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# The Roman Harbour of Alexandria Troas, Turkey

Stefan Feuser

*Heinrich Schliemann-Institut für Altertumswissenschaften, Universität Rostock, 18055 Rostock, Germany, stefan.feuser@uni-rostock.de*

This article summarizes the results of a survey conducted in the area of the ancient harbour of Alexandria Troas. It presents an outline reconstruction of the harbour and explains its significance for our understanding of the region. The harbour is located at the point where two important sea-routes met and where ships waited for favourable winds to travel through the Dardanelles. It was built in the reign of Augustus and consisted of an outer basin protected by two breakwaters and an inner basin. The area was occupied until the beginning of the 7th century.

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*Key words:* Alexandria Troas, harbour, Roman, survey, Troad.

The following article summarizes the results of a survey in the harbour of Alexandria Troas (for a fuller account see Feuser, 2009). Introductory remarks about the aims and methodology of the survey, and the history and the natural and geographical setting of Alexandria Troas, are followed by an examination and interpretation of the archaeological remains and the pottery. This leads to a reconstruction of the ancient harbour and its chronology.

## Aims and methodology

During August and September of 2005 and 2006 a team of archaeologists, underwater archaeologists and geophysicists from the Universities of Münster, Germany, and Çanakkale, Turkey, conducted a survey in the area of the ancient harbour of Alexandria Troas (Figs 1–2). The aims were: to document ancient structures which are exposed to natural and human destruction; to reconstruct the original layout of the harbour and of the connection between the city and the harbour area; and to gain a better insight into the periods of use of the harbour for a more thorough understanding of the history of Alexandria Troas and the Troad. The research area is situated in the north-west of the modern Republic of Turkey, on the Aegean coast, immediately south of the modern village of Dalyan Köy and west of the plateau on which the ancient city of Alexandria Troas was located (Fig. 2). It measures *c.*700 m north-south and *c.*400 m east-west. Most of the ancient remains are situated on land; only two structures are nowadays submerged.

First a topographical plan of the survey area was produced, which served as the basis for all further work. The still-visible built structures (H1-H31), most of them very ruinous, were documented through drawings, photography and written descriptions. All other remains such as individual columns, piles of stone, a cistern and modern bunkers were described and photographed, and their precise locations marked on the topographical plan. Cleaning or excavation of any of the partially-exposed structures was not possible. The underwater archaeologists surveyed the sea-bottom from the shoreline out to a distance of *c.*100 m, and cleaned and documented the submerged remains to the north of structure H11 in a depth of up to 4 m. Because of the strong prevailing northerly winds it was difficult, and on some days impossible, to document the submerged rock pile west of structure H5. As the survey area is densely overgrown with bushes geophysical survey was only possible in a few areas. The aims were: to trace the quay north of the salt lake; to get more information about buildings on the ridge north of the salt lake; and to verify whether or not built structures west and north-west of the salt lake continue further under the sand. Only magnetometry was used. The aims and methodology of the ceramic survey are explained in the section about the pottery and glass finds.

## A brief history of Alexandria Troas

The city of Alexandria Troas is located in the north-west of the modern Republic of Turkey, *c.*27 km south of the entrance to the Dardanelles Straits just opposite the island of Bozcaada (ancient Tenedos) (Fig. 2). It was founded by Antigonos Monophthalmos under the name 'Antigoneia' between 311 and 307 BC by a *synoikismos* of the surrounding *poleis* of Colonae, Larisa, Hamaxitus, Chrysa, Neandria, Cebren and Scepsis (for

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*Figure 1.* Aerial view of the harbour area from the west. (Forschungsstelle Asia Minor, Münster)

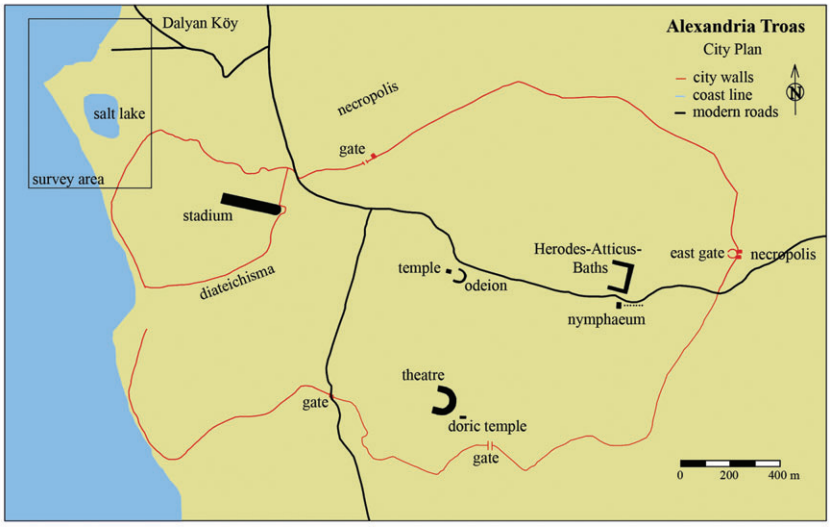


*Figure 2.* City plan of Alexandria Troas. (Forschungsstelle Asia Minor, Münster)

more detail see Cook, 1973: 198–204; Ricl, 1997: 1–21; Tenger, 1999: 118–73; Akalin, 2008). After the battle of Ipsus in 301 BC Lysimachos gained control over the city and renamed it Alexandria in the Troad. He built a wall some 40 stadia long around the city. For the rest of the Hellenistic era we know little about the political, social and economic life of the city. After the death of Lysimachos Alexandria Troas remained under Seleucid control until 227 BC, and was then a free city for nearly 100 years. In 129 BC it was incorporated into the established Roman province of Asia.

Under the rule of Augustus—probably in 12 BC—Alexandria Troas became a Roman colony and was granted the *ius italicum* (Schwertheim, 1999). The Ephesian toll regulations conceded the city the use of dues that were previously collected by the *publicani* (Engelmann and Knibbe, 1989: 114–15). In the climate of the *pax Romana* the economic and social life of the city flourished, especially in the first half of the 2nd century AD. An important benefactor of Alexandria Troas was Herodes Atticus who financed an aqueduct and a bath-complex in 134/5. After sack by the Goths in 262 the city's prosperity ended. Recent research, for example, has demonstrated that the sewage system was abandoned in the 4th century AD (Esch and Martin, 2008: 93).

