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GEOMORPHOLOGICAL EVOLUTION OF THE ÇIPLAK VALLEY AND ARCHAEOLOGICAL MATERIAL IN THE ALLUVIAL SEDIMENTS TO THE SOUTH OF THE LOWER CITY OF TROİA

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ABSTRACT

In the 1996 field season, new percussion drilling equipment was used for the first time for paleogeographical investigations on the Troia area. In addition to the previous 33 drillholes, 20 new drillholes were bored on the plain between the Lower City of Troia and Kalafatlı village. Percussion drilling with the gouge-auger exhibited excellent performance and provided valuable data. The drilling in 1996 penetrated a maximum depth of 27 m with a total drillhole length of 235 m.

The plain was formed by the Çıplak river in a structural depression between two low ridges consisting mostly of Neogene sandstones. Drilling evidence indicates a pre-Holocene formation of the depression and an Early Holocene marine transgression, followed by stages of alluvial-colluvial sedimentation.

The first archaeological material to be found consisted of sherds, marine shells which were the remains of food, and grains of charcoal in sediments located beyond the maximum extended position of the Middle Holocene coastline about 13 m below the present surface. Although the absolute date of this material is unknown, by comparison with geomorphological evidence and ^{14}C dates from other drillholes, it may be dated to about the 7th millennium BP. Alluvial-colluvial sediments above present sea level have contained a small number of sherds and marine shell fragments from food remains. The most distinctive archaeological material was found in an approximately 1 m thick layer situated 2–4 m below the present surface. This particular layer lies in front of the foot of the southern slope near the Lower City. It is a sandy alluvial-colluvial mud composed primarily of small grains of sherds and charcoal extending south to an old river channel, where it is interrupted. Another similar layer or band of sediment less filled with sherds stretches along the southern edge of the channel. Both of these layers suggest a destruction, perhaps by fire, of the Lower City. Material washed downslope from the ruins must have formed this sediment layer. Although datable material still proves elusive, Troia archaeologists are of the opinion that a Hellenistic-Roman date is most probable. This assessment corresponds well with sedimentological and geomorphological evidence.

ZUSAMMENFASSUNG

Während der Kampagne 1996 konnte das erste Mal eine neue Bohrausrüstung für paläophysikalische Untersuchungen in der Umgebung von Troia eingesetzt werden. Zu den bereits vorhandenen 33 Bohrlöchern wurden 20 neue Bohrlöcher in der Ebene zwischen der Unterstadt von Troia und dem Dorf Kalafat angelegt.

Die Ebene wurde durch den Fluß Çıplak geformt in einer strukturellen Eintiefung zwischen zwei niedrigen Hügeln, die überwiegend aus neogenem Sandstein bestehen. Die Bohrergebnisse deuten auf eine präholozäne Entstehung der Eintiefung und eine früh-

holozäne Meerestransgression hin, die von mehreren alluvial-kolluvialen Sedimentationstufen abgelöst wurde.
Das erste vorgefundene archäologische Material bestand aus Keramikscherben; Meeresmuscheln, die als Nahrung dienten und Holzkohle, die sich hinter der maximalen Ausdehnung der mittelholozänen Küstenlinie, ca. 13 m unter der heutigen Oberfläche befanden. Obwohl das absolute Alter dieses Materials unbekannt ist, kann es durch Vergleiche von geomorphologischen Nachweisen und ^{14}C-Daten aus den anderen Bohrlöchern ungefähr in das 7. Jahrtausend BP. datiert werden. Alluvial-kolluviale Sedimente über dem heutigen Meeresspiegel enthielten eine geringe Zahl an Scherben und marinen Nahrungsüberresten. Das charakteristischste archäologische Material wurde in einer ca. 1m mächtigen Schicht gefunden, die 2–4 m unterhalb der rezenten Oberfläche lag. Diese Schicht befindet sich vor dem Fuß des Hügels in der Nähe der Unterstadt. Sie besteht aus einem sandigen alluvial-kolluvialem Lehm, der sich überwiegend aus kleinkörnigen Keramikscherben und Holzkohle zusammensetzt und sich bis zu einer Stelle südlich eines alten Flußkanals ausdehnt, wo er dann unterbrochen wird. Eine ähnliche Schicht bzw. ein Sedimentband mit weniger Keramikmaterial erstreckt sich entlang des Südkante des Kanals. Diese beiden Schichten implizieren eine Zerstörung der Unterstadt, vielleicht durch Feuer. Material, das von der Ruine herabgeschwemmt wurde, bildet diese Schichten. Obwohl bisher noch kein datierbares Material gefunden wurde, vertreten die Archäologen von Troia die Ansicht, daß ein hellenistisches/römisches Datum am wahrscheinlichsten sei. Diese Annahme würde mit den sedimentologischen und geomorphologischen Ergebnissen übereinstimmen.

