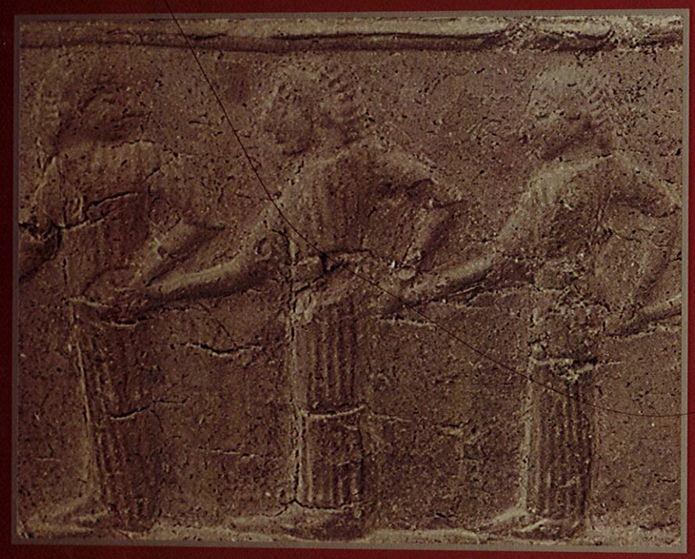
Klazomenai, Teos and Abdera:
Metropoleis and Colony



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22. The type of Clazomenian amphora found in the press unit is extremely common in the fourth-century deposits at the site. For further discussion see Doğer, "Amphores" 469, fig. 15.
23. Cf. *Agora* XII 135, 299 no. 882, fig. 9, pl. 33 (dated to 380).
24. It is dated to the early fourth century, in accordance with similar examples found at Old Smyrna: J.M. Cook, "Old Smyrna: Fourth-Century Black Glaze" *BSA* 60 (1965) 152-153 fig. 10.1.
25. Doğer, "Amphores" 469, fig. 15.
26. For similar examples of black-glazed bowls, highly likely associated with local Ionian workshops see J. Boehlau and K. Schefold, *Larisa am Hermos* III. *Die Ergebnisse der Ausgrabungen 1902-1934. Die Kleinfunde* (Berlin 1942) 184 fig. 89d; Cook, *op.cit.* (n. 24) 147-148 figs 4.1-2, 5, pl. 45a.1.
27. This terracotta sarchophagus dated to the early years of the sixth century was found at the Akpınar necropolis during the 1999 campaign. Its lid is shaped like a hipped-thatched roof and indicates that this roof model was in use during the sixth century.
28. Y.E. Ersoy, "Klazomenai in the Archaic Period" in J. Cobet, V. von Graeve, W.-D. Niemeier and K. Zimmermann (eds), *Frühes Ionien: eine Bestandaufnahme. Akten des Internationalen Kolloquiums zum einhundertjährigen Jubiläum der Ausgrabungen in Milet, Panionion/Güzelçamlı, 26.09.-01.10.1999* (in press, to be published in 2004); *id., supra* 60-64.
29. The social order of Ionia was greatly upset as a result of the offensive intention of the Persian King Cyrus and the fear caused by looters that accompanied the Persian forces. The hiatus observed in the burial grounds and the living quarters of the city should be associated with the abandonment of the city by the Ionians, who fled with fear. To make a suggestion about the settlements of that period would not be more than a mere guess, however we may claim that the Clazomenians had spread around the villages and the surrounding islands and if the mainland was inhabited the settlement must have been restricted to a small area.
30. See Güngör, *supra* 121-131, esp. 124-129.

The Archaic City of Abdera

Chaido Koukouli-Chrysanthaki

Through a combination of archaeological and geomorphological research, the most recent excavation program of the Athens Archaeological Society conducted between 1982 and 1992 has identified the existence of a second enclosure (Fig. 1)[1] to the north of the walled city uncovered in the earlier excavations undertaken by D. Lazaridis (Fig. 2 and 4).[2]

Finds have shown that this Northern Enclosure is earlier than the one to the south, and that it must be associated with the Archaic city of Abdera. The first colony was installed on the inner shore of a bay, the existence of which has been confirmed by geomorphological research (Fig. 3). The bay – phase 1 of the geomorphological changes studied by Professor A. Psilovikos and his collaborators[3] – was already formed when the first colonists from Klazomenai arrived at this part of the Thracian coast in the middle of the seventh century BC (Fig. 4). The colonists built their walled city on the low hills to the east of the shore, which, as the geomorphological research has shown, were surrounded by sea to the west and, partly, to the north.

The cemetery of the ancient city extended to the north and west along the beaches outside the walls – a phenomenon familiar in other colonies of the northern Aegean, at Akanthos,[4] Mende[5] and also at Oisyme,[6] the Thasian colony on the coast opposite Thasos.

The necropolis of seventh-century Abdera has been located outside the Northern Enclosure.[7] In Sector K very close to the north wall, an extensive excavation of a cemetery of the second half of the seventh and early sixth century BC was conducted

Fig. 1. The North Enclosure.

Fig. 2. The area of the South Enclosure.

by E. Skarlatidou.[8] In Sector Π, L. Kranioti excavated two tumuli with graves of the late seventh - beginning of the sixth century BC, under graves of the beginning of the fifth century BC[9] (Fig. 4). Farther to the north the recent rescue excavations by D. Kallintzi have also brought to light graves of the seventh and early sixth century BC.[10] In this area, to the north and northwest of the Northern Enclosure, lay the extensive cemetery of the Teian colony at Abdera (Sectors A and B). An inhumation grave in a pithos found outside the southeastern corner of the enclosure (Sector Γ) is,

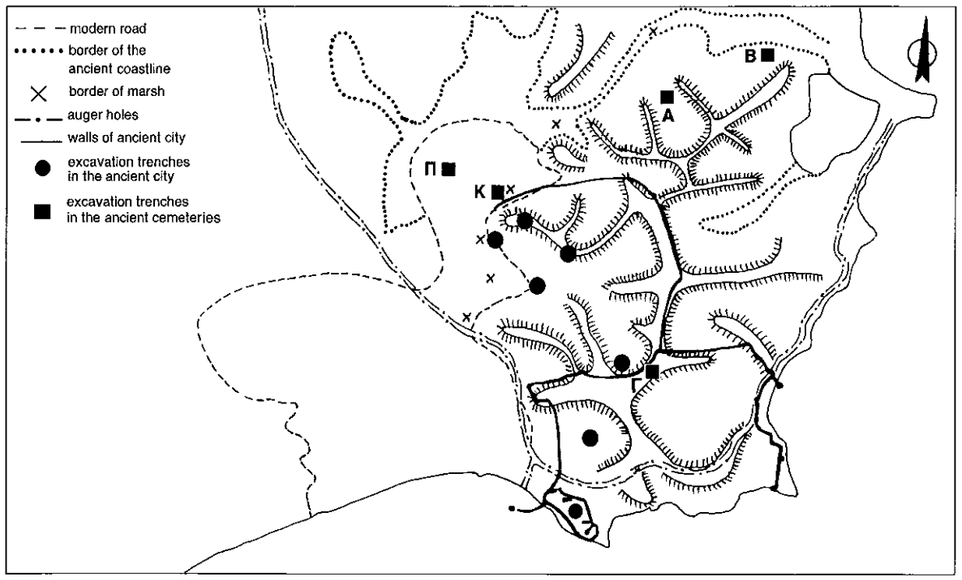

Fig. 3. The North Enclosure. Palaeogeomorphological researches. The ancient bay.

