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HOLOCENE STRATIGRAPHY OF THE LOWER KARAMENDERES-DÜMREK PLAIN AND ARCHAEOLOGICAL MATERIAL IN THE ALLUVIAL SEDIMENTS TO THE NORTH OF THE TROİA RIDGE

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Abstract

More than 25 drilling holes were made using a Unimog rotary auger and Eijkelkamp hand-drilling tools in a small area at the edge of the Dümrek plain along the foot of the steep northern slope of Troia. Surface elevation is about 7 m. here. According to the evidence obtained from the drilling holes, there is a narrow platform on the bedrock about 10 m. below the present surface. A deep old cut of the Dümrek river runs along the outer edge of this platform. The surface of the platform is covered with various marine muds and coarse sandy coastal sediments. Some marine shells taken from these sediments were dated by ^{14}C and found to be from 7000–5000 years BP. No archaeological material was recovered from these sediments. Archaeological finds start on the first land surface which formed on the platform at the present sea level. These are sherds and some remains related to activities involving fire. The oldest sherds which were found in the deepest position were dated to Troia periods VI–VII. A sediment unit containing archaeological material continues up to the present surface. Within this, many old ground surfaces can be distinguished at different levels. After the environment changed from marine to terrestrial, the Dümrek river channel was formed over a long period near the foot of the steep northern slope of Troia. Finally, the coarse sandy channel fill was covered by a fine sandy sediment unit up to two meters thick. This is flood sediment from the Dümrek river which spread here after the river's course shifted northwest to the north of Tevfikiye. We expect that archaeological excavation and detailed examination of the sediments with remains related to human activity in this area will bring useful information. On the other hand, there are obstacles to doing such excavations here, for example high ground water. Therefore we propose that sediments with archaeological remains should be examined in more detail first, using more convenient drilling techniques, after which archaeological excavations could be planned accordingly.

Zusammenfassung

In einem kleinen Gebiet am Rand der Dümrek-Ebene am Fuß des steilen Nordhanges von Troia wurden mehr als 25 Bohrungen mit einem durch einen Unimog betriebenen Auger-Bohrer sowie mit Eijkelkamp-Handbohrern niedergebracht Die Oberfläche hier liegt etwa 7 m über dem Meeresspiegel. Nach den Ergebnissen der Bohrungen bildet der gewachsene Felsen an dieser Stelle eine schmale Plattform ungefähr 10 m unter der heutigen Oberfläche. Am äußeren Rand dieser Plattform verläuft ein alter Einschnitt des Dümrek (Simoeis). Die Oberfläche der Plattform wird von verschiedenen Schlammschichten und grobsandigen Küstensedimenten überdeckt. Das mit der Radiokarbonmethode ermittelte Alter einiger mariner Muscheln aus diesen Sedimenten beträgt 7000–5000 BP. Diese

Sedimente ergaben keine archäologischen Funde. Archäologische Funde – Keramik und Überreste, die mit Feuerstellen in Verbindung gebracht werden können – kommen dann auf der ersten Oberfläche vor, die sich auf dieser Plattform auf dem Niveau des heutigen Meeresspiegels bildete. Die ältesten Scherben mit tiefster Fundlage wurden nach Troia VI/VII datiert. Eine Sedimentserie, die archäologisches Material enthält, setzt sich bis zur heutigen Oberfläche fort. Auf der Basis dieses Materials können hier zahlreiche verschiedene alte Oberflächen unterschieden werden. Nachdem sich das Meer von hier zurückgezogen hatte, entstand in der Nähe des Fußes des steilen Nordabhangs von Troia über eine längere Zeitspanne das Flußbett des Dümrek. Schließlich wurden die grobsandigen Ablagerungen von einer bis zu 2 m dicken sandigen Sedimentserie überdeckt. Diese wurden durch Überschwemmungen des Dümrek abgelagert, nachdem der Fluß seinen Lauf in die Gegend nördlich von Tevfikiye verlegt hatte.
Wir erwarten von einer archäologischen Ausgrabung und genauen Untersuchung der Sedimente mit Spuren menschlicher Aktivitäten an dieser Stelle nützliche Informationen. Andererseits stellen sich einer Ausgrabung hier Hindernisse in den Weg, etwa der hohe Grundwasserspiegel. Deshalb schlagen wir vor, die Sedimente mit archäologischen Resten vorerst genauer mit Hilfe von Bohrtechniken zu untersuchen, nach deren Ergebnissen archäologische Ausgrabungen besser geplant werden können.

Introduction

In the Iliad Homer provides detailed topographical information while narrating the events which are said to have happened in and around Troia. This stimulates the imagination and helps the reader visualize and remember the events described. Homer's writing has been read, and his descriptive skill admired, through the ages, and it has been interpreted from many points of view; it even opened the way to the discovery of the site of Troia. It is a great asset to Troian research that, thanks to Homer, an account of the environmental characteristics of 2725 years ago (Homer's own days) or 3250 years ago (the time of the supposed Troian War) has been set down in writing and has come down to the present day. On the other hand the landscape described by Homer in the Iliad is very different from the landscape of today. This means that archaeological interpretations of Homer need to take environmental characteristics and landscape changes into account. In this respect current scientific research at Troia can be seen as an outcome of the importance attached to the landscape by Homer himself.

Under the auspices of the new Troia Project led by Prof. Dr. Manfred Korfmann[1] we have since 1988 been continuing our investigations into the present geographical environment – its formation, development and change – and into the relationship between changes in landscape and the cultural periods of Troia. Our plan has been to conduct research both into the general characteristics of the geography and geomorphology of the area around Troia, and at the same time to examine in detail the ridge on which Troia is situated and the alluvial plains surrounding it (Fig. 1). A history of environmental development cannot be reconstructed from high areas alone, because such areas are subject to erosion. Data from alluvial and colluvial sediments in the surrounding lower areas also need to be brought into the picture. Only by comparison of the two it is possible to see how the environment of an archaeological site has changed over millennia and how such changes have affected the land-use of its inhabitants. For example, as alluvial deposition changed the area surrounding the ridge from sea to arable land, so the eating-habits and way of life of the people of Troia must have changed. To illuminate this relationship between man and his environment it was necessary to investigate the alluvial plains presently surrounding Troia and to determine their previous environmental characteristics or palaeogeography. As in an archaeological site, sedimentation in low-lying areas accumulates over time in a series of superimposed deposits. Sediment samples can reveal the character of the environment in which they were