Introduction

Our investigations of the natural environment of Troia have continued since 1988 in conjunction with the new Troia project led by Prof. Dr. Manfred Korfmann.[1] As explained in previous volumes of *Studia Troica,* the aim of our research is to interpret geomorphological shifts, as well as changes in the environment or general physical geography of the region, and to elucidate the connections between these environmental changes, the cultural periods of Troia, and the characteristics of land use since the first settlement periods.[2]
Landforms in the vicinity of Troia consist of low plateau ridges about 40–80 m high separated by wide valley depressions (Fig. 1). The ridges are formed from slightly consolidated sandy-clayey-limy sediments. A low undulating topography has been formed by erosion on the surface of the ridges. Erosional material transported by rivers as alluvium and by slope-wash sheet-floods as colluvium has filled the depressions and floors of the valleys.[3]
Sediment units in the lower part of a valley acquire characteristics from surrounding environmental conditions. Climate and sea-level, for example, especially control alluvial formation. Consequently, in order to clarify both paleogeographical and environmental changes, the most practical and effective approach is to examine old sediment units and to interpret their sedimentary environments. Drilling offers the only successful technique for collecting data about subsurface sedimentary units in an alluvial-colluvial area because sediments in such conditions are generally not highly consolidated and are easy to penetrate for taking samples by hand or by means of light powered drilling equipment.
In 1977, our drilling studies in the Troia area started with 7 rotary-corings completed by the M.T.A. Institute (Geological Survey of Turkey). The thickness of the Holocene sediments (younger alluvium) was found to be less than 30 m in many places on the plain to the west of Troia, and much less to the north and south. The old bed of the Karamenderes river (Scamander), however, was discovered about 75 m below the present surface in a steep cut of the river in the lower section of the plain.[4]
Drilling studies have continued since 1983 with the

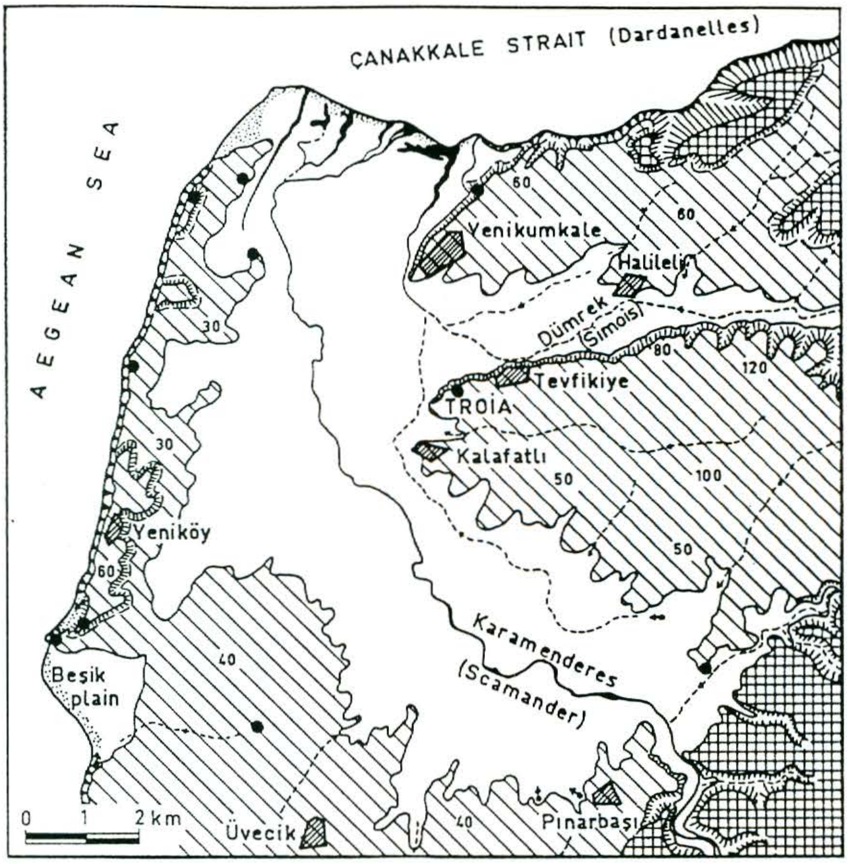

Fig. 1 Geomorphological outlines of the Lower Karamenderes plain showing the position of the Troia-Kalafatlı ridge.