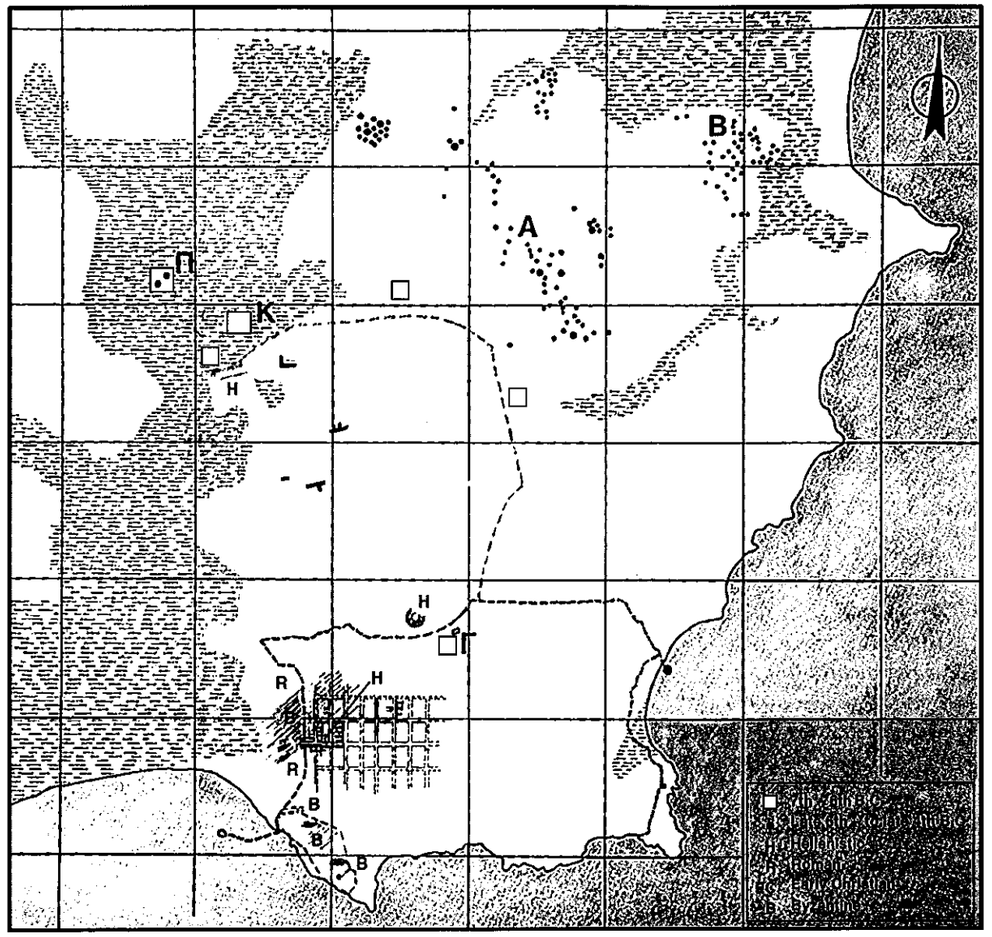

Fig. 4. The city of Abdera and its cemeteries.

however, the first and to now the only evidence that the necropolis of the Clazomenian colony extended also towards the south at the end of the seventh century BC[11] (Fig. 4).

About the city of the Clazomenians we have for the moment very little archaeological evidence: part of its walls and very poor evidence from buildings inside the walls. The excavation in the northwestern corner of the Northern Enclosure uncovered walls from two successive building phases, A and B (Figs 5-6), and confirmed the dating of the walls of the earlier phase A to the

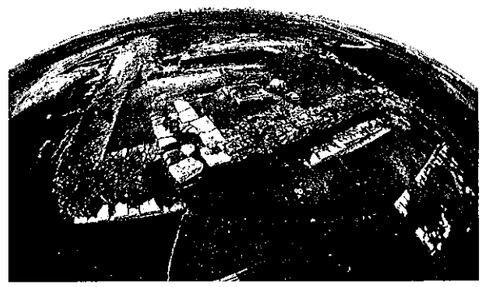

Fig. 5. The North Enclosure. Northwestern corner of the enceinte. Phases A and B.

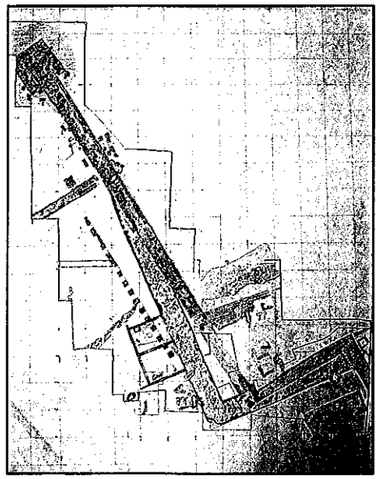

Fig. 6. The North Enclosure. Northwestern corner of the enceinte. Phases A and B.

seventh century, thus associating it with the colony of the Clazomenians.

The earlier wall of phase A is constructed of relatively small stones, and has a consistent thickness of 4 m, comparable to the Geometric and Early Archaic fortifications in both the Greek cities of Asia Minor and the islands of the Aegean, such as those of Old Smyrna[12] and of Zagora on Andros,[13] whose model can be traced back to the Early Bronze Age [14] (Fig. 7). The Abdera wall might have had a superstructure of brick, similar to the wall of Troy II,[15] as well of Old Smyrna.[16]

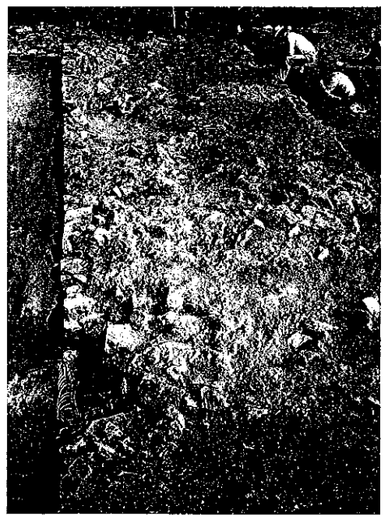

Fig. 7. The North Enclosure. Excavation of walls of phase A.

The facing of the wall is of rough-worked stones of different sizes (Fig. 8). A section of the wall has been uncovered; it runs in a north-south direction and at its southern end makes a turn to the west, where geomorphological research has identified a beach (Figs 5-6). We cannot say where the wall ended to the west since it is covered by the wall of the later phase B. It is most likely that it did not proceed any farther west, since the later wall of phase B seems to have come to an end a few metres to the west (Fig. 9). At the other end of the uncovered wall of the early phase A, a gateway came to light, the remains of which suggest later repair work to the wall (Fig. 10).

A more definite dating of the wall of phase A was achieved by extending the excavation to its interior. On the inner face of the circuit wall the excavation brought to light two rooms of a building (Figs 11-12). In the interior of the western room a rectangular construction of upright slabs was found, with a floor made of fragments of tiles and vessels (Fig. 13). It must be interpreted as a cist built storage unit, a feature well-known in the Aegean from the Subgeometric houses excavated at Zagora on Andros.[17]

On the floor of the room an iron double axe was found (Fig. 14). The destruction layer of this room

Fig. 8. The North Enclosure. Walls of phase A. Detail of the external face.

Fig. 9. The North Enclosure. Walls of phase A under walls of phase B.

Fig. 10. The North Enclosure. Gate of the walls of phase A.

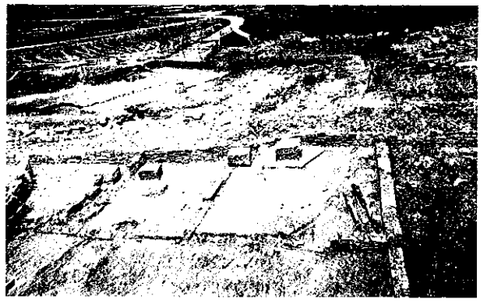

Fig. 11. The North Enclosure. Two rooms of an Archaic building.

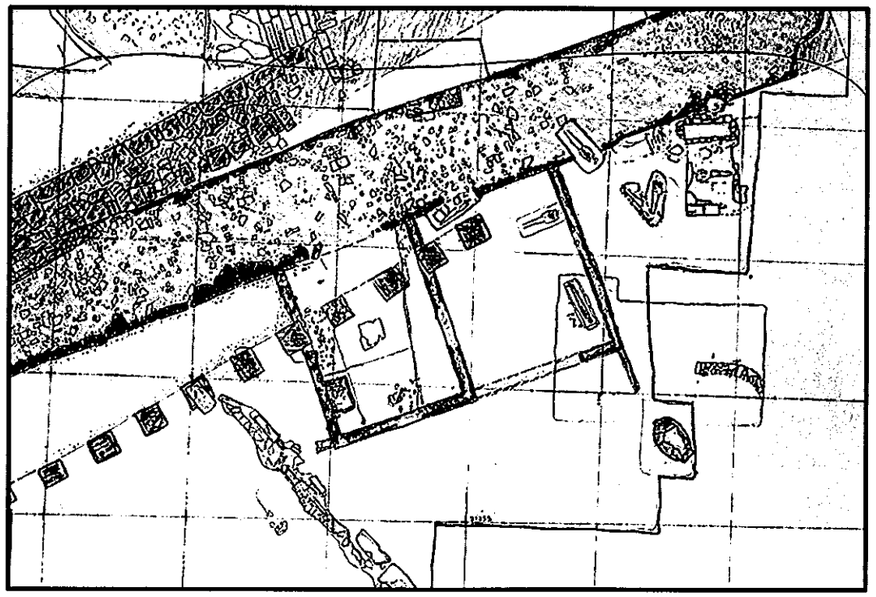

Fig. 12. The North Enclosure. Two rooms of an Archaic building.