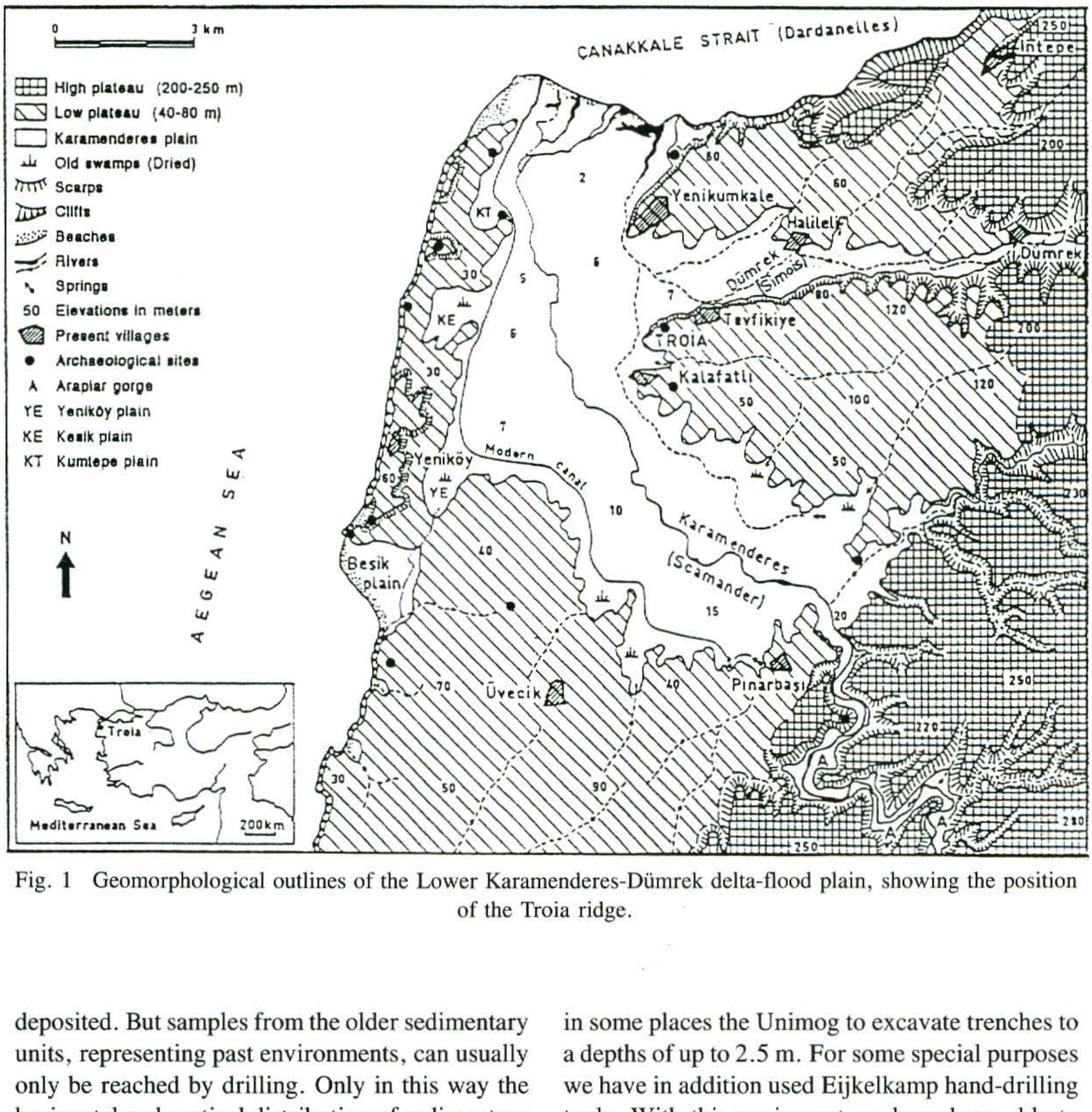

Fig. 1 Geomorphological outlines of the Lower Karamenderes-Dümrek delta-flood plain, showing the position of the Troia ridge.

deposited. But samples from the older sedimentary units, representing past environments, can usually only be reached by drilling. Only in this way the horizontal and vertical distribution of sedimentary units can be determined and the three-dimensional geometry of the changing environments be delineated.

Since 1976 we have taken cores from over 200 holes in the alluvial valley-floor of the Karamenderes-Dümrek and the Aegean coastal strip. Most were taken using a special adaptation of the hydraulically-powered Unimog vehicle – an "Archaeomog" – granted to the Troia Project in 1988 by Daimler-Benz. A rotary auger drilling-rig attached to this vehicle has yielded very valuable results to a depth of 20.50 m. For more detailed examination of surface-deposits we have also used in some places the Unimog to excavate trenches to a depths of up to 2.5 m. For some special purposes we have in addition used Eijkelkamp hand-drilling tools. With this equipment we have been able to penetrate to a depth of 10 m.

This paper presents the results of drillings along the foot of the northern slope of the Troia ridge. The first test drillings here produced much archaeological material from a 7 m.-thick alluvial-colluvial deposit of sediment. The material in question consists generally of pot-sherds and remains from fires such as charcoal, burnt bones and burnt shells. Since archaeological excavation has not so far been possible in this area, and since the drill-holes have a diameter of only 7.5 cm, we decided to increase our data by drilling more than 25 holes over quite a small area (Fig. 2).