The Emperor Constantine thought of building his new capital in the territory between Alexandria Troas and Ilium, which demonstrates the good geographical setting of the Troad, but in the end he built it at Byzantium. This meant that the importance of Alexandria Troas was reduced, as the sea-routes in the eastern Mediterranean were now mainly focused on Constantinople (Tenger, 1999: 172). In the 4th and 5th centu-

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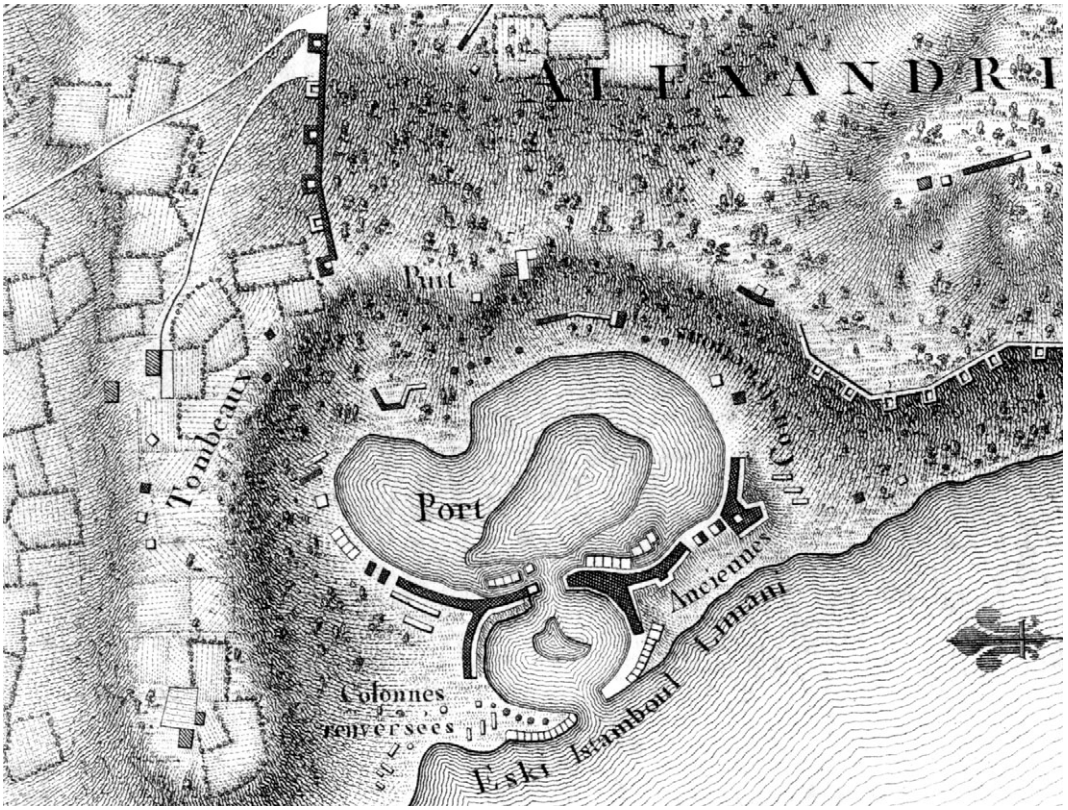


*Figure 3.* Detail of the 1786 plan of Alexandria Troas by L-F. Cassas. (Choiseul-Gouffier, 1842, tab. 39)

ries three bishops and the emperor Julian are mentioned visiting the city in 451 (Ricl, 1997: 234f.). After that Alexandria Troas vanishes from literary sources. The city must have been abandoned at the latest during the 7th century, and we only come to know about the former metropolis again in the reports of travellers from the 14th century onwards.

The earliest traveller visiting Alexandria Troas and its harbour was Ludolf of Sudheim, a priest from Westphalia, during his pilgrimage to Jerusalem between 1336 and 1341. The harbour must have been destroyed very thoroughly as he only mentions a few foundations in the water and columns buried under the soil (van der Vin, 1980: 30–37, 294, 579–86). The most detailed accounts of the harbour ruins are given by Pietro della Valle (1674: 7–8), who visited Alexandria Troas in August 1614, and Anton Prokesch von Osten (1837: 370–72; Biller, 2008), who investigated the city in 1826. Both describe the harbour in the condition that it is today. Several sarcophagi, however, mentioned by Prokesch north-west of the city plateau (Prokesch von Osten, 1837: 371) were not relocated during the present study.

Two maps of the ruins of Alexandria Troas illustrate the harbour in detail. Both were drawn under the instruction of M. Choiseul-Gouffier. One produced by L-F. Cassas in 1786 (Choiseul-Gouffier, 1842: tab. 39) (Fig. 3) reveals two lakes—the smaller one connected to the sea, the city plateau with the rest of the fortification wall, the ridge in the north and several ancient structures around the lakes. The map also records a cemetery ('*Tombeaux*') to the north-east of the salt lake. The second map was drawn by M. L. J. J. Dubios in 1814 (Choiseul-Gouffier, 1842: tab. 44) (Fig. 4). It shows only one lake, which has no connection to the sea, and no ancient foundations. It records several smaller granite columns and three huge, probably monolithic, granite columns instead, two of them positioned parallel to each other. Nearly all the travellers mentioned that marble and granite stones and columns of the ancient city were transported from the site and used as building material in Constantinople/Istanbul (Feuser, 2009: 33).

## Natural and geographical setting

Knowledge of the natural and geographical setting is of great importance for understanding the function and the development of the harbour of Alexandria Troas. From April to October the wind blows mainly from between the north-north-west and north-north-east (Neumann, 1986: 347–57). Winds from a southerly direction almost exclusively occur in spring and autumn. In winter the harbour basin had to be protected against heavy storms, especially from the south.

As it was not possible to conduct geomorphological drillings along the coastline we have to rely on work done by I. Kayan in Beşik Bay near Ilium for changes in relative sea-level along the west coast of the Troad

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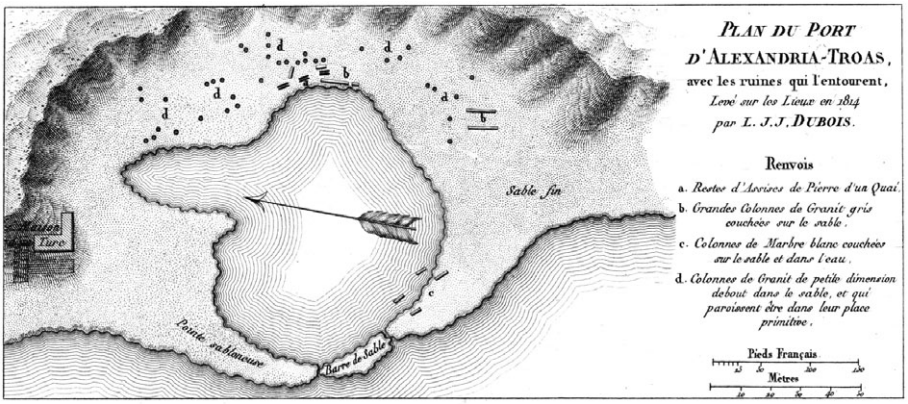


*Figure 4.* 1814 Plan of the harbour by M. L. J. J. Dubois. (Choiseul-Gouffier, 1842, tab. 44)

(Kayan, 1988; Kayan, 1991; Kayan *et al.*, 2003: 382f., fig. 2). As Beşik Bay is *c.*20 km north of Alexandria Troas and as there have been no massive tectonic up- or down-lifts and no rivers with large amounts of alluvium flowing into the sea on the west coast of the Troad, I apply this coastline curve also for Alexandria Troas (with all methodological problems kept in mind). Kayan gives the sea-level curve for Beşik Bay as follows: *c.*4000 BC sea-level on the west coast of the Troad was as high as today; from 3000 BC until *c.*1500 BC the level dropped *c.*2 m below present sea-level and then started to rise again. In the Augustan Age the sea-level was *c.*1–0.5 m lower than the present (Kayan, 1991: 88–91 fig. 5, tab. 8; Kayan *et al.*, 2003: 382f. fig. 2). Nevertheless, new data for the coastal development of Alexandria Troas is needed in the future.