Fig. 13. The North Enclosure. Interior of the Archaic building.

can be dated to the late seventh –early sixth century, on the basis of the pottery (Fig. 15), mainly bowls in the eastern Aegean style– lotus and eye bowls (Fig. 16) – as well as pottery of the so-called Wild Goat style (Fig. 17).[18]

The dating of the destruction layer of this building to the late seventh – early sixth century provided a terminus ante quem for the dating of the first phase of the city walls, which can be assigned to the Clazomenian colony. The walls of phase A had to be constructed before the end of the seventh century, and the appearance of a Daedalic figurine can raise the date to as early as the third quarter of the seventh century (Fig. 18). However, the excav-ation sample available at present is not large enough to link the destruction layer of this building inside the walls with a more general destruction layer of the first Clazomenian colony.

The presence of these buildings in the interior of the Northern Enclosure is strong evidence that the area was at a safe distance from the sea. According to the geologists the shoreline began further to the west (Fig. 3) beyond the low hills of the coastal area where the walls and the first buildings of the Clazomenian colony were constructed.

From the actual city of the Clazomenian colonists the only building remains for the moment are the scanty and dispersed house walls brought to light within the Northern Enclosure farther to the east of the discovered walls. They have been excav-

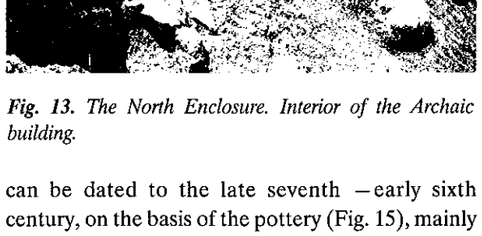

Fig. 14. The North Enclosure. Iron double axe found in the Archaic building.

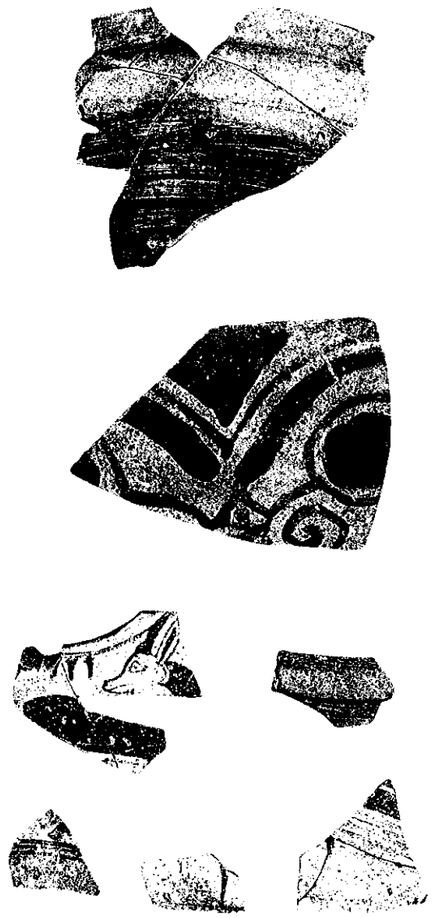

Fig. 15 - 17. The North Enclosure. Sherds found in the Archaic building.

Fig. 18. The North Enclosure. Daedalic figurine.

ated by E. Skarlatidou under a building of the fourth century BC and are dated to the end of the seventh and the beginning of sixth century BC.[19]

The archaeological finds from the Archaic city, as those from its cemeteries, have shown that the Clazomenian colony did not last only a few years, coinciding more or less with the lifetime of its founder Timesios, but it was a community with strong city walls, whose life continued uninterrupted down to the early sixth century BC and probably until the arrival of the colonists from Teos.[20]

Earlier scholars had already formulated a number of questions concerning the life of the city before the arrival of the colonists from Teos. As long ago as 1966, J. May [21] had expressed surprise at the level of activity of the Abdera mint so soon after the founding of the colony, and had suggested the possibility of previous relations between Teos and the local sources of silver in the neighbouring area.

The sporadic appearance of pottery from the late seventh century during the excavations of D. Lazaridis had also puzzled B. Isaac who attempted to link these finds with colonial activity by Thasians in the area of Abdera.[22] Yet the finds from the 1982-1992 excavations in the Northern Enclosure and the cemeteries of the seventh century rule out any link with the island of Thasos –the total absence of Cycladic pottery is of particular significance– and confirm the Ionian character of the colony. Its special relationship with the mother city Klazomenai, is evident from the frequency of Clazomenian transport amphorae at the graves of the Clazomenian colonists.[23]

Although few in number, there are archaeological finds to support the view that the settlers from Teos did not find an abandoned site when they arrived at Abdera.[24] In the second quarter of the sixth century a chronological link between the two colonies is represented by finds, such as certain Ionian type banded bowls or rosette bowls and eye bowls (Fig. 19), as well as a very small number of Middle Corinthian vessels coming from the excavation at the area of the walls, and more clearly from the cemetery of Section K excavated by E. Skarlatidou.[25] There are also some other isolated finds, dated to the second quarter of the sixth century, such as a fragment of a bronze shield band with a representation of Theseus and the Minotaur (Fig. 20).[26]

It is evident that the Clazomenian colony cannot have enjoyed great prosperity. Apart from the invasions of Thracian tribes, the settlers from Klazomenai had to battle malaria, traces of which were identified by the palaeopathological research of A. Agelarakis in the bones recovered from the seventh century cemetery excavated by E. Skarlatidou.[27] The reinforcement of colonies by a second wave of settlers was a frequent phenomenon, familiar from the case of the neighbouring island of Thasos.[28]

Fig. 19. The North Enclosure. Fragments of sixth-century pottery.

Fig. 20. The North Enclosure. Fragment of a bronze shield band.

In the middle of the sixth century the colonists from Klazomenai cannot have had either the strength or the will to resist the overwhelming tide of settlers from Teos, who, according to Herodotos,[29] left their city 'πανδημεί' in 545 BC, to seek a new home in Thrace. However, given the final domination of Abdera by the settlers from Teos, as well as the competition among Greek cities to found colonies and their attempt to justify sovereign rights over these colonies through the stories of *oikistes*, it is difficult to explain the cult of the founder of the Clazomenian colony, Timesios, among a colony of Teians, especially since the paean,[30] commissioned by the people of Abdera from Pindar, makes no mention either of the contribution of the Clazomenians or of the first founder Timesios.

The recognition of a cult of hero worship of the first Clazomenian founder among the Teians 'ἐν Ἀβδήροισι', who maintained close relations – as the new evidence from inscriptions shows[31] – with the mother city, might be regarded as the result of an original agreement between the earlier and later settlers to coexist peacefully. The survival of the Clazomenian founder's cult among the Teians may have been a legacy of such an agreement. It could, however, be seen as a Teian provocation to the Clazomenians, if we suggest that the story of Timesios – all-powerful but hated by the people of the city – as told by Aelian[32] – occurred not in Klazomenai but in Abdera.[33]

In the light of this possible coexistence in the city of Abdera of both Clazomenians and Teians – which appears to be indicated by the recent archaeological finds – I believe that a new reading might be attempted of the ancient *scholion* on the lost verses of Pindar's paean,[34] identifying the 'ἐπήλυδας' referred to in the *scholion* with the Teians of the first phase of the Teian colonization. However, such an attempt would lead me far beyond the safe confines of fact, especially since once a link is established between the lines of the paean and the Teian mother city, the 'ἐπήλυδες' of the *scholion* might also be sought in those Teians seeking refuge at Abdera following the devastation of Teos during the suppression of the Ionian Revolt (492 BC).[35]

However, if – as A. Graham asserts – there is no solid ground for the historian in the interpretation of these philological data,[36] we can at least look forward to new archaeological finds from future excavations at Abdera, Teos and Klazomenai, finds which will cast more light on this obscure period of the early history of the city of Abdera, to which the surviving fragments of the Pindaric paean refer.

