of Mytilene, silted up gradually from the 10th c. to the middle of 13th c. AD and it is the city's only topographic characteristic that has not survived the passage of time.[54] In the 4th c. BCE the shorelines of Euripus were modified by the construction of strong retaining walls along its banks. The strait ceased to be a natural boundary, lost its defensive mission, and in the following centuries on its banks the administrative and religious centre of the city was built, naturally in direct contact with the two harbours. Longus, at the beginning of his novel Daphnis and Chloe, written probably in the second half of the 2nd c. AD, makes a particularly important reference to the appearance of Mytilene in the Late Roman years and specifically to the Euripus: »Πόλις ἐστὶ τῆς Λέσβου Μυτιλήνη, μεγάλη καὶ καλή: διείληπται γὰρ εὐρίποις ὑπεισρεούσης τῆς θαλάττης, καὶ κεκόσμηται γεφύραις ξεστοῦ καὶ λευκοῦ λίθου. Νομίσειας ἂν οὐ πόλιν ὁρᾶν ἀλλὰ νῆσον = Mytilene is large and beautiful as it is divided by the Euripoi [the word Euripus in plural], and the sea passing by down below is decorated with bridges of white polished marble stone. You think you are looking at an island, not a city«.[55] His description has been criticised by many scholars as creating a fiction about the existence of marble bridges connecting the old city with the ›expansion‹ of the city to the west. In 1999 and 2000, however, rescue excavations partly revealed two arched bridges of the strait, probably of Roman date. The first bridge was located at the corner of Ermou and Simantiri streets opposite the Yeni Mosque. Specifically the base of the arch was found, with a length of 10.50 m and displayed width of 1.80 m, while in the same area by the end of the 1970s a part of the second arch of the bridge, now preserved in the basement of a modern building. The arch, with wedge-shaped blocks (voussoirs) and a height of 2.24 m and visible width of 0.80 m, was interpreted as the outer face of the south side of the bridge.[56] The second bridge was located at the junction of Ermou and Mitropoleos streets. The central section of the arch was revealed with 5.60 m length (EW) and 7.40 m width (NS), but it was not possible to identify its piers (pl. 8, 2).

The North harbour of Mytilene was located northwest of the city's Byzantine castle. Strabo describes the northern harbour of Mytilene as »mega«[57] (= great) and Thucydides as »Malean« (= taken from Μαλόεντος Ἀπόλλωνος).[58] During the Classical period the harbour seems to have been expanded and replaced a smaller harbour that is considered the city's Archaic harbour.

Within the basin and close to the Ottoman addition to the castle (Kato Kastro), several blocks and columns at the sea surface and a submerged breakwater can be seen, which are traditionally attributed to the Archaic harbour (see pl. 7, 2). However, this attribution remains just a hypothesis that needs further examination, especially because the structure form of the breakwater appears to be chronologically later.[59]

[53] Κουρτζέλλης 2008, 219–222; Kourtzellis 2013a, 47–49.

[54] Diod. 13. 79. 6; Κοντής 1978, 211–213. 215 f.; Kourtzellis 2013b, 28–31.

[55] Hunter 1983, 31–38; Morgan 2004, 1 f.

[56] Αχειλαρά 1999a, 743 f. figs. 10–12; see also Kyriakopoulou in the present volume.

[57] Strab. 13. 2. 2.

[58] Thuc. 3. 3. 5.

[59] Θεοδούλου 2010, 96.

The North commercial harbour's basin is defined by two artificial breakwaters: the southeastern and largest on the castle side measures about 350 m in length and 7.5 m in width (pl. 9, 1), while the windward northwestern breakwater is 75 m long and 8.5 m wide (pl. 9, 2). Both breakwaters were constructed in the same way as the city walls on land, but with stone blocks along the sides, large enough to withstand the crashing waves caused by the prevailing northeasterly wind. The harbour entrance is estimated to have had an opening of about 300 metres. Every 38 metres, both breakwaters have rectangular transverse openings, namely ›channels‹ within the breakwater structure (see pl. 9, 1–2). These channels are 1.55 m wide in the northwestern breakwater and 1.80–2.20 m in the southeastern one. The channels were covered with barrel vaults and located below the level of the dock and across the width of the breakwaters. The vaults do not survive but their former existence is evident at the first blocks above the vertical walls of the channels. The channels appear to have been created to allow the water to circulate and to control the power of the waves. Originally there were at least three channels in the northwestern breakwater and seven in the southeastern. Today only their floor survives along with the side walls and the springers of the barrel vaults in some cases. The breakwaters are constructed according to the emplekton system, with the outer faces made of strong rectangular stone blocks and an inner filling with smaller rough stones.[60]