Important for the development of the harbour is the fact that in ancient times two significant sea-routes met in the area of Alexandria Troas (Leaf, 1923: 234; Rougé, 1966: 85–93; Arnaud, 2007: 328 fig. 2) (Fig. 5). The first reached from the Black Sea through the Propontis and the Dardanelles to the south coast of Asia Minor and from there further south to the Levant. The second proceeded from Alexandria Troas to the west to Greece, either along the northern coast to Thessalonica or to the south-west through the Aegean to Athens and from there to Rome. The apostle Paul is the most prominent traveller of these routes, and not until he reached Alexandria Troas did he have to decide whether he wanted to travel into the Propontis and into the Black Sea or to Greece in the west.

Because of strong currents in the Dardanelles, flowing from the Propontis in the north into the Mediterranean, and the prevailing northerly winds in this area, it was only possible for ancient sailing ships to enter the Dardanelles with wind from the south—even for sailing ships of the 19th century it was impossible to cruise against the north wind in the narrow straits (Neumann, 1991: 98; Höckmann, 2003: 137). The counter-current some 15 m below the surface is of no importance for seafaring (Neumann, 1986: 357; Höckmann, 2003: 137). The harbour of Alexandria Troas,


*Figure 5.* Schematic reconstruction of the sea-routes along the coast of the Troad. (Stefan Feuser)

located some 27 km south of the Dardanelles, was in Hellenistic and Roman times the only suitable anchorage on the western coast of the Troad for ships waiting for favourable southerly winds (Leaf, 1923: 233).

The hinterland of Alexandria Troas is rather small (Leaf, 1923: 234; Karmon, 1985: 3). The city is linked to it by a road along the coast leading to the Dardanelles in the north or the Apollo Smintheus Sanctuary and Assos in the south. A second road runs east into the Scamander valley (Jewett and Stupperich, 2008). There are several harbours on the south coast of the Troad, in the Dardanelles and the Propontis which reduced the size of the hinterland. One important item is produced in the hinterland of Alexandria Troas: the

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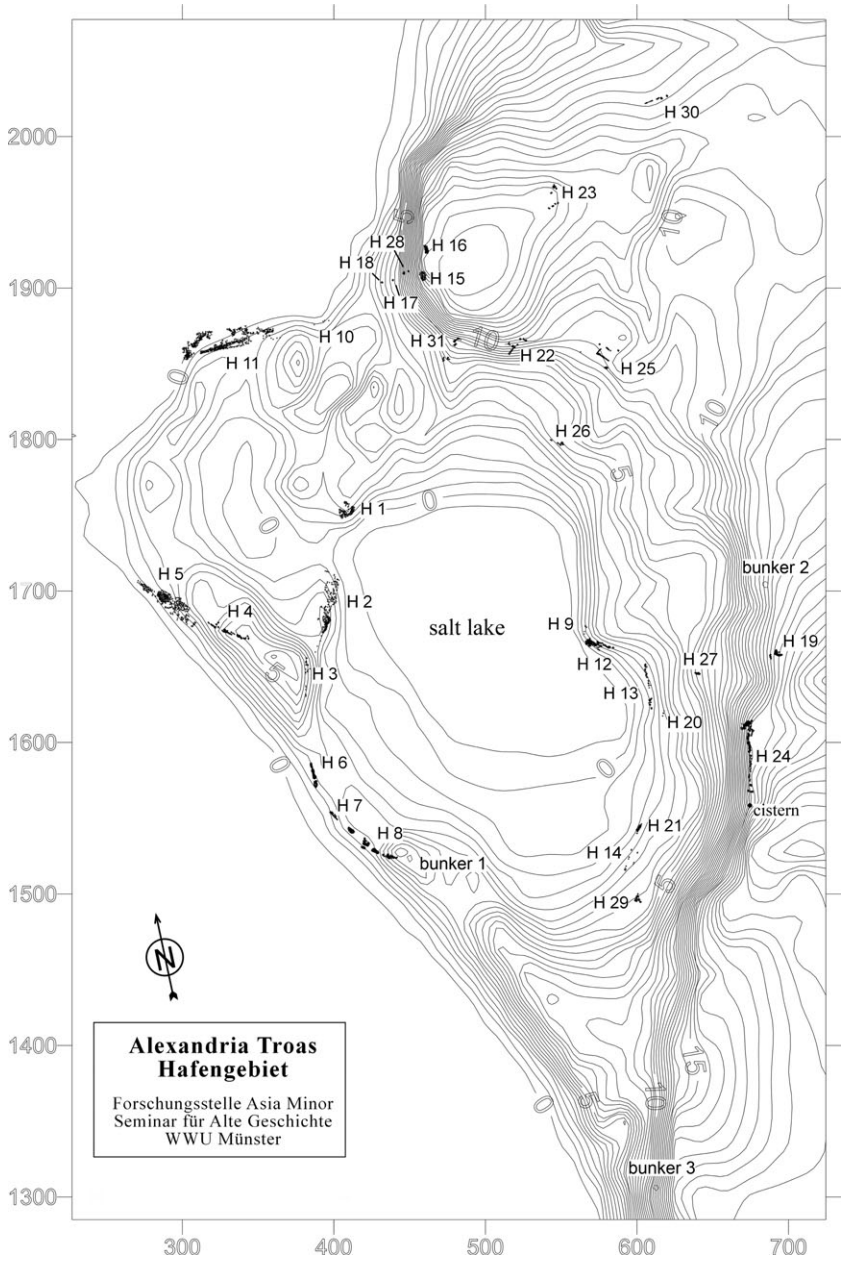


*Figure 6.* Topographical plan of the harbour area with the ancient structures H1-H31, the cistern and the modern bunkers. (Forschungsstelle Asia Minor, Münster)

columns of *marmor Troadense*. The quarries of this grey granite are located between eight and 12 km to the east of Alexandria Troas in the Çiğri Dağ Massif (Ponti, 1995). The stone can be found in many places in the eastern Mediterranean and was exported as far as North Africa and Italy (Pensabene, 1995: 318, fig. 341; Feuser, 2009: 22, fig. 3). Some columns of *marmor Troadense* still in the quarries are monolithic and up to 11 m long, and some must have been shipped from the harbour of Alexandria Troas, as it is the nearest harbour to the quarries.

## Archaeological remains and reconstruction

The area of the ancient harbour is now dominated by a salt lake which is separated from the sea by sandbanks (Figs 1 and 6). This lake is at no point deeper than 0.95 m below sea-level. In the east the topography rises to the plateau of the ancient city *c*.15 m above sea-level. The ridge to the north of the lake, on which an old school building of Dalyan Köy is situated, rises steeply in the west to *c*.15 m, whereas in the north-east the ground ascends gently to *c*.10 m. North-west of the

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*Figure 7.* View of structure H11 from the east; on the left the ashlars set in line with *opus caementitium* to the right; in the foreground remains of a 'column'. (Forschungsstelle Asia Minor, Münster)

salt lake there is a second lagoon-like area not higher than 0.5 m above present sea-level, which is separated from the sea by dunes not higher than 2 m. In winter the lagoon is filled by salty water, whereas in the summer it is dry. In the west between the salt lake and the sea the ground consists of sand or is very sandy, whereas in the west it is composed of solid earth.