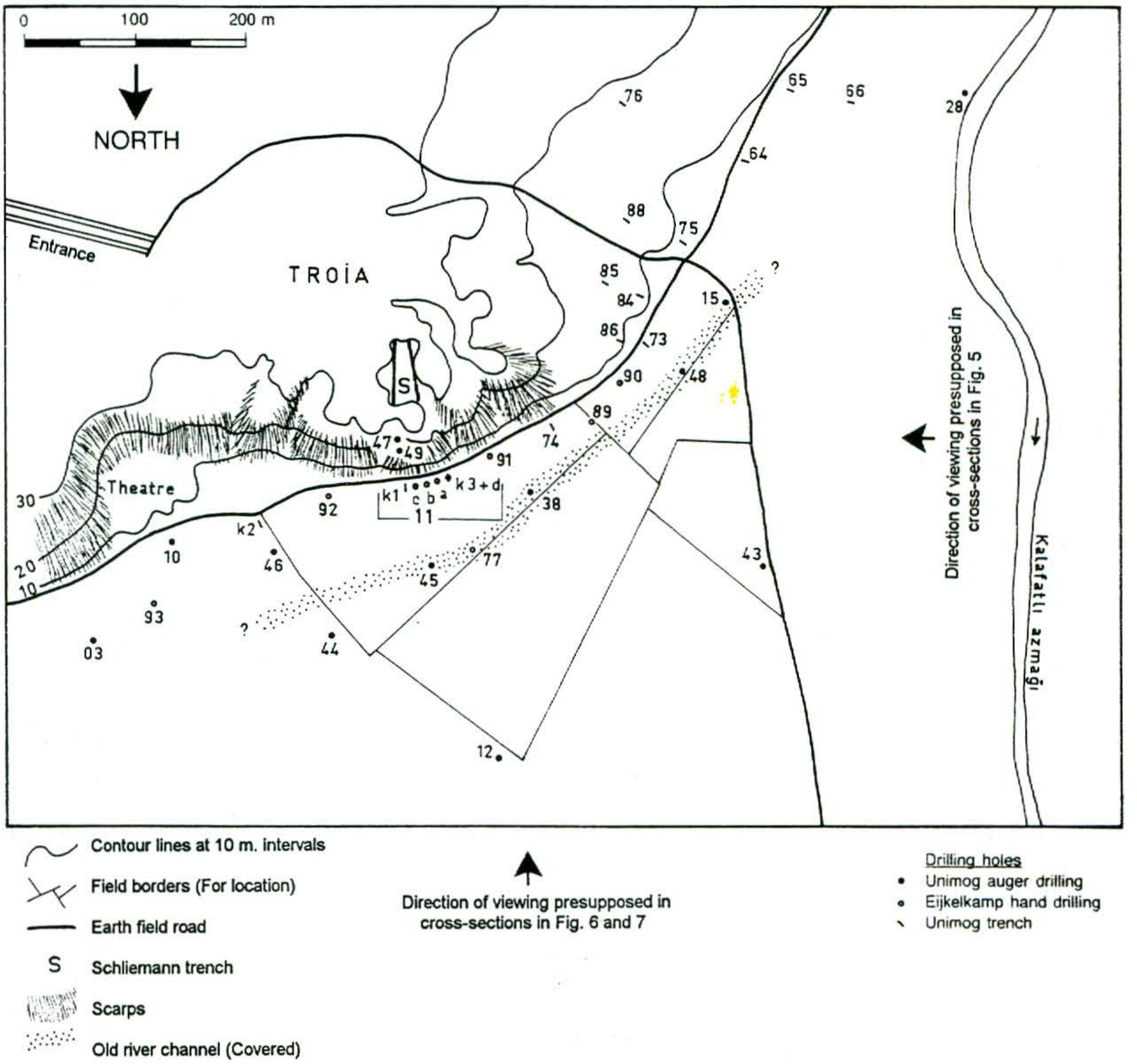

Fig. 2 Slope at the northern foot of Troia and locations of the drilling-holes. The map is oriented with North at the bottom so as to facilitate comparison with the cross-sections in Figs. 6 and 7.

In the following discussion we shall first summarize the geological structure and the landform characteristics of the environs of Troia, and the general stratigraphy of the sediments in the Karamenderes-Dümrek plain. In all this we shall take a palaeogeographical approach. Then we shall describe the alluvial-colluvial sediment unit which runs along the foot of the northern slope of Troia and contains the archaeological material, placing it within the general sequence of sedimentation. Finally we shall examine its relation to environmental changes.

Structure and Geomorphology

The landforms of the Troia area consist of low plateau ridges, generally about 40–80 m. high, with wide alluvial valley floors between (Fig. 1). The ridges are formed from shallow limey-clayeysandy marine sediments which originally accumulated at the bottom of a shallow sea extending from the Black Sea-Marmara to the northern Aegean during the Late Miocene – Early Pliocene. In that geological era the Aegean Sea did not have its present shape, and there was a land-connection between the Greek and Anatolian peninsulas to the South. Movements in the earth's crust subsequently broke and raised the stratified shallow marine sediments, causing them to bend slightly and to tilt in several directions. Rivers later formed in the long depressions between the raised areas and filled them with alluvium, so forming the present plains.

The largest depression runs in a roughly North-South direction and was formed by the Karamenderes River (Fig. 1). To the West and East of this depression the structural lines differ in orientation. To the West a narrow ridge (the Yeniköy or Sigeium ridge) runs North-South, separating the Karamenderes (Scamander) plain from the Aegean Sea. To the East, however, there are two principal ridges, both of which run East-West: the Yenikumkale ridge to the North and the Troia ridge to the South. Both are formed from Neogene strata which dip slightly to the South, and are separated by the Dümrek (Simoeis) River which has formed here, shaping the valley floor and depositing alluvium. The steep slopes on the north faces of both ridges are faulted. Consequently the ridges and the Dümrek valley are asymmetrical and present a "faulted cuesta" morphology.

The faulted northern slope of the Troia ridge is steep and runs in a nearly straight line from West to East. At its western end, where Troia is located, it has an elevation of c. 30–40 m., and it rises gradually to the East to reach over 100 m. Because of its asymmetrical transverse profile, rivers flow southwards off the ridge in long, low valleys with a gentle incline, while on the north side only a few indentations have been formed into valley-heads by the cutting action of surface waters.

Holocene Stratigraphy

The joint alluvial plains of the Karamenderes and Dümrek rivers which encircle Troia are delta-flood plains (Fig. 1). This means that formation of their surfaces has been dictated by the sea-level. The evidence from our drillings shows that during the last ice age the Karamenderes and Dümrek plains were much lower than at present. Valley floors from that period have been found at c. 30 m. below the present surface West of Troia, and were themselves deeply cut by the river channel. At the junction of the old Karamenderes and Dümrek rivers the old river-bed lies 50 m. below the present surface (Fig. 3).

The thawing of the glaciers after the last ice age caused a rapid rise in sea-level, and the sea intruded into the old Karamenderes valley depression.[2] The transgression-surface was initially covered with coarse sandy-gravelly coastal sediments, and shells from these sediments have been dated by ^{14}C to 10,000 BP. This formation was then overlain by a sediment unit generally consisting of blackish-grey fine sandy homogeneous marine mud containing a large quantity of organic colloids. The evidence from the drillings indicates that the rising sea covered the bottom of the lower Karamenderes valley in its entirety, coastal swamps, at least, reaching the vicinity of Pınarbaşı in the South. At this date the sea also formed a small indentation towards the mouth of the old Dümrek valley. This was deepest at the foot of the slope on the south side because of the asymmetrical shape of the valley (Fig. 4). The indentation was later mostly filled with coarse sandy river-sediments.