There can be no doubt that the later **wall of phase B,** which partially covers the wall of the earlier phase A, should be linked to the colony from Teos (Figs 5-6).[37]

The northern section of the discovered wall of phase B, where it turns eastward, passes over and closes the gateway of the earlier wall of phase A (Fig. 21). The wall of phase B is narrower than the earlier and employs different masonry. In thickness it varies from 2.70 to 3 m. The external face (Fig. 22), is of large rectangular blocks of stone arranged in the isodomic system, while the inner face is constructed of small stones, more or less carefully arranged in place.

The construction of the walls of phase B must be dated to the late sixth century BC. At this period an open-air sanctuary with cult altars was

Fig. 21. The North Enclosure. Northwestern corner of the walls. Sanctuary with two altars.

Fig. 23. The North Enclosure. Sanctuary outside the northern corner of the walls.

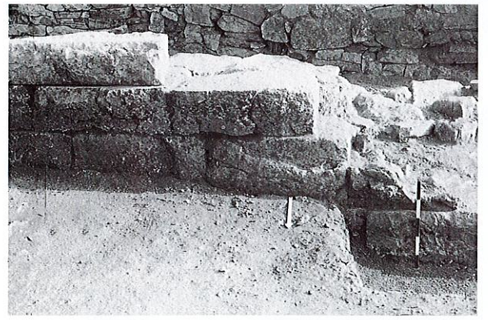

Fig. 22. The North Enclosure. External face of the walls of phase B.

Fig. 24. The North Enclosure. Sanctuary outside the northwestern corner of the walls. Altar –*Eschara 1.*

established outside the walls on a plateau of the natural rock (Fig. 6 and 21).

Altar 1 is a simple rectangular *eschara,* partially destroyed. In Altar 2, the steps of *prothysis* leading up to the sacrificial place have survived. Monumental stairs leading to the plateau with the altars are contemporary with the walls of the second phase (Figs. 23 and 24). The figurines found in Altar 1 (Fig. 25) may be as early as the last quarter of the sixth century BC.

This open-air sanctuary was dedicated to a female divinity, whose cult continued into the fifth and down to the end of the fourth century BC. The thousands of miniature hydriai, which were found thrown on the monumental steps together with ash

Fig. 25. The North Enclosure. Figurines from the Altar-Eschara 1.

and burnt animal bones from sacrifices, belong to the latest phase of this sanctuary (Figs 26-27). The great numbers of these miniature hydriai as well the figurines testify to a cult connected with the Nymphs or Demeter and Kore (Figs 28-29).[38]

The finds excavated so far cannot confirm whether the construction of the new fortification wall of phase B coincides with the settlement of the new colony from Teos. It is possible that the settlers from Teos originally made use of the wall built by the colonists from Klazomenai – the repair work which can be seen in the area of the gateway may date from this phase[39] – and at a later stage designed an entirely new wall, in combination with fortifications to defend the harbour (Fig. 21).

During this phase, the gateway was closed and a well was sunk in the area of the gate destroying part of the wall of the earlier phase A. Investigation of

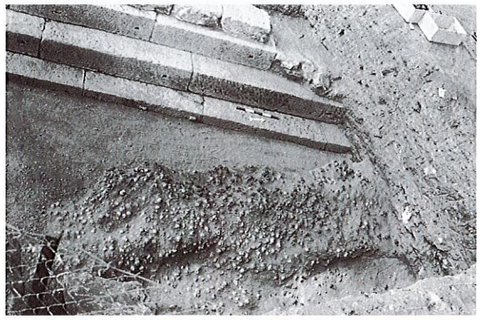

Fig. 26. *The North Enclosure. Sanctuary. Deposit of votive hydriai.*

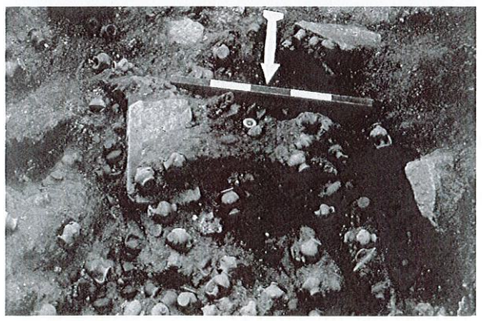

Fig. 27. *The North Enclosure. Sanctuary. Detail of the votive hydriai deposit.*

Fig. 28. *The North Enclosure. Sanctuary. Female seated figurines.*

Fig. 29. *The North Enclosure. Sanctuary. Fragment of a figurine of a mother with her daughter.*

the well is not yet complete, but the earliest finds to date from within it may belong to the third quarter of the fifth century BC.[40]

The levels of beach sand found in this area (Fig. 30),[41] and above all the presence of the building, identified as a ship shed (Figs 6, 31 and 34),[42] support the view that this section of the fortification wall provided protection on the north side for the entrance to the harbour. The ship shed, of which only the northern line of columns has been uncovered, was built at a distance of 6 m from the walls of phase B and runs parallel to them, passing

Fig. 30. *The North Enclosure. Wall of phase B.*

Fig. 31. *The North Enclosure. Wall of phase B. Ship shed.*

over the seventh century two-room building. The columns, made of local stone, were unfluted and, rather than standing on a stylobate, they stood on individual rectangular bases made of the same local stone (Fig. 31). At the western end of the northern side the columns are replaced by a solid wall.

The ship shed was destroyed in an incident of severe flooding which led to vast quantities of beach sand burying its western part. The same layer of sand also covered the area between the boat-house and the remains of the Clazomenian walls, but not of the walls of the Teian phase (Fig. 32).

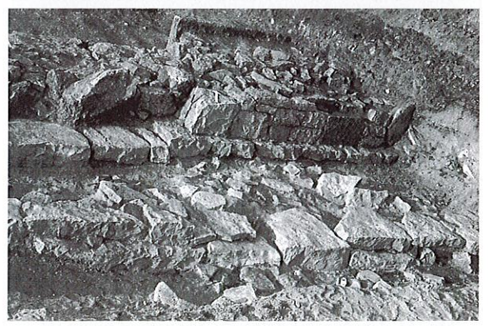

Fig. 32. *The North Enclosure. Flood on the walls of phase A.*

The dating of this flood layer might also offer a terminus post quem for the construction of the western coastal wall, part of which was uncovered (Fig. 33). This section of the walls, which ran along a north-south axis and formed the western wall of the Archaic city along the shoreline, was built on the fill of the flood layer. The harbour, therefore, had been filled in by the time the western wall was constructed. That this area was at that time solid ground can also be inferred from the presence of a rectangular base outside the wall (Fig. 33 and 34).

The flood dated to the early fifth century BC might also be related to the silting up of the river mouth, which led to the second phase of geomorphological changes, which gradually filled the harbour of the Archaic city.

Yet, according to the archaeological evidence, the north city continued its life during the fifth and on to the middle of the fourth century BC. Excavations in the area of the North Enclosure have revealed buildings with successive phases from the fifth to the fourth century BC (Fig. 35).[43] In different places within the North Enclosure, small scale excavations[44] have also brought to light fragmentary remains of public (Fig. 36) or private buildings dated to the fifth and the first half of the fourth century BC.