The surveyed area is bounded on the north and north-east by the modern village of Dalyan Köy, on the east and south-east by the plateau of the ancient city with the remains of the fortification wall, and on the west by the sea. In this zone we documented 31 ancient structures (H1-H31) of varied size, mainly constructed of *opus caementitium*, 78 columns and column-drums of different sizes and conditions, two stone piles, one cistern and three modern bunkers (Fig. 6). Just two of the ancient structures reach into the water or are submerged, the rest are located on the land.

***The breakwaters of the outer basin***

North of the second lagoon, next to the sea there is a structure consisting of *muschelkalk* (shell limestone) ashlars and concrete (H11) (Figs 6–7). This structure is *c*.50 m long and 1–1.5 m wide in the west and up to 4 m in the east. In the south there are ashlars set next to each other in a line 25 m long. To the north is *opus caementitium* attached to the ashlars. Further to the north and already in the water are several large ashlar blocks of up to 2.5 × 1.2 × 0.3 m. A second row of ashlars to the north, corresponding to the one in the south, is missing. On top of the more-or-less level upper side of H11 are two granite 'columns' no more than 0.8 m high.

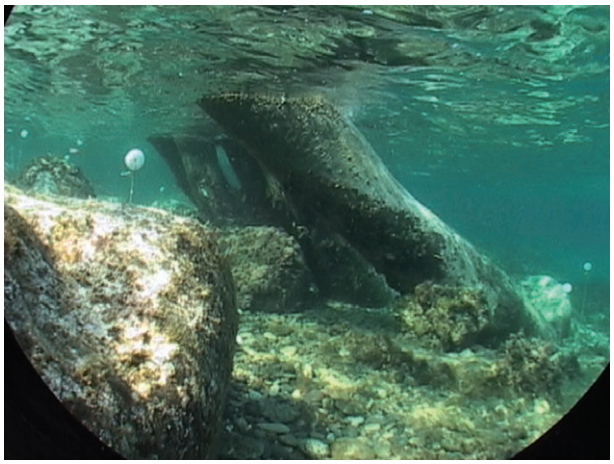

*Figure 8.* View of the columns in the sea north of structure H11. (Forschungsstelle Asia Minor, Münster)

In the sea immediately north and west of H11 over 100 granite columns and slabs, all of the local *marmor Troadense,* have been sunk (Fig. 8). The columns are up to 3.8 m long and have a maximum diameter of 0.8 m. Underwater survey revealed that they are not the result of an accident, but were placed there intentionally. Some of the columns were sharpened and then rammed into the sea-bed. They are leaning towards the south against columns placed on the sea-floor. It seems as if these columns and slabs were deliberately placed north of H11 to strengthen it at the point where waves coming from the north hit it with their full kinetic energy—and still do today.

From the size and location of this structure we can conclude that it was the northern breakwater of the harbour. The large ashlars were the foundation on which two walls of *muschelkalk* ashlars were set with *opus caementitium* between. The whole structure may have been placed on an embankment of rubble stones. The columns and slabs in the sea to the west and north must have been placed there when the breakwater was already weakened by wave energy.

West of the salt lake, immediately at the shoreline, there are two structures of *opus caementitium* which are oriented roughly north-west to south-east (H4, H5) (Fig. 6). H4 can be traced for a length of *c*.15 m on the upper edge of a dune at a height of between 3 and 6 m. It is followed in the north-west by H5 which extends into the sea where it continues for another 100 m as a great embankment of dumped rubble and rocks. Only on aerial photographs can the size of the embankment be seen clearly (Fig. 9). The rock mound was built directly on the sea-bed. On the beach H5 can be fol-

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lowed for *c*.40 m (Fig. 10). It consists of *opus caementitium* with limestone ashlars to the west. The concrete is heavily eroded by the sea. To the east the *opus caementitium* is bordered by a row of *muschelkalk* ashlars. The middle part of H5 is still in a good state of preservation (the northern structure in Figs 10 and 11). The neatly-paved *opus reticulatum* surface slopes to the south-west at *c*.45°. A wall about 1.6 m wide and not much higher than 1 m, still intact in the east but eroded towards the west, is located on this surface. Two drains pass through the wall.


*Figure 9.* Aerial view of the northern and southern breakwaters. (Vehbi Tutmaz)

The location, the construction of the well-preserved central section of H5, and the huge submerged embankment, have enabled us to interpret this as the southern breakwater. The *opus caementitium* was constructed on top of the rock mound, a construction method that Pliny the younger (*Epistulae* 6.31.17) describes for the breakwater at Centumcellae, *pilae* built on the rock mound of the breakwater. It is not quite clear what these pilae looked like. Humphrey *et al*. (1998: 476–7) translate this passage as 'masses of concrete laid on top of the stones', which would match the situation in Alexandria Troas. The top of the breakwater is gently sloping towards the sea to absorb the kinetic energy of the waves rolling up from the south and to prevent undermining by wave-action. The drains were necessary when waves reached over the small wall.

We can conclude therefore that the outer basin of the harbour of Alexandria Troas was protected by one breakwater on the north (H10, H11, H17, H18) and another on the south (H4, H5) (Figs 6, 9, 12). The southern breakwater was build with an angle of 45° against the wind from the south so that the kinetic energy of the waves could not hit it all at once (for a


*Figure 10.* Part of the drawing of structure H5. (Forschungsstelle Asia Minor, Münster)


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*Figure 11.* View of the middle part of structure H5 with sloping surface and wall, from the east. (Forschungsstelle Asia Minor, Münster)

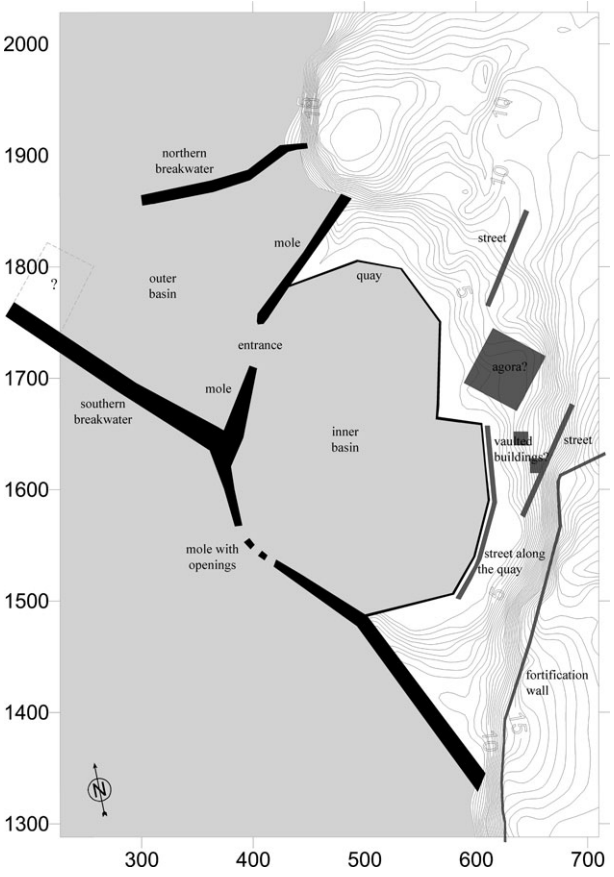


*Figure 12.* Schematic reconstruction of the harbour of Alexandria Troas in the Roman period. (Forschungsstelle Asia Minor, Münster)

similar layout at Cosa see McCann, 1987: 137–8). Both breakwaters are artificial structures consisting of an embankment of rubble stones and rocks on which a top of concrete (southern breakwater) or of concrete and *muschelkalk* (shell limestone) ashlars (northern breakwater) was built. The rough boulders of the southern breakwater are of the same rock as the ridge north of the salt lake and the city plateau and were probably quarried directly from there. The embankment is mainly submerged today, only a few blocks reach up to the surface. It might have subsided under its own weight as it was built directly on the sandy sea-bottom (Blackman, 2008: 647); however, even in ancient times most of it was submerged and only the upper part reached out of the water.