Our previous investigations have shown that the sea first reached its present level about 6000 years ago.[3] Alluvial deposition, deltaic progradation and flood plain aggradation were then all accelerated by the action of the rivers. Coarse sandy coastal sediments formed behind the receding coastline and continuously covered the surface of the fine sandy homogeneous marine mud. The sedimentary environments (such as beach, lagoon, coastal swamp) changed rapidly during this progression, and as a result a variety of different sediments can be found. But most prominent are coarser sediments, in many places containing abundant marine shells. ^{14}C dates taken from the shells decrease in age as the sampling proceeds outwards to the present coast-line.[4]

For example shells taken from regressive sediments to the Southwest of Troia are dated to 6000–

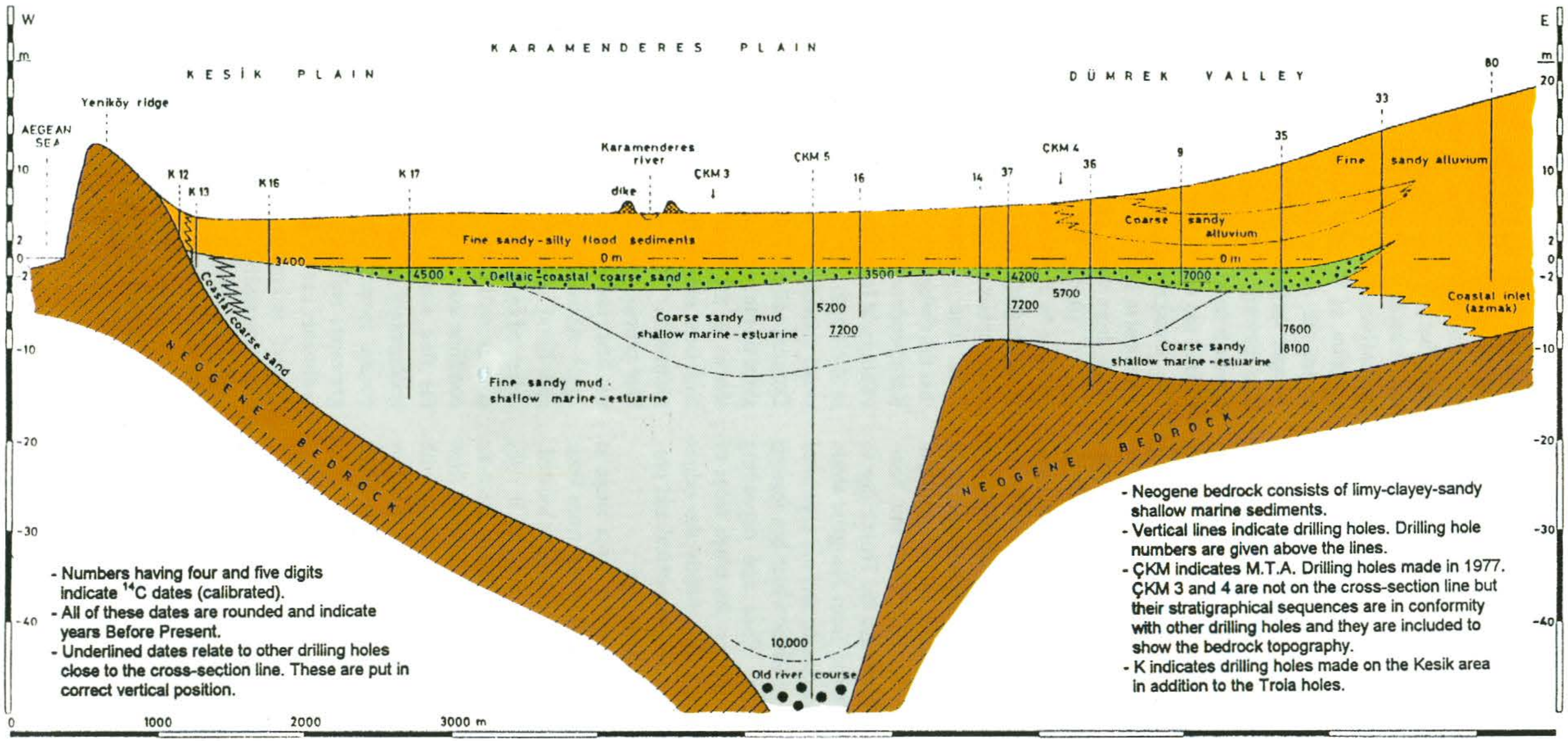

Fig. 3 Simplified West-East cross-section of the Lower Karamenderes-Dümrek delta-flood plain.