We are not yet able to date the various stages in the fill of the harbour of the north city. The discovery of an ancient breakwater at the southwestern corner of the North Enclosure[45] indicates that harbour building works were carried out in phases following the geomorphological changes in what used to be the coastal area between the Archaic

Fig. 33. *The North Enclosure. Sea wall of phase B1.*

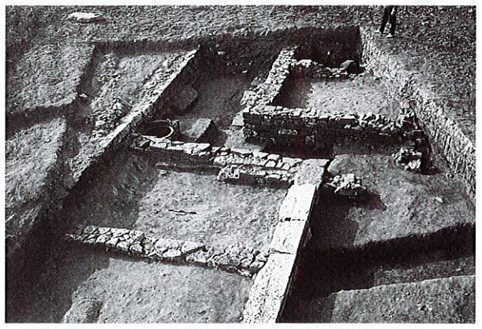

Fig. 35. *The North Enclosure. Buildings in the area of the North Enclosure.*

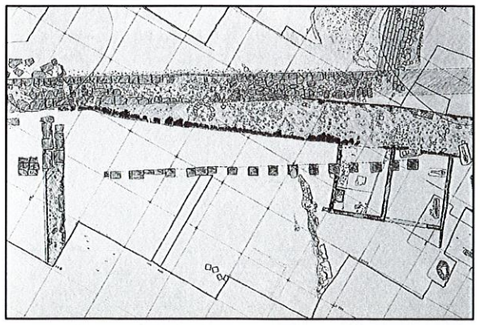

Fig. 34. *The North Enclosure. Sea wall of phase B1.*

Fig. 36. *The North Enclosure. Foundations of a monumental building.*

wall and the line of the shore today.

The important changes which followed in the city of Abdera during the fourth century BC must have been closely related to these geomorphological changes. It is now certain, however, that it was not only geomorphological changes that lay behind the abandonment of the Northern Enclosure and the removal of the city to a new position near the sea, where a new harbour was constructed (Fig. 2).

The laying out of a new city on the Hippodamian plan may also have been prompted by historical events. Indeed the conquest of Abdera by Philip II must be the event that opened this new chapter in the history of the city, as the study of its coinage, has recently shown.[46]

Chalkidos 4
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Abbreviations

Αρχαία Θράκη II = D. Triandaphyllos and D. Terzopoulou (eds), *Πρακτικά 2ου Διεθνούς Συμποσίου Θρακικών Σπουδών. Αρχαία Θράκη* II. *Κομοτηνή, 20-27 Σεπτεμβρίου 1992* (Komotini 1997)

Graham, "Adopted Teians" = A.J. Graham, "'Adopted Teians:' a passage in the new inscription of Public Imprecations from Teos" *JHS* 111 (1991) 176-178.

Graham, "Abdera and Teos" = A.J. Graham, "Abdera and Teos" *JHS* 112 (1992) 44-73.

Koukouli-Chrysanthaki, "Αρχαϊκή πόλη" = Ch. Koukouli-Chrysanthaki, "Η αρχαϊκή πόλη των Αβδήρων. Β: Αρχαιολογικές έρευνες" in *Αρχαία Θράκη* II 715-734.

Skarlatidou, "Abdera" = E. Skarlatidou, "The Archaic Cemetery of Abdera" *Thracia Pontica* III (1985) 99-108.

Skarlatidou, *Νεκροταφείο Αβδήρων* = E. Skarlatidou, *Από το Αρχαϊκό νεκροταφείο των Αβδήρων. Συμβολή στην έρευνα της αποικίας των Κλαζομενίων στα Άβδηρα* (unpublished Ph.D Diss., University of Thessaloniki 2000)

Notes

1. Koukouli-Chrysanthaki, "Αρχαϊκή πόλη" 715-734.
2. D. Lazaridis, *Άβδηρα και Δίκαια* (*Ancient Greek Cities* 6) (Athens 1971).
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The Archaic Cemetery of the Clazomenian Colony at Abdera

Eudokia Skarlatidou

The ancient sources,[1] most notably Herodotos,[2] mention an unsuccessful attempt by the Clazomenians to establish a colony in 654 BC at the site that was to be Abdera, led by an *oikistes* called Timesios. They were repulsed by the local Thracian tribes and at the same site a century later (in 545 BC) a colony was founded by Teos. The chance discovery in 1982, and the subsequent excavation, of a cemetery dating to the second half of the seventh and the early sixth century BC, clearly Greek in terms of its finds and its burial customs, leave no room for any doubt that it was connected with the Clazomenians' attempt to establish a colony at Abdera.[3] For this reason this discovery was unexpected.

The cemetery was located outside the northwest corner of the ancient city's North Wall (Fig. 1, K), which was excavated a little later, the first Archaic phase of which also dates to the second half of the seventh century BC.[4] The burials were placed directly on a layer of sea sand, which was the result of geomorphological changes in the region.

The cemetery was excavated over an area of 857 m^2 yielding 282 burials, mostly jar burials (*enchytrismoi*), a few pit graves and one cist grave. Cremation was practised to a much lesser extent. The cemetery is characterized by horizontal stratigraphy, where the burials are irregularly arranged, one adjacent to the other, sometimes on two levels (Figs 2-3). The random nature of the burials meant that many of them overlapped or had been disturbed or even destroyed, especially in areas where they were closely clustered (Fig. 4).

Mainly small pots (amphorae, cooking pots, small jars, and pithos-amphorae) were used for the 239 jar burials, which contained burials of infants and children. The burial vessels were not laid in any specific way and their orientation varied. The mouth was generally covered with a small stone or a larger stone slab, or with fragments of broken vessels (Figs 5-6). The covers, like the burial vessels themselves, were frequently supported by other stones, especially in most of the cases where the vessels were broken and defective from the start (Fig. 7). With very few exceptions, the interiors were filled with sand from the cemetery. In cases where the mouth of the amphora was too narrow for the dead infant to be inserted, part of the body of the amphora or the base was removed to provide a larger opening.

The twenty-two pit graves contained mainly adults, both men and women, and a few adolescents and children, in various postures (Fig. 8). The single cist grave was occupied by an infant (Fig. 9).

The finds from the cemetery consist mainly of pottery and a few pieces of jewellery. Seven categories of pottery are distinguished. The first and most numerous comprises wares of East Greek origin, either plain or with linear and geometric decoration. A large proportion of this category consists of two types of Ionian bowls: hemispherical Subgeometric bird bowls and bowls of the same shape decorated with groups of lines (Figs 10-11). It has been suggested that they were mainly produced in North Ionia and that they represent an Ionian *koine*.[5] The technical similarities which the

Geoarchaeological Investigations in the Area of Ancient Abdera

George E. Syrides and Antonios A. Psilovikos

Introduction

Ancient Abdera was founded in the eastern coastal margin of the Nestos river delta in the northern Aegean Sea (Fig. 1).

The ruins of the ancient city lie on low hilly terrain running north to south and consisting of metamorphic (gneiss, mica schist) rocks of the Rhodope massif.

The present day morphology reveals a wide coastal marshland zone that surrounds the hilly terrain from east and west.

The progress of archaeological research in various places has unearthed city ruins, cemeteries and port facility ruins. The last were located 1.5 km inland from the present shoreline and have triggered numerous questions about the position of the coastline during the time of ancient Abdera, and subsequently the palaeogeographic changes of the ancient landscape.

A first attempt to investigate these questions was carried out during May 1982. A research project undertaken by the authors in close collaboration with Ch. Koukouli-Chrysanthaki, head of the Ephorate of Antiquities of Kavala, yielded the important data described below.

Research Procedures

- Geomorphological study of the area.
- Study of air photographs (1945, 1979) taken by the Greek Military Geographical Service.
- Sediment sampling from natural and artificial cross sections.
- Drilling and sampling of 8 boreholes up to 4 m depth.
- Sedimentological analysis with sieving of the sediment samples (size, sedimentological parameters).
- Microscopic examination of the samples.
- Optical determination of the mineralogy (%) of the grains. Surface morphology of the grains (Sphaericity-Roundness)
- Palaeontological study and determination of the invertebrate fauna included in the samples.
- Determination of the remaining assorted materials (pottery fragments, gypsum crystals, charcoal, etc).

Results from the Prospecting of Archaeological Excavations

In several places ancient ruins were built on or covered over by coastal marine sands with sea shells (Fig. 1, A,B,Γ,Δ). Port facilities were also located (Fig. 1, B,Γ).

Kastro ruins and Arvanitidis plot (Fig. 1,B): ruins of walls built on rocky basement (gneiss, schist) and accompanied by coastal marine sands. Port facilities such as the *Neosoikos* and the pier were founded partly on gneiss and partly on coastal marine sandy sediments. Stratigraphy reveals two successive phases of wall building separated by coastal marine sandy sediments (Fig. 2). Many of the blocks of the ancient pier preserve holes opened by marine boring bivalves (*Gastrochaena*, *Lithophaga*).