***The moles of the inner basin***

A structure of *muschelkalk* ashlars and *opus caementitium* is located immediately north-west of the salt lake (H1) (Fig. 6). The ashlars can be found in its western section whereas the concrete follows to the east. In its southern section H1 ends in a U-shape. In the north the structure is hidden under a dune under which it proceeds further to the north-east where it can be traced to the bedrock of the ridge north of the salt lake. An *opus caementitium* structure up to *c*.50 m long and *c*.8 m wide can be found west of the salt lake (H2) (Figs 6 and 13). It is best preserved in its northern section, while the southern end is buried under sand. Five steps are located along its upper edge, which might have served as foundations for ashlars. The upper side itself is level and stands *c*.2.7 m above sea-level. Immediately north-east of H2 are four granite slabs, while a bit further to the north are two sandstone slabs lying in a row.

The area between structures H1 and H2 is the connection between the salt lake and the second lagoon. It is less than 0.5 m higher than the present sea-level. Geophysical survey between H1 and H2 revealed no further artificial structure under the sand. In the south-west the salt lake is separated from the sea by dunes not much higher than 1.5–2 m, whereas further north and south the dunes rise to a height of 6 m. In this area measuring *c*.85 m from north to south, three structures of *opus caementitium* emerge out of the sand (H6, H7, H8) (Figs 6 and 14). The colour, quality and composition of the concrete of all three structures are similar. The northern structure H6 emerges only a few centimetres out of the sand. It is *c*.16.5 m long and 1–1.7 m wide. The next, H7, *c*.18 m to the south-east, is *c*.7 m long and *c*.1.5 m wide. H8 consists of 4 units which are not connected to each other above ground. The first is located *c*.8.5 m south-east of H7 and measures *c*.5 × 2.5 m. The second unit, *c*.8 m away, is 4.5 m long and 3.5 m wide. The third, which measures *c*.4.8 × 2.5 m, is *c*.3 m south-east of the second. The fourth unit is the best preserved, *c*.10 m long and *c*.3 m wide, and situated *c*.3 m south-east of the third. The first three units are preserved to a height of no more than *c*.1.5 m above ground, whereas the southernmost unit survives to a height of *c*.5 m above sea-level and carries on further south under a dune. The concrete of the second and third units consists of an upper layer of white mortar and a lower layer of dark-grey mortar with small and medium-sized inclusions of volcanic ash

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*Figure 13.* View of structure H2 from the east. (Forschungsstelle Asia Minor, Münster)

*Figure 14.* View of structures H7 and H8 from the north-west. (Forschungsstelle Asia Minor, Münster)

(Fig. 15). Whether this additive is pozzolana from the Bay of Naples or volcanic ash from a different place could not be determined as an analysis was unfortunately not possible. A similar building technique occurs in the *pilae* of the harbour of Cosa (McCann, 1987: 76–8, 81–2, 141, 325).

The geophysical survey revealed that H6 and H7 are a bit larger than visible on the ground and that H7 and the northern end of H8 have no connection with each other or with neighbouring structures, whereas the three southern units of H8 are connected to their neighbours. The situation can be summarized as follows (Fig. 12): the foundations of two walls come out of the dunes from the north and the south, but they stop before reaching each other. Between these walls there are two foundations of *c*.11 × 7 m which are not connected to each other or to the walls in the north and south. We can conclude, therefore, that the outer basin was separated from the inner one by two moles (Fig. 12). The rest of the northern mole can be seen in structure H1 and of the southern mole in H2. The construction of the southern mole H2 with *opus caementitium* and foundations for ashlars is quite similar to the mole of the ancient harbour of Ampurias (Nieto *et al*., 2005: 90–93). The entrance to the inner basin of the harbour of Alexandria Troas was *c*.36 m wide and located to the north-west so that the waves could not reach it with their full kinetic energy. Against the prevailing northern winds the northern breakwater, the northern mole and the ridge in the north of the harbour area protected the inner basin.

In the south-west there was a mole with three openings to the sea (H6, H7, H8) (Fig. 12) which helped to prevent silting-up of the inner basin by maintaining a

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*Figure 15.* Detail of the *opus caementitium* of structure H8, from the west. (Forschungsstelle Asia Minor, Münster)

constant circulation of water (Blackman, 2008: 648). The gaps between the structures of *c*.15 m and *c*.8 m are too narrow to function as an entrance into the harbour basin for ships. The superstructure of the mole could have been built of timber or of concrete. Similar structures can be found in several other Hellenistic and Roman harbours in the Mediterranean (Blackman, 1982: 197–202; Blackman, 2008: 648, 654–5; Feuser, 2009: 112–16).

***The quay of the inner basin***

Directly east of the salt lake there is a structure (H9) 8 m long and up to 3 m wide made of two layers of ashlars with a core of *opus caementitium* to the east (Figs 6 and 16). The height of the first layer of ashlars is *c*.0.55 m, and of the second layer *c*.0.3 m. Farther to the east this feature follows a very damaged structure (H12) made of white *opus caementitium* *c*.6 m long and 2 m wide (Fig. 16). A few metres further to the south-east several ashlars can be found set in a line in an area of *c*.25 m (H13). They protrude only a few centimetres out of the ground. All these three structures are set at right angles to each other. Their location and the steep step of the ground of 2 m make it highly possible that we have here the remains of a quay. The original location of the rest of the quay and the dimensions of the inner basin were confirmed by its still-visible foundations, geophysical measurement and the contour map. The quay of the inner basin was polygonal with a rectangular extension in the west (Fig. 12). The remains of the quay are thoroughly ruinous, which is why we cannot be sure whether it was stepped or not.

The seven 'columns' of *c*.0.4 m diameter and no more than 0.8 m high (Fig. 17), situated along the 2-m contour line in close connection with the ruins of the quay, were probably used as bollards. However, this identification is uncertain given the lack of comparable material in the archaeological record. Lehmann-Hartleben suggests the use of simple stone bollards at the harbours of Aphentrika, Nesis, Panormos and Tarracina (1923: 207, 244, 271, 273), but none has been confirmed archaeologically. The most common installation for the mooring of ships in Roman times is pierced stone blocks, as for example in the Severan harbour at Leptis Magna, the Trajanic harbour at Portus, or the harbour of the River Tiber in Rome (Blackman, 1982: 203–04; 2008: 651) or depicted on the Torlonia Relief of *c*.200 AD (Blackman, 2008: 639 fig. 25.1).

***The road system and building remains***

The granite kerbstones of a road can be found east and south-east of the salt lake (H14, H20) (Fig. 6). They are up to 1.7 m long and *c*.0.15 m wide. According to the present position of the kerbstones the road was *c*.4 m wide. Granite slabs of the road pavement which have been unearthed by ploughing can be found nearby. Similar roads next to a quay have been detected in the Roman harbours of Ephesus (Zabehlicky, 1995: 210), Phaleris (Schäfer, 1981: 69) and Cenchreae (Scranton *et al*., 1978: 36–8). The remains of several columns next to this street show that there might have been a columned hall alongside, but no further remains of its architecture were found.