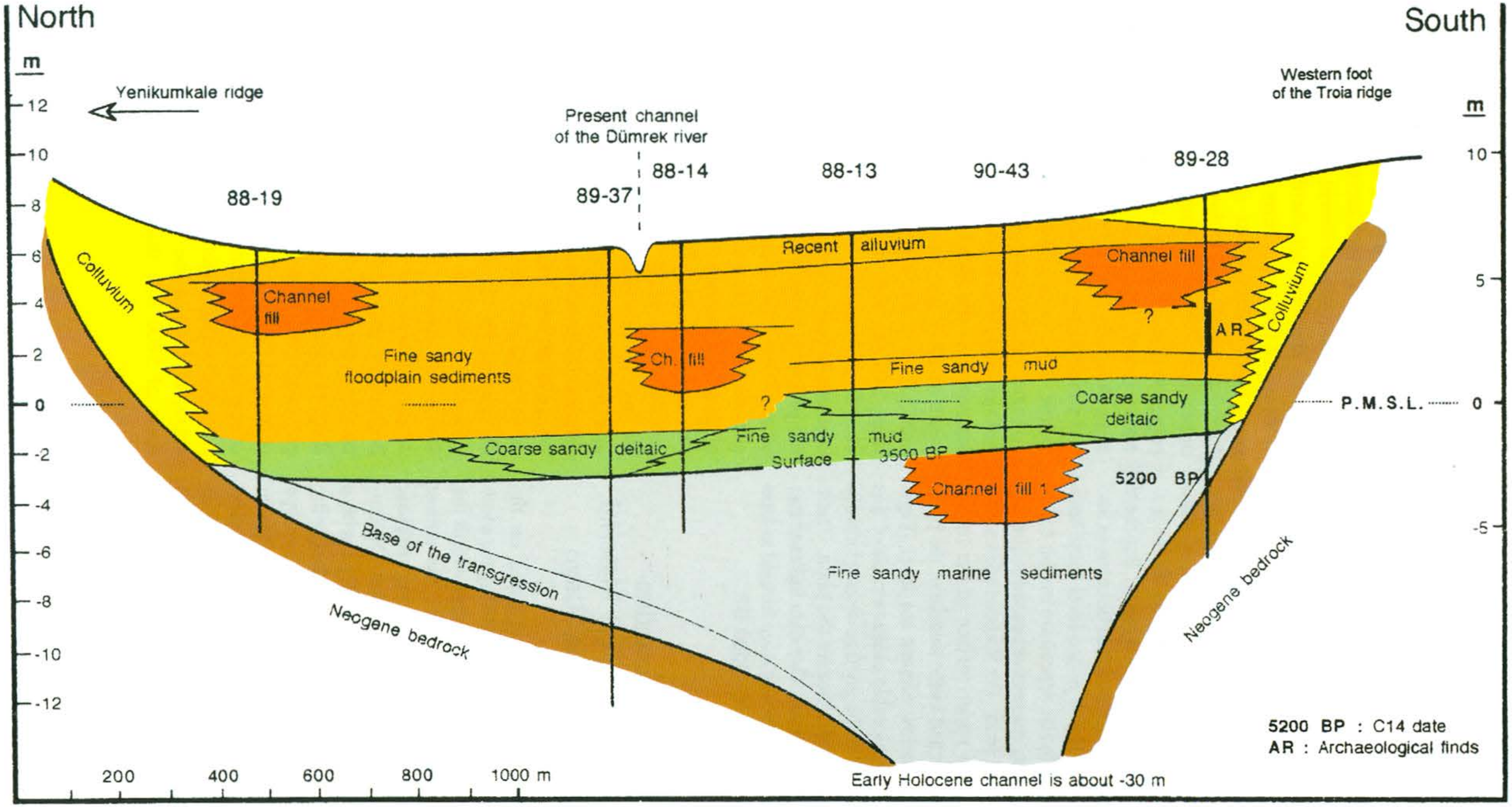

Fig. 4 A cross-section across the lower part of the Dümrek valley between Yenikumkale and Troia. Early Holocene channel depth of the Dümrek river is known from our 1977 drilling evidence. There are two noticeable things here. One of them is a river channel cutting the marine sediment-unit on the surface of the old sea-bottom (Channel fill 1). This is a new proof that Bronze Age sea-level fell by about 2 m. (Kayan 1991). We suppose that the surface formed on the marine sediments about 3500 years ago. The other thing is a slight northward inclination of the surface on the marine sediments and covering delta-flood plain sediment-units. This implies some small recent tectonic movements, although we do not have enough evidence of this matter. Also there are some correlation difficulties on the sediment-units between the drills number 14 and 13. Discussion of this subject is not directly related to this paper, and will be addressed elsewhere along with other evidence.

5500 BP, while shells taken from deposits to the West of Troia are dated to 5000–4500 BP. This sediment unit is only a few metres thick but is widespread and, vertically, forms an important transition-zone between marine and fluvial sediments (Fig. 3).

Our previous investigations have also revealed the occurrence of a modest fall in sea-level. This began at c. 5000 years BP, and by 3500–3000 BP sea-level was about 2 m. lower than at present. It seems that this fall in sea-level increased the rate of horizontal deltaic progradation and flood plain formation. Between 3000 BP and 2000 BP the sea-level reached its present position again. But there is no evidence that the sea intruded once more into the valleys. The small rise in sea-level must have been balanced by alluvial deposition on the coast. Over the coarse sandy regressive coastal sediments lie flood-sediments from the Karamenderes and Dümrek rivers. The upper surface of the transition-zone is very flat and in the middle of the plain lies about 1–2 m. below present sea-level (Figs. 3 and 4). This is a noticeable characteristic of this sedimentary unit. The flat surface rises gradually towards the slopes which border the plain. There it reaches present sea-level. Our data indicate that this is the first plain-surface to have formed as land when sea-level fell at 5000–3500 BP.

Late Holocene Sedimentation Containing Archaeological Material, to the North of the Troia Ridge

The ancient city of Troia was founded on the western tip of the ridge which runs along the south side of the Dümrek valley and extends towards the Karamenderes plain (Fig. 1). Here the almost horizontal lie of the layers of Neogene sediment has produced a surface which is fairly flat. Descending southwards from the ridge is a slope with a gentle incline caused by the slightly south-dipping structure of the layers. On the north side the slope is steep and wall-like with bedrock exposed at many points. It is partly covered by archaeological material and old excavation-dump, the deposits being especially thick to the North of Schliemann's North-South trench. The height of this steep northern slope gradually increases towards the East where the Hellenistic theatre is situated in a broad indentation (Fig. 2).

Along the southern edge of the Dümrek valley, between the front of the theatre and the western tip of the ridge, the surface elevation is about 7 m. Here, in a 7 m.-thick sediment unit, our drill-holes produced abundant pot-sherds, large stones and evidence of fires (ash, burnt soil, pieces of charcoal, burnt animal-bones and shells). Some of these have been washed down the slope from the upper part of the site: small sherds with rounded edges have clearly been transported by running surface-water. But large stones and fire-remains associated with them cannot have been transported and are obviously *in situ*. They may be remains of simple fire-places constructed of rough stones arranged on the ground, e. g. for cooking game and sea-food. Material of this sort was found most frequently to the North of Schliemann's North-South trench (Figs. 5 and 6). Here, in drill-holes only 7.5 cm in diameter, there were close correlations between the various levels at which archaeological material was found. These levels are best interpreted as old ground-surfaces on which the people of Troia walked and pursued a variety of activities. If this is correct, then during the early periods of Troia the foot of the steep northern slope of Troia was not used for continuous habitation but for access to the surrounding wet terrain and probably for hunting.

During the Early Holocene the rising sea intruded, as explained above, into the lower Karamenderes valley and extended towards the Dümrek valley to form a small bay. The deepest part of this bay lay on the south side, near the foot of the Troia ridge, as dictated by the structural asymmetry of the valley (Fig. 4). The evidence from our drillings shows that deeper marine sediments are to be found close to the bedrock slope. But on the bedrock at about 50 m. North of Schliemann's trench, at about 10 m. below the present surface, there is a narrow coastal platform (Fig. 7). The platform widens towards the West, and its surface is covered by Early Holocene marine sediments or coarse sandy coastal deposits. Marine shells taken from the coastal sediments at the east end of the ridge, in front of the theatre, have yielded ^{14}C dates of 5800 BP; those taken from the same deposits at the west end of the ridge have yielded dates of 5200 BP (Fig. 6). No artefacts were found in any of these sediments.