The constructions on both breakwaters are set on a foundation of small rough stones connected together with concrete, the chemical composition of which is yet to be determined. Koldewey mentions the existence of hydraulic mortar for both the foundations and the filling. However, it is not possible to define whether the connecting material of the stones was really mortar or marine encrustation.[61] A chemical analysis of relevant samples would provide an accurate answer to the question of the nature of these traces, which also touches upon aspects of the construction's dating. Its height varies depending on the morphology of the sea bed. The defensive walls of the city appear to have extended onto these constructions and they could have ended in towers at their tips. Despite the fact that no remains of the walls survive, at the end of the southeastern breakwater large blocks can be seen measuring more than the normal size of the stone blocks used elsewhere for the breakwater. These blocks were obviously meant to support some kind of stronger and heavier construction. Carvings and large stone blocks can be traced on the rocky ending of the southeastern breakwater. The lighthouse in the 1782 engraving by Choiseul-Gouffier could possibly be or interpreted as a surviving memory of that ancient tower or a Medieval one.[62]

The lower part of the construction on the northwestern breakwater projects slightly from the upper surviving course and both bear carvings of dovetail clamps. Since lead clamps could not be poured underwater, it is possible that the lower structure had been the first dock to be constructed and was later submerged and one more course added.

Another potential explanation is that the two structures were built at the same time, the one as the top of the dock and the other as the base of the fortification wall, and that they are both underwater today due to sea level change.[63] The isodomic structural pattern and the use of dovetail clamps are comparable to the remains of the harbour structures that have been excavated

[60] Θεοδούλου 2010, 95–97.
[61] Koldewey 1890, 5 f.
[62] Choiseul-Gouffier 1782, 83–87 (drawing on page 86).
[63] Theodoulou 2014, 495 f. figs. 2–3.



at the north entrance of the Euripus, where a coin, a sixth stater of electrum, found among the building ashlars of the pier can convincingly date the construction to the middle of the 4th c. BCE.[64] But it is worth noting that at the southeastern mole this pattern does not seem to have been repeated.

The destruction of the breakwaters and the degradation of the harbour led to the gradual sedimentation of the harbour basin, as well as of the Euripus strait. It is, however, not yet clear whether the Euripus was filled up due to the silting of the basin or the basin was filled up because of the blocking of the Euripus.

Koldewey dated the basic construction of the harbour to the second half of the 5th c. BCE, during the Peloponnesian War, based on a text of Thucydides: »τῶν τε γὰρ λιμένων τὴν χῶσιν καὶ τειχῶν οἰκοδόμησιν καὶ νεῶν ποίησιν ἐπέμενον τελεσθῆναι« = while they were waiting until the breakwaters for their harbours and the ships and walls that they had in building should be finished.[65] In the same study he expressed the opinion that the defensive wall of the city continued on top of the breakwaters, occupying the external sides, while the interior sides were used as a quay for passengers and goods. Taking into account the recent underwater research, the similar masonry at the northwest mole, and portable finds and coins from the harbour works of Euripus, we favour a construction date during the second half of the 4th c. BCE.[66]