The road network within the harbour area could just be revealed in outline (Fig. 12): Two roads led away from the quay. The first started in the north-east of the inner basin and proceeded with a shallow gradient to

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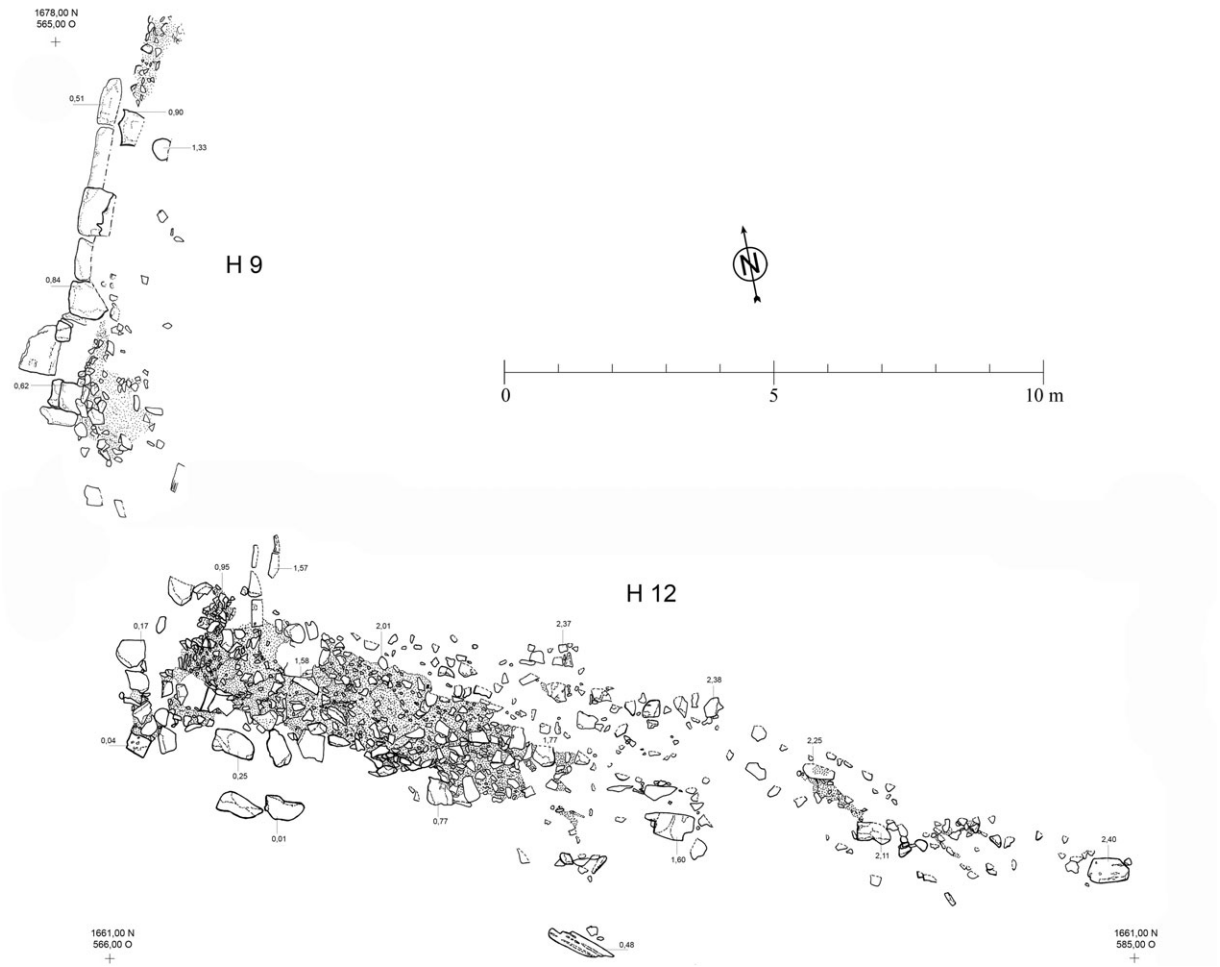


*Figure 16.* Drawing of structures H9 and H12. (Forschungsstelle Asia Minor, Münster)

the north of Alexandria Troas. We do not know whether or not this road led to a gate in the city wall, as the modern village of Dalyan Köy is built over its further course. The second road started to the east of the quay and had a steeper gradient, reaching the height of the city plateau just north of the fortification wall. The two roads were probably used for different purposes: heavy loads like the columns of *marmor Troadense* might have been transported on the shallower northern road while lighter goods could also have been transported on the steeper one.

The columns still *in situ* and the shallow relief indicate that there might have been an agora-like space east of the inner basin (Fig. 12). The buildings associated with the harbour have been thoroughly destroyed. On the edge of the city plateau, just outside the city wall, stands a small, polygonal vaulted building of *opus caementitium* (H19) (Figs 6 and 18). The upper side is level. There is a door-like opening to the west and two window-like openings in the north and south. It is prominently placed opposite the harbour entrance and visible from most of the harbour area. It is too small and too far from the quay to be a storage-building. Because of its prominent location outside the city wall it is more probable that it was the substructure of a tomb. As the harbour of a city was important for its economic wealth and a prominent entrance, it would also have been the scene of representations of the community and its elite (Zimmermann, 1992: 169). In Cyzikos we know from an inscription of the 1st century AD of the tomb of a prominent family in the harbour area (Schwertheim, 1978; Schörner, 2007: 33, 283–5). Unfortunately the tomb itself has not yet been archaeologically attested. During recent research at Portus a necropolis with at least two mausolea and several fragments of funerary monuments was detected not far from the Trajanic harbour along the road leading to the Tiber (Keay *et al*., 2005: 290).

A structure of *opus caementitium* east of the salt lake at the beginning of the slope of the city plateau (H27) (Fig. 6) is largely destroyed, but is important for the reconstruction of the plan of the harbour area. H27 consists of two pillar-like structures placed on a wall. Towards the south the eastern pillar shows the beginning of a vault (Fig. 19). A stone-dump borders it on the south, consisting of an upper layer of small rubble

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*Figure 17.* 'Column' HS56, from the south. (Forschungsstelle Asia Minor, Münster)

*Figure 18.* View of structure H19, from the west. (Forschungsstelle Asia Minor, Münster)

stones beneath which are larger rubble and some ashlars, many with mortar attached. Only the remains of H27 and the stone-dump show that vaulted storage-buildings probably stood beside the quay. Further buildings might still be buried.

No evidence of a lighthouse has been found, but there must have been some kind of installation to guide ships into the outer basin and to mark the entrance to the inner one. These could have been built of perishable material, such as wood. The buildings of Alexandria Troas, where the terrain rises to a height of 105 m above sea-level, must have been visible far out to sea and could have served as a day-mark for shipping.