The oldest channel of the Dümrek river lay to the North of the platform (Fig. 4). Here its bed was found at about 35 m. below the present surface. This depression is filled with marine sediments up to 2–3 m. below the present sea-level. This allows us to deduce that, at the end of the period of marine sedimentation, the depth of water was about 2–3 m. This former sea-bottom surface rises gradually towards the slope along its south edge and is bordered at present sea-level by coarse sandy coastal deposits containing a variety of shells. Drilling-evidence indicates that the old sea-bottom is covered with coarse sandy deltaic-coastal sediments which gradually change further up to river-flood sediments. The fact that terrestrial sediments begin below the present sea-level can be explained by the temporary 2 m. fall in sea-level around 5000–3500 BP. It is therefore possible to say that the surface along the foot of the northern slope of Troia first became land about 3500 years ago, and that people started to use this surface during the early periods of Troia. Indeed, when the present sea-level is reached in drill-holes in this area, the nature of sediment changes from terrestrial to coastal with marine shells. Simple fireplaces and their remains appear just above this transition surface. Sherds among these deepest archaeological finds are dated by Troian archaeologists to Troia VI or more probably VII. This dating is consistent with the reconstructed changes in sea-level and with the resulting deltaic progradation and the formation of the area into land (Fig. 6).

After the area changed to land, the channel of the Dümrek river formed on the surface of the new delta plain near the foot of the same slope on the north side of the site (Figs. 2 and 7). Along a narrow strip of land at the bottom of the slope there is a coarse sandy channel-fill which can easily be traced. It begins from the North of the theatre and extends towards the West, but East of the theatre it disappears among finer river sediments. It therefore seems that along the foot of the northern slope of Troia there was a narrow strip of land bordered on its North by the Dümrek river-bed; and that, for a long period starting from Troia VI–VII, this narrow piece of land was subjected to human use. It was, however, also a place of deposition – both for sandy alluvium spread by the Dümrek river when it flooded, and for colluvium washed down from the northern slope of Troia. This wash contains small archaeological finds such as sherds. The wider and lower part of the plain to the north of the river-bed was likewise covered by large amounts of fine sandy alluvium from the Dümrek river during the same period, and was gradually filled and raised. There is some evidence from drilling that the Dümrek river-floods occasionally covered areas of the south bank that were in use by humans. No archaeological material has been found in these deposits (Figs. 6 and 7).

The present channel of the Dümrek no longer lies in the same place. To the North of Tevfikiye it turns Northwest and runs away from the northern slope of the Troia ridge (Fig. 1). Moreover the river has in recent times been diverted into an artificial channel to prevent flooding. Drilling evidence shows that the river's coarse sandy channel-fill has been covered by fine sandy flood-sediments about 1–2 m. thick along the northern slope of Troia. Here a new transition between the coarse sandy channel-deposits and the fine sandy flood-sediments can be clearly distinguished in trenches cut by the Unimog.

There is insufficient evidence to determine the date of the Dümrek river-channel's shift to the Northwest. Occasional sherds can be found in the coarse sandy fill of the old river-course, but their rounded shapes show that they have been transported and worn down by river waters. Other sherds occur in the younger fine sandy alluvium which covers the channel-fill. These too have been transported and worn down and are not on their own adequate for dating. Although some have been dated as Hellenistic-Roman by the Troia experts, this is not at present enough to date the changes in sedimentation.

Conclusions and Suggestions

On the site of Troia, at the western tip of the ridge, there is a thick accumulation of many layers of occupation deposit deriving from a variety of periods. The ridge, with its overburden of later strata, is therefore not the easiest place to reach the remains of the earliest periods. These may more easily be reached on and below the slopes which surround the Troia ridge. In an attempt to arrive at a preliminary understanding, the surface of the bedrock was exposed by drilling and the nature of the sediments and of the archaeological material covering it was examined.

The slope to the South of the site has only a gentle incline. It was used as a settlement area for longer than the surrounding slopes, right up until the late periods, and consequently the earlier archaeological layers suffered disturbance from later activities. Investigations here of the earlier periods of settlement have been carried out continuously since 1988 by geophysical methods,[5] by drilling studies[6] and by archaeological excavations.[7]

To the North of the site the earliest occupation-layers have been exposed in Schliemann's North-South trench and in its extension towards the steep northern slope. Here the layers of Troia I and II lie on the surface of the bedrock or on its natural cover of soil. But it is impractical to try to trace the contemporary settlement surfaces directly down to the foot of the slope because this is where Schliemann threw much of his dump. We therefore examined a variety of sedimentary units, and their archaeological contents, by drilling. In this way we attempted to delineate the morphology of the covered bedrock-surface along the foot of the slope and to reconstruct environmental changes and related modes of land-use.

Our techniques of drilling did not allow us to take samples without any disturbance to the structure and texture of the soil extracted. And stones sometimes limited the depth to which we could drill, especially where archaeological material was plentiful – despite the importance of these areas for our purpose. But the evidence is sufficient to allow an initial interpretation of the deposits along the foot of the northern slope of Troia, and to show that, from an archaeological point of view, the area is an important one. We were able to determine that along the foot of the northern slope of the Troia ridge there is a narrow platform on the bedrock at about 10 m. below the present surface. The sea-level, which began to rise during the early Holocene, covered this surface 6000–5000 years ago, and generally coarse sandy coastal sediments were deposited here. Contemporary sediments continue to the North, towards the central part of the present plain, with fine sandy marine muds. From these sediments there have come no archaeological finds.

Marine sediments of the platform were covered with deltaic-coastal alluvium, and the first land-surface was formed at about 7 m. below the present surface, a depth which corresponds to the present sea-level. It is on this surface that the first cultural remains are found. These consist of pot-sherds and more especially indications of fire. The earliest sherds from the deepest position date to Troia VI or VII. Coarse sandy river-channel deposits show that at that time the Dümrek river lay close to the slope. Thus between the steep slope and the old river bed there formed a narrow strip of land which was used by the inhabitants of Troia. To the North of the river-bed a flood plain developed at the same period. In the more recent past and to the North of Tevfikiye the Dümrek river has shifted its course towards the Northwest, and fine sandy flood sediments have covered the old channel-fill.

In the light of these findings we consider that it would be very useful to make an archaeological excavation about 7 m. deep at the foot of the northern slope of Troia, just to the North of Schliemann's North-South trench. In this way some archaeological ground-surfaces might be found which could be related to settlement layers on the top of the ridge. There would, however, be some technical difficulties. One is the huge pile of dump at the north end of Schliemann's North-South trench. Although a part of this has been taken away, complete clearance of the area would still be very difficult. Another difficulty is posed by the high level of ground water, which lies only about 3–4 m. below the surface during summer time. This means that an excavation to a depth of 7 m. would go 3–4 m. below ground-water. Before undertaking such a difficult task we need to be sure that the results would be worth the effort. We plan to carry out more drilling here using more suitable techniques and equipment. By taking undisturbed core-samples from various sediments using drilling-equipment which is capable of penetrating stony levels, such as percussion-type drilling equipment, it should be possible to decide on the feasibility of archaeological excavation. Percussion-drilling equipment is also needed for our investigation to the South of Troia. It would for example provide a very rapid and reliable means of examining and evaluating some anomalous areas shown up by geophysical survey. Percussion-drilling would also make it possible to penetrate deeper than 20 m. in the middle part of the plain and to investigate the natural sedimentary units and their geographical environments.