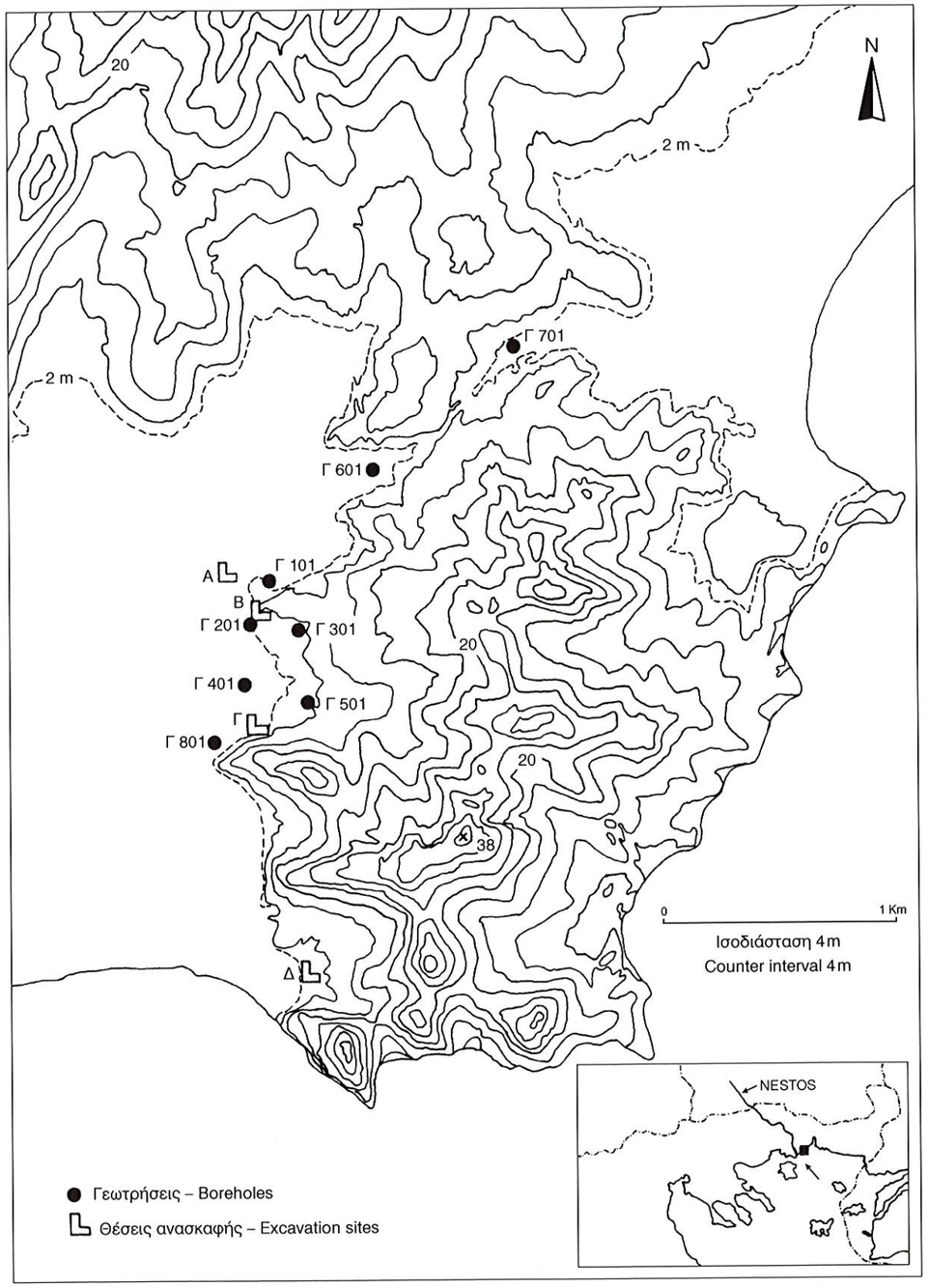

Fig. 1. *Topographical map of the area of ancient Abdera.*

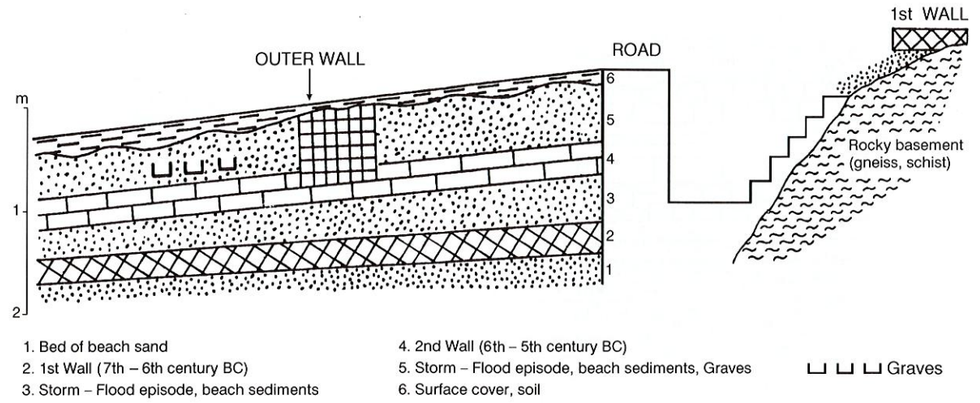

Fig. 2. *Schematic stratigraphy in the archaeological excavations at Kastro.*

In the vicinity of Kastro a trench opened in the Arvanitidis plot revealed beds of coastal marine sands with seashells (Fig. 3,B).

Tsakos plot (Fig. 1 and 3,C): an ancient pier was built on and partly covered over by coastal marine sands with sea shells.

Ancient cemetery at 'Mandria' (Fig. 1,A): graves were covered by coastal marine sand (Fig. 3,A).

Archaeological site of Abdera (Fig. 1,Δ): Classical ruins in some places are covered by coastal marine sand with seashells (Fig. 4).

Coastal Area of Abdera

In the beach of Abdera into the present day harbour, remnants of piers of an ancient (Byzantine?) harbour appear.

Prospecting on the seashore and elaboration of the results of 6 boreholes (P.E.D.E. of Thessaloniki) drilled along the coastal area at the Pavilion of E.O.T. allow a reconstruction of the stratigraphy (Fig. 5). West of the hills the rocky basement has subsided. Marine sands with gravel and silt lenses fill the subsidence.

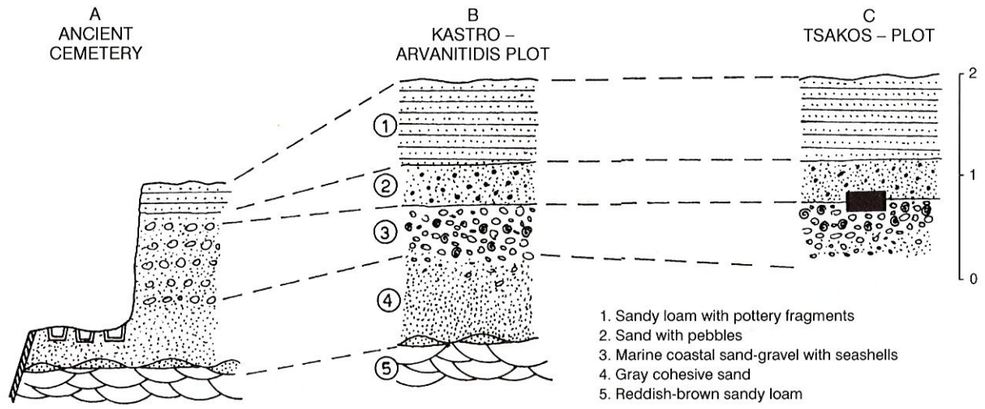

Fig. 3. *Stratigraphic correlation of the beds exposed in archaeological trenches.*

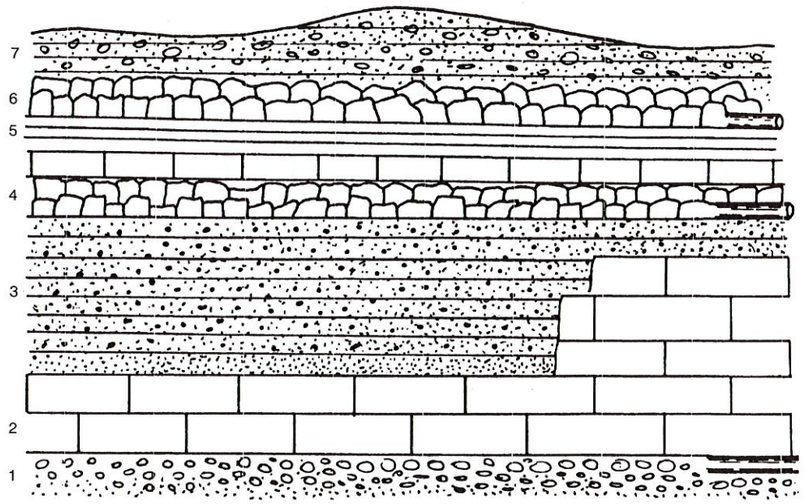

Fig. 4. Stratigraphic cross section of the archaeological site of Abdera which reveals the alternation of human activities and natural processes.