*Figure 19.* H27, beginning of the vault, from the west. (Forschungsstelle Asia Minor, Münster)

***The Late Roman fortification wall***

A structure of great length along the edge of the city plateau east of the salt lake is composed of *opus caementitium* (H24) (Fig. 6). It can be followed for *c.*45 m and is no more than 1.5 m wide. To the east the structure extends into the soil of the plateau, to the west H24 ends in a wall up to 1.60 m high (Fig. 20). In this wall are holes of *c.*15 × 15 cm which penetrate to a depth of up to 1.6 m. H24 is the remains of a Late Roman fortification wall, and the holes were used for scaffolding during the construction process. As the *diateichisma* of Alexandria Troas was probably erected in the 3rd century AD (Schulz, 2002: 39–40), the fortification wall in the harbour area might be of the same date. As the majority of the pottery from the survey area dates from the 5th-7th century (see below) it is also possible that the wall was built during this period. The city wall of Aphrodisias was built in the mid- to late-4th century AD and for several other Late Roman circuits in Asia Minor a construction date in the 4th or 5th century can be assumed (de Staebler, 2008: 308–11, 317–18). However it is important to focus on the fact that the harbour of Alexandria Troas was at no time included within the fortification wall of the city.

***Miscellaneous remains***

Along the edges of the ridge north of the salt lake can be found several structures of *opus caementitium* (H15, H16, H22, H25, H30) (Fig. 6) whose purpose is not quite clear. Most probably they were used for levelling the surface of the ridge. Only at one point on the top of the ridge is the almost-completely-destroyed founda-

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*Figure 20.* H24 wall with rectangular holes, from the west. (Forschungsstelle Asia Minor, Münster)

tion of a building visible (H23) (Fig. 6). Geophysical survey on the ridge gave no indication of significant building activity. A small excavation next to the modern school building in 1997 unearthed some walls of the 5th-7th century AD and two *pithoi* (Biller, 1999). This area must have been used for storage in Late Roman times, but it was not possible to reconstruct a building complex as the excavation trenches were not large enough. Although the examination of the ridge gave no clear indication of its use in ancient times, it is likely that there were several buildings in this prime location. But if so they must have been destroyed early and very thoroughly as none of the travellers from the 14th century onwards described any remains of ancient buildings on the ridge.

A cistern is built into the remains of the fortification wall at the upper edge of the city plateau (Fig. 6). It is constructed of rubble stones and has a diameter of *c*.3 m. It was too unsafe to measure its depth as the edges are not very solid. The cistern must have been built after the destruction of the Late Roman city wall, but it is impossible to decide on its exact date.

### *The columns*

During the survey we documented 78 columns, mainly in the area north and east of the salt lake. With the exception of two marble columns, all were of local granite from the Çiğri Dağ Massif. They can be classified by size into three groups. The first consists of 53 columns with a diameter of *c*.40 cm and preserved to a height of up to 2.4 m. Some are still standing *in situ* (Fig. 21). Eight stand on three sides of a flat area just west of the salt lake, and just a few metres further south another four stand in a line. The second group consists of four monolithic columns of *marmor Troadense* near

*Figure 21.* Two columns *in situ* east of the salt lake, from the north. (Forschungsstelle Asia Minor, Münster)

the salt lake. Two are located immediately west of the lake and are 11.5 and 11.3 m long with a diameter of 1.4 m (Fig. 22). Their measurements are similar to others still in the *marmor Troadense* quarries in the Çiğri Dağ Massif (Ponti, 1995). The two other columns lie parallel to each other south-east of the lake. They are 9.2 and 8.8 m long with a diameter of 1.16 m. The third group consists of seven drums of *marmor Troadense* which were found in the north-east zone of the survey area and to the west of the salt lake on the beach, covered by a layer of sand *c*.5 cm thick. The drums have a height of *c*.40 cm and vary in diameter from 62 to 92 cm. The seven granite 'columns' only 80 cm high, with a slightly oval diameter of 39–44 cm and a roll on the upper end (see above, Fig. 17) are

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*Figure 22.* Monolithic column of *marmor Troadense* west of the salt lake, from the south-west. (Forschungsstelle Asia Minor, Münster)

closely connected to the quay and were probably mooring bollards.

The question of a yard at the harbour of Alexandria Troas where the columns of *marmor Troadense* were stored before shipping is raised by Ponti in his study of the granite quarries in the Çiğri Dağ Massif (1995: 315 n.41). As the four monolithic columns and the seven column-drums found in the survey area were not used in buildings in the harbour area, it is possible that they were kept in a central storage place at the harbour in Roman times. Later they must have been spread over the harbour area for different purposes. Where this stone-yard might have been situated we unfortunately do not know. As the area around the quay was cramped it is impossible that it was used as a storage place. A decree known from Ephesus forbad the storage of marble and timber on the quay as such goods obstructed traffic in the harbour (Wankel, 1979: 140–43). A stone-yard for the harbour of Alexandria Troas was probably located a little outside the dock area.

***The modern bunkers***

There are three small bunkers of ferro-concrete located in the harbour area (Fig. 6). The first is south-west of the salt lake on a dune, the second east of the lake on the edge of the city plateau in a height of *c*.16 m, and the third at the southernmost edge of the survey area just below the edge of the plateau. They all have one entrance which is protected and hidden by rubble stones and one opening for heavy artillery, except the one east of the salt lake which has three openings. The bunkers are distributed in such a way that every point on the beach could have been covered. North of the modern Turkish village of Dalyan Köy several further bunkers of the same dimensions and layout are situated along the shore. They were most probably built against an Allied invasion of the Dardanelles in World War I. Ancient structures and stones were extensively used for the foundation and protection of the bunkers.

## The pottery and glass finds

For the ceramic survey the area was divided into 21 survey fields orientated along the borders of the modern fields. It was intended to have a rather homogeneous ground visibility within each field, but visibility among these survey fields varied, which reduced their comparability. Because of the terrain and the dense vegetation it was not possible to survey the steep slopes of the city plateau or of the ridge north of the salt lake. These areas were just investigated briefly. No finds were made on the sandy terrain of the beaches and the dunes west and south-west of the salt lake.

The survey areas were field-walked systematically with a spacing of *c*.3 m between walkers. Datable pottery fragments such as feet, rims and stamped pieces, as well as glass and bronze fragments, were collected and studied. In every survey field three spots each of 2 $m^2$ were laid out in which all of the artefacts were counted for statistical analysis of the approximate density per $m^2$. The ground visibility, the condition of the terrain, the density of the finds and characteristic features were documented. On the one hand it was intended to gather material to establish a chronology of the harbour area and on the other hand to define areas of use. However, because of erosion processes and intensive agricultural cultivation which had caused movement of the finds it was unfortunately not possible to determine different areas of use.

The date of the fine wares from the harbour area ranges from the 1st century BC/1st century AD to the beginning of the 7th century AD. The majority of the pottery dates from the Late Roman period, and there were no finds from the Hellenistic period. The finds include only a few types of Eastern Sigillata B Ware (ESB) and Eastern Sigillata C Ware (ESC) that go back to the 1st and 2nd century AD. The shapes and decorations of the African Red Slip Ware (ARS) can be dated to the 4th and 5th century AD. The types of the Late Roman C Ware (LRC) are the most common ones among the *terra sigillata* from the harbour area. Especially the forms Hayes 3 and 10 (1972: 329–31, 343–6) are quite frequent and date from the 5th to the mid-7th century (Fig. 23).