NOTES

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2 Kayan 1995, 211–235.

3 Kayan 1991, 88, 89, 90.

4 I am very grateful to Dr. B. Kromer of the Institut für Umweltphysik der Universität Heidelberg for carrying out the ^{14}C datings.

5 Jansen 1992, Becker, Faßbinder and Jansen 1993; Becker and Jansen 1994.

6 Korfmann 1991, 26.

7 Korfmann 1991, 26; Korfmann 1992a, 27–31; Korfmann 1992b; Korfmann 1993, 14–21, 25–28; Easton and Weninger 1993; Jablonka, König and Riehl 1994.

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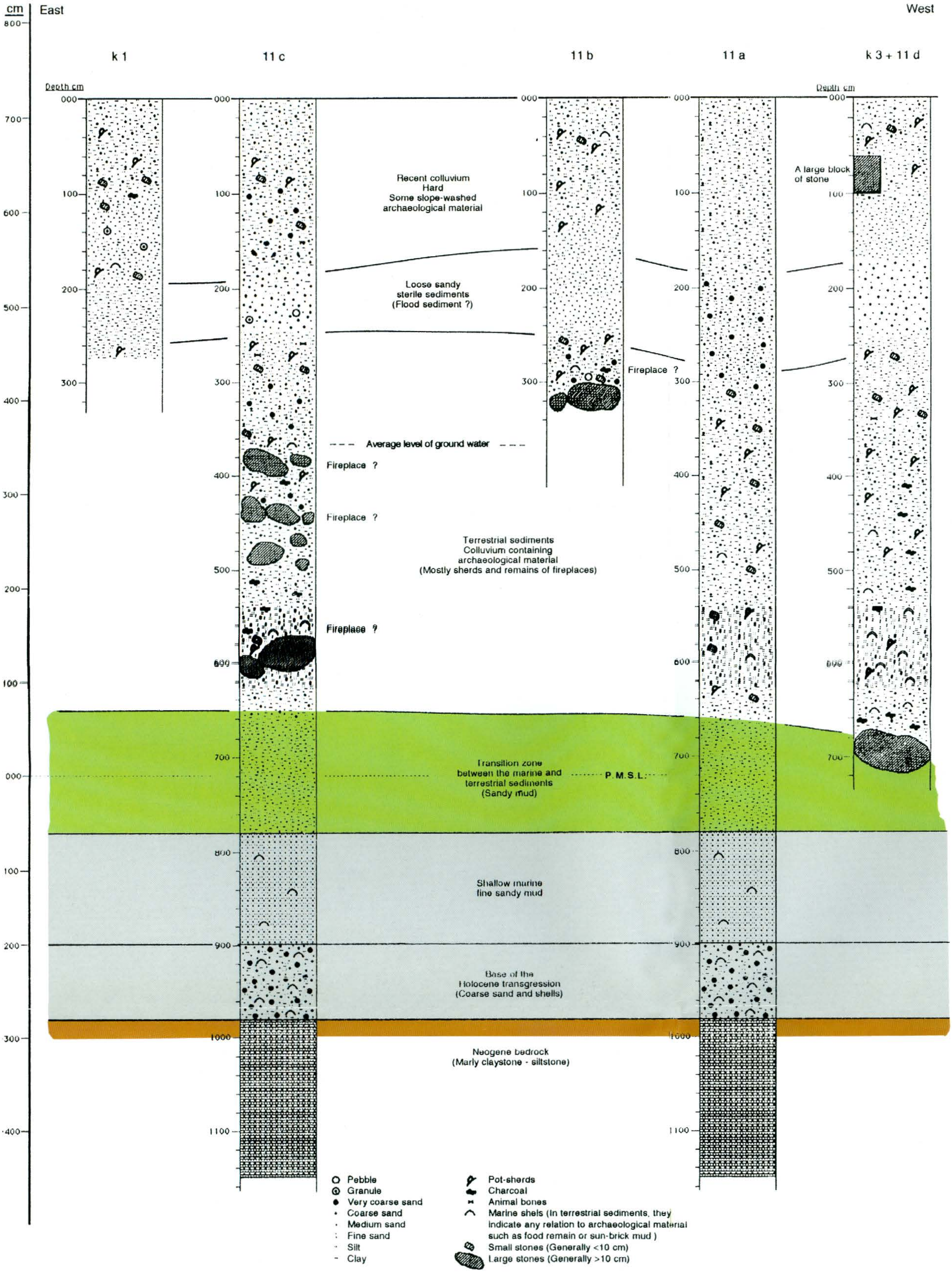

Fig. 5 Details of drill-holes no. 11. Foot of the northern slope below Schliemann's North-South trench, looking south from the Dümrek plain.