**The coastal zone and the northern entrance to the Euripus Strait**

Excavations carried out in 1999 in the coastal area of the northern end of the Euripus have unearthed important structures not only for the ancient topography of the city, but also for the dating of the demanding and expensive public construction project of the harbour basin. The most important investigated structures were the monumental western entrance of the Euripus strait and a jetty (paved mole) that projects northward in the harbour basin beneath the modern statue of the ›Asia Minor Mother‹ (pl. 10, 1). Two parts of the jetty were located,[67] which was rectangular in shape and constructed with ashlars of a reddish and grey colour placed as stretchers and headers. The outer blocks on the east and west sides are connected by clamps, while the inner blocks are placed directly next to each other without any binding mortar. At the point where the jetty joins the quay, two courses of ashlar are preserved; as it extends northward in the harbour it is as high as seven courses at the east and eight courses at its west face. The west side was further reinforced because from this direction the jetty was exposed to the strong northwest current. The stone blocks are placed directly on the seabed, and it is only at one part in the west that a course of rubble stones was found at a lower level, forming a kind of a base for the structure. The end of the jetty has not been excavated. The faces of the top course of the jetty have square and rectangular bores on the surface of the stones, pointing to the existence of at least one more course that is not preserved. The quay is connected with the jetty at the east. A length of 28.20 m, a greatest width of 1.65 m, and a height of 1.71 m (five courses) on the northern face have been revealed. It was originally made of stone blocks laid in the isodomic system. In the middle of the uncovered part a second, repair, phase is preserved, in which the stone blocks are bound together with ›kourasani‹ (hydraulic mortar), and finally, at the point where the jetty

[64] Κουρτζέλλης 2010, 190–192 fig. 3.1.
[65] Thuc. 3. 2. 2; Koldewey 1890, 5–7 pls. 1–3.
[66] Θεοδούλου – Κουρτζέλλης 2010, 134–136.
[67] One 14.70 m long and 6.10 m wide; the other 3.40 m long.

meets the quay, there was a hasty makeshift repair in which a broken fluted column was reused.[68] At the east side two courses of the quay are preserved. The structure is connected with the monumental formation, which delimits the west side of the Euripus.

The above mentioned structure is a rectangular wall that ends in a semicircle at the east (pl. 10, 2). The total length of the semicircular and rectangular sections is 5.47 m, and it is 4.58 m wide. The outer part of its rectangular section is made of hard volcanic stones that form a ››frame‹‹ into which blocks of a soft volcanic rock were inserted. The semicircular outer façade is constructed of seven wedge-shaped stones (voussoirs) that are locked together with dovetail clamps lacking any kind of mortar. The greatest diameter of the semicircle is 4.10 m, and its length is 2.04 m. Its east face consists of meticulous isodomic masonry and is preserved to a height of 2.00 m or five courses. Some of the stone blocks are inscribed with letters of the Greek alphabet (Γ, Δ, E, H) and mason marks (▲ and ▼). The entire structure is founded on the sandy seabed, and the craftsmen tried to protect it by surrounding it with wooden planks of a preserved length of 3 m, which are supported by fifteen cedar tree trunks. Portable finds have settled down to the foundation level of the outer mole. They consist mainly of pottery from the Archaic to the Late Roman period, all found in the same stratum.[69] The absence of a proper stratigraphy is however expected at the seabed.

The excavations by the local Ephorate on the coastal zone of the North harbour allow us a better understanding of the picture that the harbour presented from the Archaic to the Late Roman period[70] as a particularly active area with sanctuaries, the commercial agora, pottery and metalworking workshops, taverns, and also the cemeteries outside the defensive walls.[71] The city's harbour installations should be seen as a part of a wider building programme, which started from the middle of the 4th c. BCE and continued unhindered during the 3rd and 2nd c. BCE, resulting in the transformation of Mytilene from a provincial city to one of the most beautiful cities of the East part of the Roman Empire, according to the ancient testimonies already remarked.

An illustrative example of this refinement of the city is the two-storey stoa with a marble façade, almost in contact with the harbour's inner installations and directly opposite the harbour's entrance (pl. 11, 1). The Doric stoa is oriented east-west with maximum preserved dimensions 87 x 16 m. Its original length is estimated as 150 m as a large part of it maybe is preserved below a modern public building.[72]

Square-shaped foundations, measuring 1.40 x 1.46 m, preserved to a height of six courses and built of a soft porous volcanic rock, supported twenty octagonal columns made of a pinkish volcanic rock. Its façade by the seaside was made of marble bearing impressive architectural elements. The stoa was constructed most probably in the 3rd c. BCE, incorporating in its foundation the inner part of the coastal city wall that was no longer in use. Its construction on the coastal front of the North commercial harbour of Mytilene reveals its mercantile character.