The sherd of a base of an *unguentarium* with an unreadable print of a stamp belongs to a type of Late Roman *unguentarium* ware which was first described by Hayes, and appears in many contexts of the 5th-7th century in the Mediterranean (Hayes, 1971: 247–8, fig. 3). The colour of the fabric of the sherd from Alexandria Troas is brown which matches with a local variation from Ephesus (Metaxas, 2005: 95–7) which was exported to the west coast of Asia Minor (Ladstätter and Sauer, 2005: 133).

There are quite a lot of amphoras, not surprising in a commercial area. No complete vessel is preserved and neither stamps, graffiti nor dipinti have been found on any sherd. Several typologies of Roman to Early Byzantine amphoras exist (for example Hayes, 1992:

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*Figure 23.* Mainly Late Roman pottery from survey area F19. (Forschungsstelle Asia Minor, Münster)

61–77; Lüdorf, 2006: 51–62), but not all the types from the harbour area fit these series. The examples date from the late-1st century BC to the early-and-mid-7th century AD, with an emphasis on the Late Roman period of the 5th-7th century. The unglazed cooking wares are quite hard to date because of the lack of a firm typology for the eastern Mediterranean. Several rims of cooking pots from the harbour area show parallels to a type from a well at the 'Staatsmarkt' in Ephesus which appeared in a layer of the 1st century AD (Meriç, 2002: 103f. nos K625–31). The other types of cooking wares can only generally be dated to Roman and Late Roman times.

Few sherds of Byzantine glazed wares were found during the survey, and no Byzantine coarse ware apart from one unspecific fragment. The form and fabric of the glazed wares can be compared to examples from the Beşiktepe near Troy which are dated by Böhlendorf to the 12th and 13th centuries (1997: 404 no. 33). Byzantine wares are restricted to the north of the survey area. Pottery from Seljukan or Ottoman time has not been discovered.

The few glass finds are in a very fragmentary condition. The feet of two wine-glasses belong to a form of blown glass that was widespread in the eastern Mediterranean from the 4th century onwards (Berndt, 2003: 112). The rims of two flasks and two beakers as well as the folded rim of a bowl cannot be dated more exactly than the Late Roman period.

To conclude, the pottery from the survey area dates from the 1st century BC/1st century AD to the beginning of the 7th century AD and was imported from the west coast of Asia Minor (LRC; Late Roman *unguentarium*) and from North Africa (ARS); several amphoras also came from North Africa. Possibly there was local production of Roman amphoras and coarse ware in Alexandria Troas, but this cannot be confirmed on the basis of the pottery from the harbour area.

## The chronology of the harbour

The construction date of the harbour of Alexandria Troas can be based on several indications. Firstly the *opus caementitium* frequently used as a building material was employed for the first time in Asia Minor in the second half of the 1st century BC (Ward-Perkins, 1958: 77–101; Ganzert, 1984: 175; Waelkens, 1987: 94, 101; Hueber, 2007: 50–52), which means that it is highly improbable that the harbour was built earlier than this date. Secondly, the earliest pottery in the harbour area dates from the 1st centuries BC/AD, and no pottery of earlier date has been detected. Thirdly, as Alexandria Troas became a Roman colony and was granted the *ius italicum* under the reign of Augustus it is most probable that not only the city centre but also the harbour was built or extended at this time. In summary it can be said that the harbour installations of Alexandria Troas were most probably erected at the end of the 1st century BC or the beginning of the 1st century AD.

There are no hints of any pre-Roman occupation. Neither the surviving buildings nor the pottery give any indication as to where a Hellenistic port might have been located. It is possible that the Roman harbour was built over the Hellenistic one so that nothing of it remained, or that the Hellenistic harbour was located at a different place and has not yet been

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identified. However, it does not seem possible that the Hellenistic *polis* did not have a port, as the city was planned as the new centre of the Troad by Antigonos Monophthalmos and Lysimachos (Tenger, 1999: 143–4; Akalin, 2008: 29–34).

We can assume that there must have been several phases of restoration and repair due to earthquakes which are reported in the region for the 1st and 2nd century AD (Rapp, 1982: 50). The different colours and varying composition and quality of the *opus caementitium* of the documented structures might suggest that there were several building phases. Unfortunately it is not possible firmly to date these phases. The Late Roman pottery clearly indicates that the harbour area must have been occupied until some time between the 5th and the beginning of the 7th century, but we do not know whether the inner basin was still in use or not. It is important to remember that the harbour is located outside the Late Roman fortification wall. This might indicate the possibility that the inner basin was no longer in use during this period, bearing in mind that important harbours still in use in Late Roman times such as Portus, Leptis Magna, Karthago and Anthedon were included within the city walls (Blackman, 1982: 194).

Nevertheless an anchorage might have been located in the outer basin, as the northern breakwater was strengthened by granite columns. These columns and slabs come most probably from buildings and streets in Alexandria Troas. They can only have been placed along the northern breakwater when the city was already partly abandoned. However, the harbour of Alexandria Troas clearly lost its former significance, and it seems that the island of Tenedos, opposite Alexandria Troas, became more important for trade through the Dardanelles from the mid-6th century onwards. It was the emperor Justinian I who built a granary on Tenedos which should have been big enough to store the whole load of the grain fleet from Egypt. From this island granary it was shipped to the new capital, Constantinople, when the winds were suitable (Koder, 1998: 99, 287, 289f.; Bieg *et al*., 2006: 152). By this date, therefore, it would seem that the harbour of Alexandria Troas had lost its function as the place where ships waited for favourable winds to travel through the Dardanelles.

## Concluding remarks

The harbour of Alexandria Troas consisted of an inner basin of *c*.45,000 m$^2$ and an outer one of *c*.24,000 m$^2$ (Fig. 12). The inner basin measured *c*.300 m north-south and *c*.170 m east-west in the northern section and *c*.210 m in the southern section. The quay was *c*.600 m long. The harbour of Alexandria Troas with its two basins was as far as we know a medium-sized harbour of the ancient Roman world, slightly bigger than Side (Knoblauch, 1977: 41–7 fig. 5) and Cenchreae (Scranton *et al*., 1978: 14 n.2), but smaller than Ephesus (Groh, 2006: 99f., 105), Portus and Leptis Magna (Scranton *et al*., 1978: 14 n.2). But it should be emphasized that the importance of a harbour cannot only be determined by the size of its basins and the length of its quays. It seems as if medium-sized harbours like those of Alexandria Troas and Side (Knoblauch, 1977) were large enough to function as a junction of important sea-routes. Traffic in the harbour of Alexandria Troas must have been heavy. It was a hub for goods and passengers in the north-west of Asia Minor. Ships waiting for southerly winds to travel through the Dardanelles into the Propontis and the Black Sea had to wait there, probably anchored in the outer basin so as not to disrupt the loading and unloading in the inner basin.

In the reign of Augustus maritime trade in the Mediterranean became more intensive and the installations which supported this trade were improved. The centre of this development was the Tyrrhenian Sea, where the emperor supported the harbours first of all because of their military importance (Roddaz, 1984: 95–117, 181–3; Reddé, 1986: 472–502). The example of Alexandria Troas shows that harbour installations well beyond Italy were also supported and improved by the emperor. As both Alexandria Troas and Parium, situated respectively at the entrance and exit of the Dardanelles, became Roman colonies and were granted the *ius italicum* in the Augustan period (Ricl, 1997: 21), it seems as if the emperor intended to guarantee and foster maritime traffic through these important straits.

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