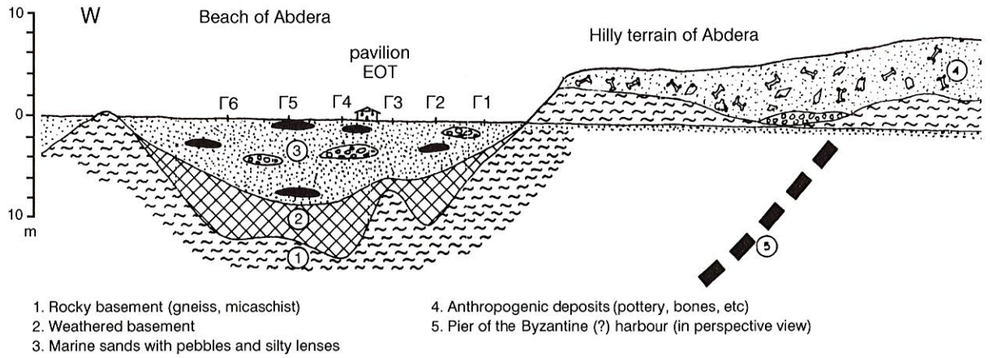

Fig. 5. Schematic stratigraphic cross section along the beach of Abdera.

Borehole drilling

In selected places (Fig. 1) 8 boreholes (Γ 101 - Γ 801) were drilled and core samples were taken in order to obtain data for a more comprehensive investigation of the area. Sedimentological analysis of the core samples reveals sediments deposited in different environments such as: marine, beach, lagoon, marsh, and terrestrial. Detail Palaeontological analysis of the sediments reveals also a rich invertebrate fauna (Table I) consisting of numerous shells and shell fragments mainly of marine, but also of fresh water origin.

Table I. Invertebrate fauna from borehole cores of the area of ancient Abdera

	BIVALVIA		*Triforis* sp.
+	*Arca noae*		*Trochus* sp.
	Arca lactea		*Gibbula* sp.
	Arca sp.		*Natica* sp.
	Glycymeris sp.		*Nassa semistriata*
+	*Mytilus sp.*		*Nassa* sp.
	Chlamys sp.		*Columbella* sp.
o+	*Ostrea* sp.		*Cerithum vulgatum*
o	*Loripes lacteus*		*Cerithium / Bittium*
+	*Chama* sp.		*Murex* sp.
	Acanthocardia tuberculata		*Pirenella* sp.
	Acanthocardia paucicostata		*Clavus* sp.
	Plagiocardium papillosum		*Cantharus* sp.
o	*Cerastoderma edule*		
	Mactra sp.		SCAPHOPODA
	Donacilla cornea		*Dentaliuin inaequicostarum*
	Solen sp.		
	Tellina sp.		ECHINODERMATA
	Donax sp.		*Paracentrotus* sp.
	Capsela variegata		test fragments and spines
	Venus verrucosa		
	Venus gallina		ARTHROPODA
	Venus sp.		CIRRIPEDIA
	Timoclea ovata	+	*Balanus* sp.
o	*Tapes* sp.		
			DECAPODA
	GASTROPODA		Crab Fragments
*	*Planorbis* sp.		
*	*Bithynia / Hydrobia*		FORAMINIFERA
	Alvania sp.		*Elphidium* sp.
	Tornus sp.		*Triloculina* sp.
	Rissoa sp.		
	Caecum sp.		Fish Remnants
			teeth, bones, otoliths.

* Fresh water species
o Euryhaline marine species
\+ Marine species attached on hard substratum

Γ 701

0.00-0.20 m	Dark brown sandy loam (marsh)
0.20-1.20 m	Brown sandy loam
1.20-2.00 m	Weathered gneiss basement

Γ 601

0.00-0.60 m	Blackish clay-peat (marsh)
0.60-2.60 m	Gray-brown sandy loam (marsh)

Boreholes Γ 701 and Γ 601 were drilled in both sides of the 'neck' of the hilly terrain (Fig. 1) in order to investigate a possible discontinuity of the rocky basement between the hilly terrain from north to south. The appearance of gneiss basement below 1.20 m in Γ 701 excludes any possibility of the existence of a marine channel.

Γ 101

0.00-0.20 m	Blackish clay-peat (marsh)
0.20-0.80 m	Yellowish fine sand with numerous gypsum crystals
0.80-1.40 m	Gray sandy loam with gypsum crystals rounded pottery fragments,

and seashell fragments
1.40-2.40 m Gray-yellowish sand with numerous seashell fragments

Sedimentological characters of the sand at 1.40-2.40 m indicate a sandy beach. Numerous gypsum crystals at 0.20-1.40 m indicate a restricted coastal marine environment with intensive evaporation.

Γ 201

0.00-0.20 m Dark brown clay-peat (marsh)
0.20-0.40 m Brown sand
0.40-0.80 m Gray sandy loam with few pottery fragments, slug and few seashell fragments
0.80-1.00 m Gray-yellow sand with few seashell fragments and fish teeth
1.00-1.20 m Gray sandy loam with few pottery and seashell fragments
1.20-2.20 m Gray-yellow coarse sand with gravel, numerous rounded pottery fragments, slug, few bone fragments, and numerous seashell fragments

The palaeoenvironment was coastal shallow marine (1.00-2.20 m) but finally shifted to marshy (0.00-0.40 m). The presence of numerous rounded pottery fragments and a few fragments of glassy slug indicate intensive human activity.

Γ 301

0.00-1.20 m Brown to brown-blackish sandy loam with pottery fragments and few seashell (*Mytilus*) fragments
0.0-0.50 m Brown silty-sandy loam
2.60-3.10 m Weathered gneiss basement

The borehole penetrates exclusively terrestrial sediments and ends at the weathered gneiss basement. In the top the presence of pottery fragments indicate human activity, while the seashells of *Mytilus* are man gathered.

Γ 501

0.00-2.00 m Dark brown sandy loam with numerous small fragments of pottery, few fragments of glassy slug, bone fragments and man gathered edible seashells (*Mytilus, Chlamys, Cerastoderma*)
2.00-2.20 m Blackish loam (marsh)
2.20-2.40 m Yellowish sand with seashells (marine)
2.40-4.20 m Gray-blackish to gray-greenish loam (marsh)

The borehole penetrates in the top (0.00-2.00 m) terrestrial sediments with remnants of human activity (pottery fragments, glassy slug, food litter: bone and edible seashell fragments). Below 2.00 m depth, marsh deposits appear with a short interval (2.20-2.40 m) of marine sediments.

Γ 401

0.0-0.50 m Dark brown loam-peat with numerous fresh water shells (*Planorbis, Bithynia/Hydrobia*) (marsh)
0.50-2.60 m Gray fine sand with few small pottery fragments, and numerous seashells

Γ 801

0.00-0.40 m Blackish loam-peat (marsh)
0.40-2.60 m Gray fine sand with numerous seashells

Boreholes Γ 401 and Γ 801 indicate (0.50-2.60 m, 0.40-2.60 m) a typical shallow (≥1 m) to coastal marine environment with fine-grained sedimentation and very rich marine fauna. Almost the entire fauna of Table I was found in both boreholes. At the top (0.00-0.50 m, 0.00-0.40 m) marshes dominated the area.