[68] The repair is dated to the 5th–6th c. AD. It is examined more analytically in Κουρτζέλλης 2010, 189.
[69] Κουρτζέλλης 2010, 189 f.
[70] Κουρτζέλλης 2008, 213–222, Kourtzellis – Theodoulou (forthcoming).
[71] Williams – Williams 1987, 254–257, fig. 4; Williams – Williams 1989, 173–176; Williams – Williams 1990, 187–189 fig. 2.
[72] The stoa was first uncovered in 1929 during construction works of the ›Refugee Market‹ that was preserved until 1998, at that time, and due to building of the new Town Hall of Mytilene, the largest part of the stoa was revealed (Ευαγγελίδης 1927–1928, 17 f. fig. 3; Acheilara 1998b, 1998, 772 f. no. 4 pl. 7; Acheilara 1999b, 749 f.).



The existence of more stoai in the west (excavated and covered again) testifies the localization of the ancient agora in this urban area, connected directly with the North commercial harbour. In Late Antiquity (4th–6th c. AD) the monumental two-storey stoa had been destroyed and an almost rectangular bath, measuring 12 x 11.5 m, with six rooms, rectangular reservoirs, and conduits was built above its central part. Because baths are quite common in harbours during Roman times, this urban transformation reflects the needs of a new settlement period, far away from the Aiolian roots of the city.

## Conclusion

The harbours of Lesbos are major technical achievements and an indicator of the prosperity of the island's cities. The underwater structures of the North harbour of Mytilene and the harbour of Methymna, both dated to the 4th c. BCE, give an insight into the construction technology and material use of the island's maritime infrastructure. Both harbours present the technique of the isodomic ›emplekton‹-masonry employed elaborately as well as different repairs and transformations in later periods. The harbours of Eresos and Antissa seem to be the oldest harbours on Lesbos. Their construction in the Archaic period with Lesbian masonry[73] is not only important for the date of the marine constructions themselves, but also for the history of ancient port infrastructure. Their construction technique proves that Lesbian masonry was not only an artistic option for the people of Lesbos but also a powerful construction method applied even to unseen underwater marine structures.

The date of the harbour structures in Antissa and Eresos to the Archaic period (6th c. BCE), and at the same time the absence of new port structures in the same cities during the Classical and Hellenistic periods, leads us to two important conclusions. The first is that this date sheds light on the possible form of the Archaic harbours and port installations of the other cities of Lesbos, especially Mytilene and Methymna, where no traces of the Archaic harbours have survived. The second conclusion has to do with the lack of financial and political ability of the smaller cities to rebuild port installations during the Late Classical and Hellenistic periods. Specific incidents of the local history of the weaker cities of the island, Antissa, Eresos and Pyrrha, reflect a lack of real opportunities to renovate their cities, which is also visible from the absence of monumental public architecture. Reasons for the decline of these cities could be manifold: the reduction of their power after the Peloponnesian War, the continuing conflict between oligarchs and democrats, or other factors such as the damage due to natural disasters in the case of Pyrrha or the concession to the nearby city-states, as in the case of Antissa. Thus the harbours and their development reflect the shift of political power and financial wealth of the city-states, which only in some cases were able to meet the new demands as members of the Hellenistic kingdoms or later the Roman Empire.

[73] Aristot. eth. Nic. 1113 7b. 29–32; see also Acheilara in the present volume.

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**Figures**

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**Dr. Theotokis Theodoulou, Hellenic Ministry of Culture & Sports, Ephorate of Underwater Antiquities, Faculty Member; E-mail: ttheodoulou@culture.gr**

**Dr. Yannis Kourtzellis, Hellenic Ministry of Culture & Sports, Ephorate of Antiquities of Lesbos, Faculty Member; E-mail: ikourtzellis@culture.gr**