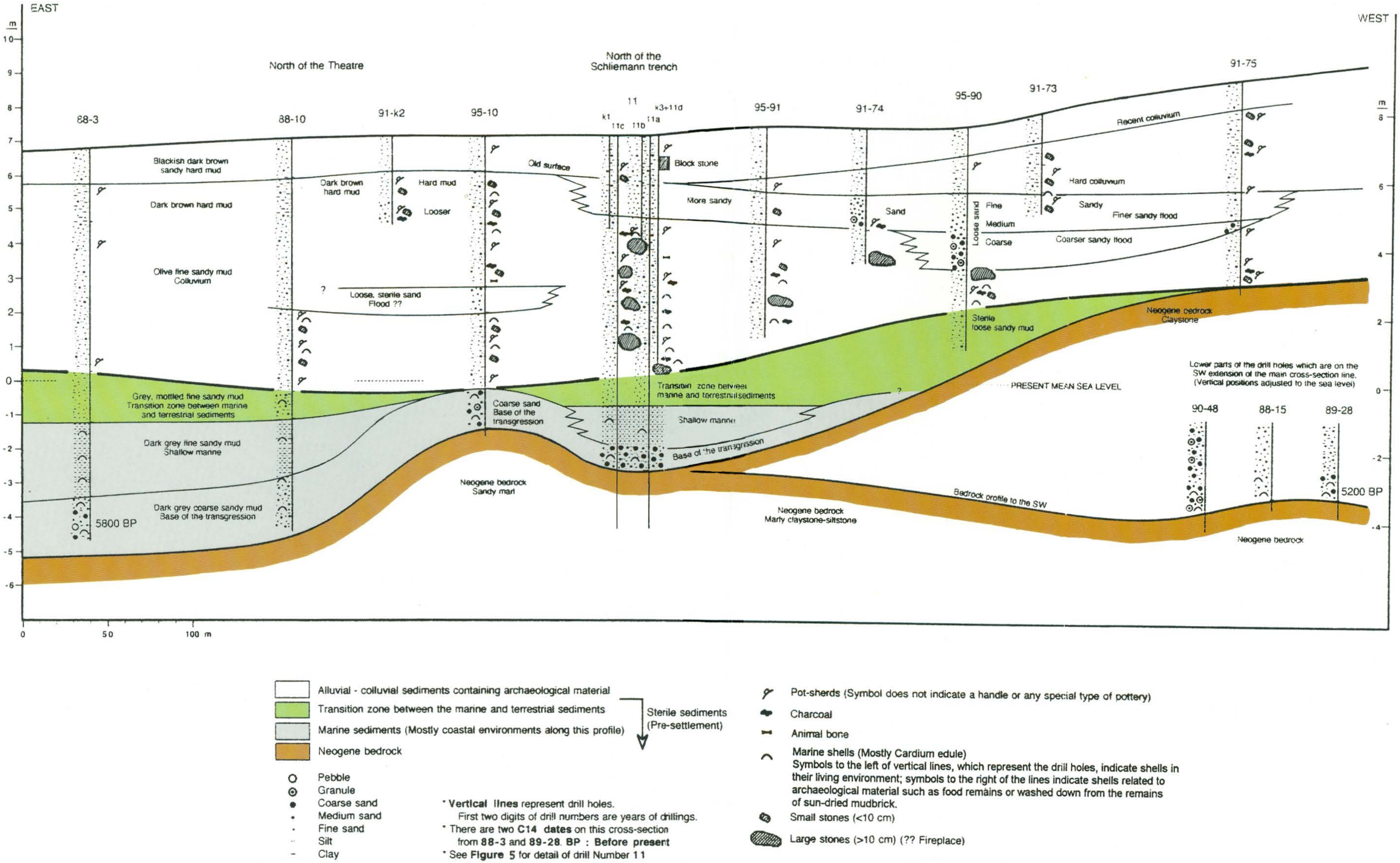

Fig. 6 Position of archaeological material in various sedimentary units of changing environments alongthe foot of the northern slope of Troia, looking south from the Dümrek plain. See: Fig. 2.

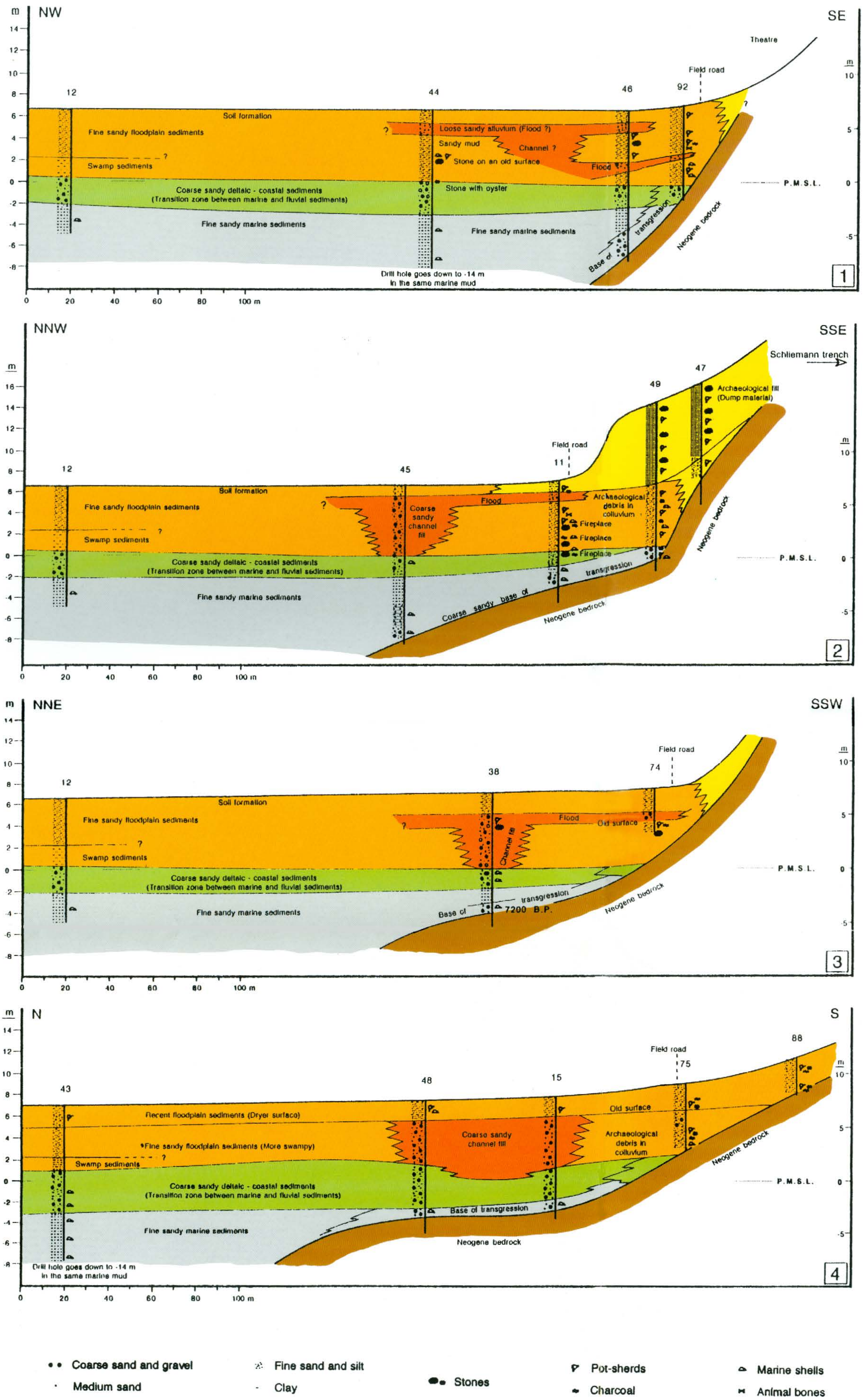

Fig. 7 Transversely serial North-South cross-sections along the foot of the northern slope of Troia. The top section lies to the East, the bottom to the West.

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ANHANG

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