A synoptic synthesis of lithostratigraphic and palaeoenvironmental data, as well as the materials found in the cores of the boreholes are presented in Figure 6.

Palaeogeography

Elaboration of the results allow a first approach to the problem of palaeogeographic evolution of the area that seems to follow 4 stages:

Stage I

During the Holocene the sea coastline was a few kilometers further north than the present coast, approaching the margins of the hilly terrain. A peninsula consisting of metamorphic rocks dominated the area. A low (<4 m) and narrow

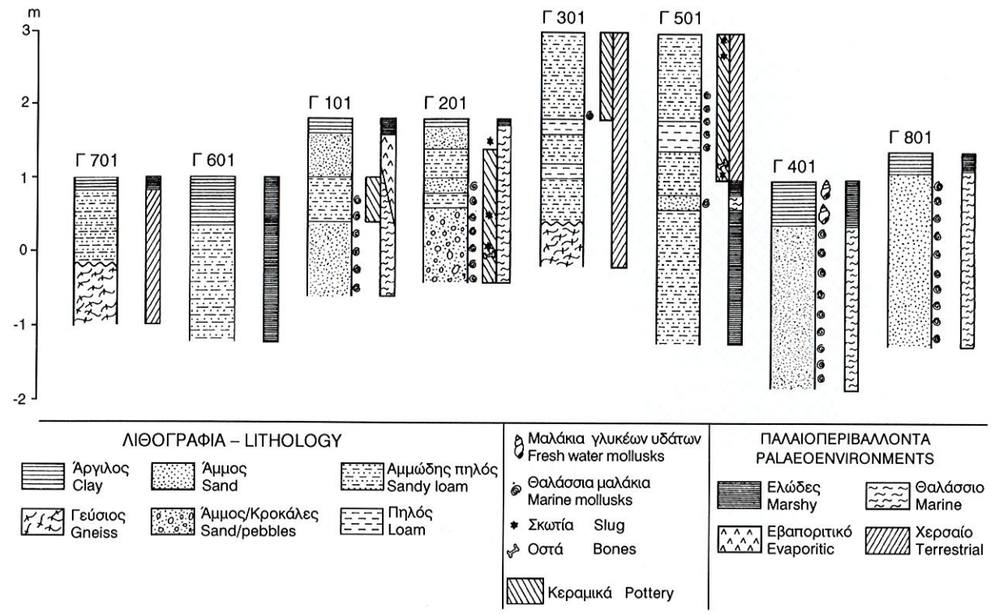

Fig. 6. Synthesis of Lithostratigraphy, Palaeoenvironment, and the findings of the core samples from the boreholes drilled in the area of ancient Abdera.

(~300 m) 'neck' connected the peninsula with the hilly terrain to the north (Fig. 7, I).

Ancient Abdera was built during the seventh century BC on this peninsula, and port facilities were constructed (Fig. 1, B,Γ) on the west coast.

By that era the sea level was 1.2 - 1.5 m below the present level. Critical for the future of the city was the vicinity of ancient Abdera to the delta of the Nestos river from the west, a prograding area with intensive land-sea interactions of deltaic sediment deposition, flooding episodes and coastal wave action.

Stage II

The enormous supply of clastic sediments from the neighbouring Nestos delta caused a gradual shallowing of the sea, shifting the coastline southwards. Marshes and coastal lagoons were formed (Fig. 7, II). In some of them evaporation of seawater was intensive and gypsum crystals were deposited. Modifications observed in the port facilities may indicate the impact of the port silting.

Stage III

The gradual alluviation of the area continued. Along the present-day coast an extensive (~12 km long) and wide (50-250 m) offshore sand bar was formed, parallel to the coast. Communication with the open sea was gradually cut off and marshlands and lagoons started to form again (Fig. 7, III). The sand bar that is clearly visible in the 1945 air photographs of the Military Geographical Service has as starting point the steep present-day hilly shore of Abdera and, following a westerly course, it terminated in the middle of the Nestos delta. A violent disturbance of the sea by southerly winds and intensive wave action was the main reason for the formation of this sand bar. Similar sand bars are also very common in the western part of the Nestos river delta (Keramoti – N. Karvali) as well as east of Abdera (Porto Lagos – coastal lagoons – Bospos river estuary).

According to archaeological criteria this stage can possibly be dated in the third-second centuries BC and connected with the decline of the city. An

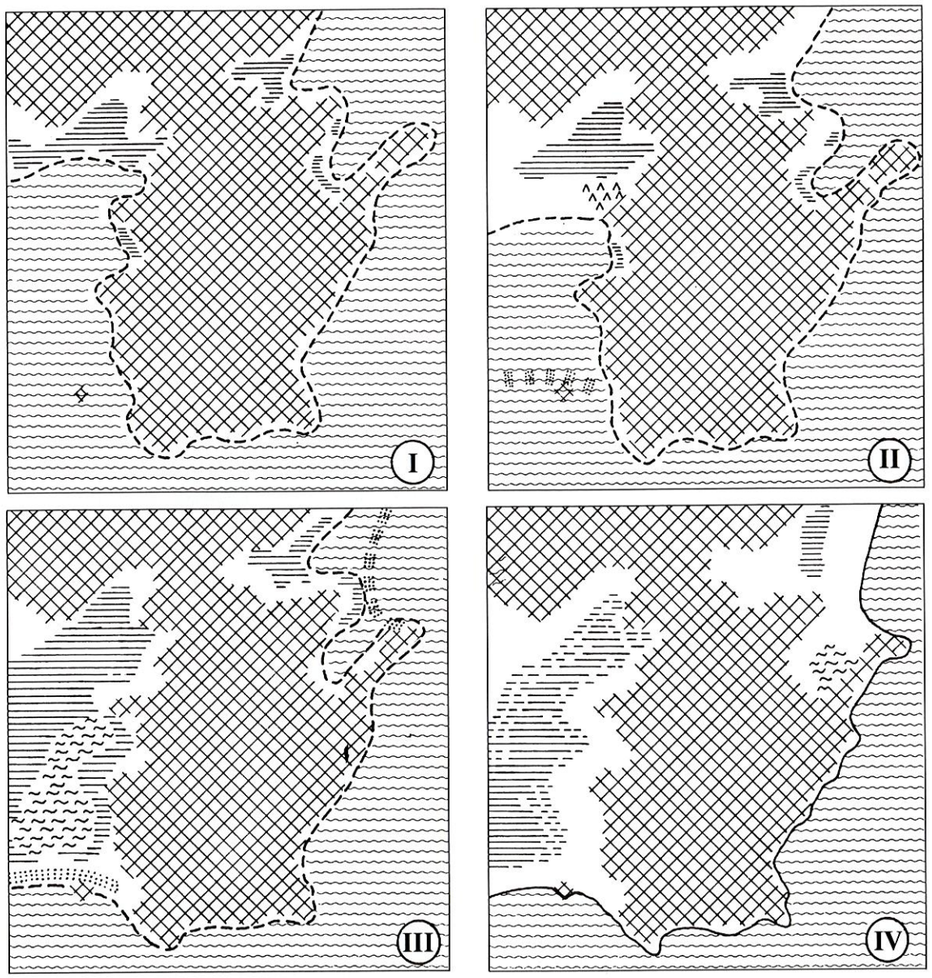

Fig. 7. *Sketches indicating the palaeogeographic evolution of the area of ancient Abdera.*

obliterated port, as a result of extensive silting, may have been the main reason for this decline.

Stage IV

Extensive marshlands dominated the area and the coastline approached that of the present day coast (Fig. 7, IV). The end of this stage is marked by intensive human impact with extensive reclamation of the marshlands for agriculture and rapid change of the area.

Remark: Fig. 7 includes palaeogeographic sketches (qualitative data) and not maps (quantitative data).

The authors are of the opinion that the palaeogeographic evolution of the area had a gradual impact on the port facilities, forcing a diachronic relocation of the port facilities from north to south. If this hypothesis is true then archaeological excavations may locate the older ports at the north and later ports towards the south.

Ancient Abdera is a very interesting area from the palaeogeographic point of view, and further research is needed for a more comprehensive study of the interrelations between the ancient city and the palaeoenvironmental changes.

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