Beşik-Tepe and Troia Archaeological Expeditions led by Prof. Dr. Manfred Korfmann. Research conducted in the Beşik plain generated evidence for sea-level changes as well as data outlining the geomorphological development of this small coastal plain.[5] Since 1988, our exploration has concentrated on the alluvial plain surrounding Troia. A variety of techniques and equipment have been employed to suit not only our various objectives but also the material to be penetrated. Unimog rotary-auger drillholes reached a depth of 20.5 m, Eijkelkamp hand-auger drillholes 8–10 m, and Unimog trenches 2.5 m. By 1996, the number of drilling points in the landscape around Troia reached a total of 210 in number. Sediment samples were physically examined and analysed specifically for grain-size in our laboratory in the Department of Geography at Ege University. Organic material, especially marine shells, was dated by Dr. B. Kromer at the Institut für Umweltphysik der Universität Heidelberg. Consequently, quite detailed information was obtained regarding alluvial sedimentation and stratigraphy from the area encircling Troia.[6]

Although the Unimog supplied valuable data by means of its great hydraulic power, samples could not be taken as undisturbed cores, because of the mixing effect of rotary-auger drilling. In addition, due to the great size of the auger-rods, sediments climbed upward under high pressure during operation, obscuring the true depth of selected samples. These conditions presented a great obstacle to making precise correlations, substantiating our preference for percussion drilling equipment during recent studies. Our proposal to acquire percussion drilling equipment was endorsed by Prof. Dr.

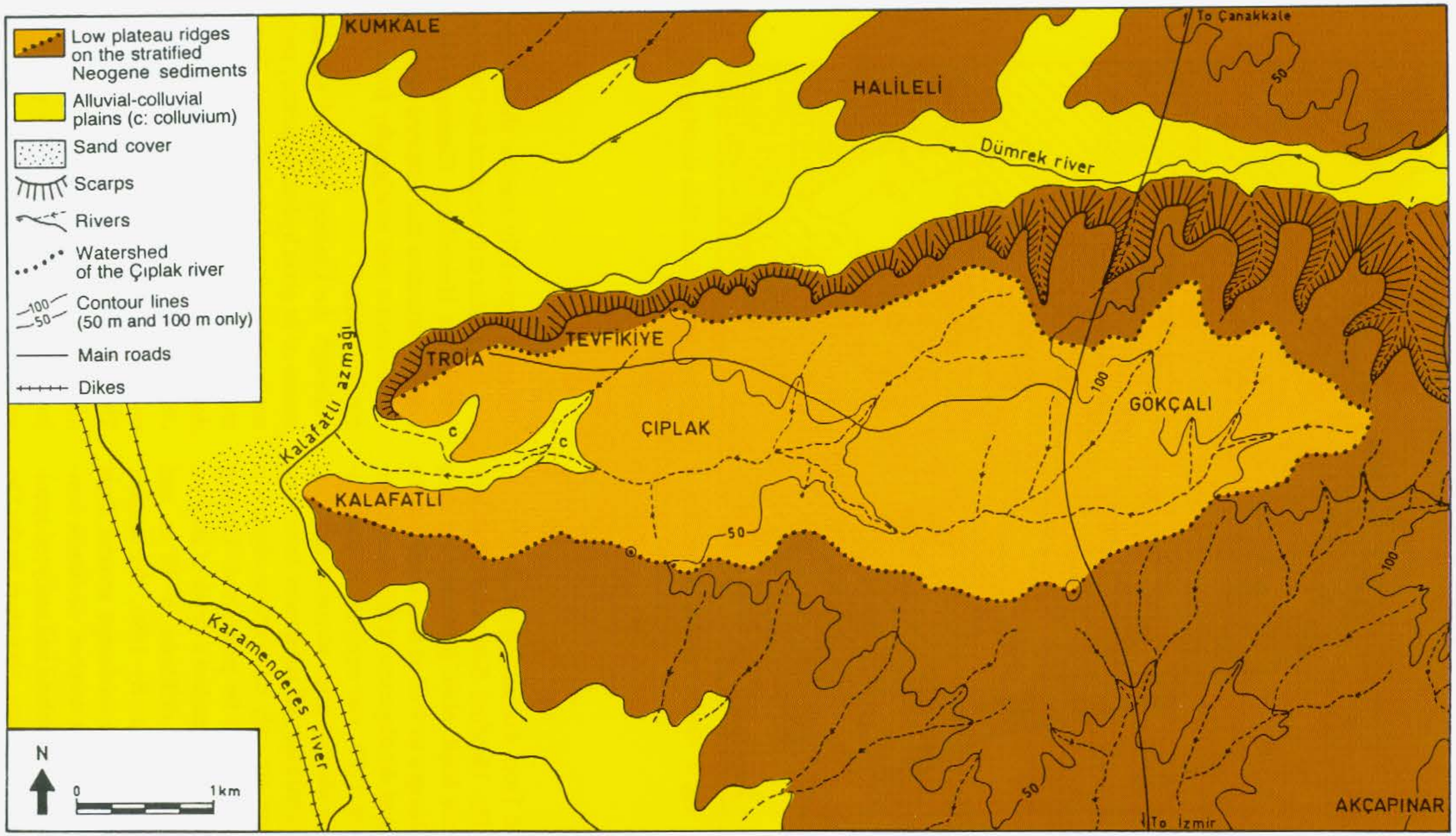

Fig. 2 Hydro-morphological map of the Çıplak valley and the lower flood plain between the Troia and Kalafatlı ridges.

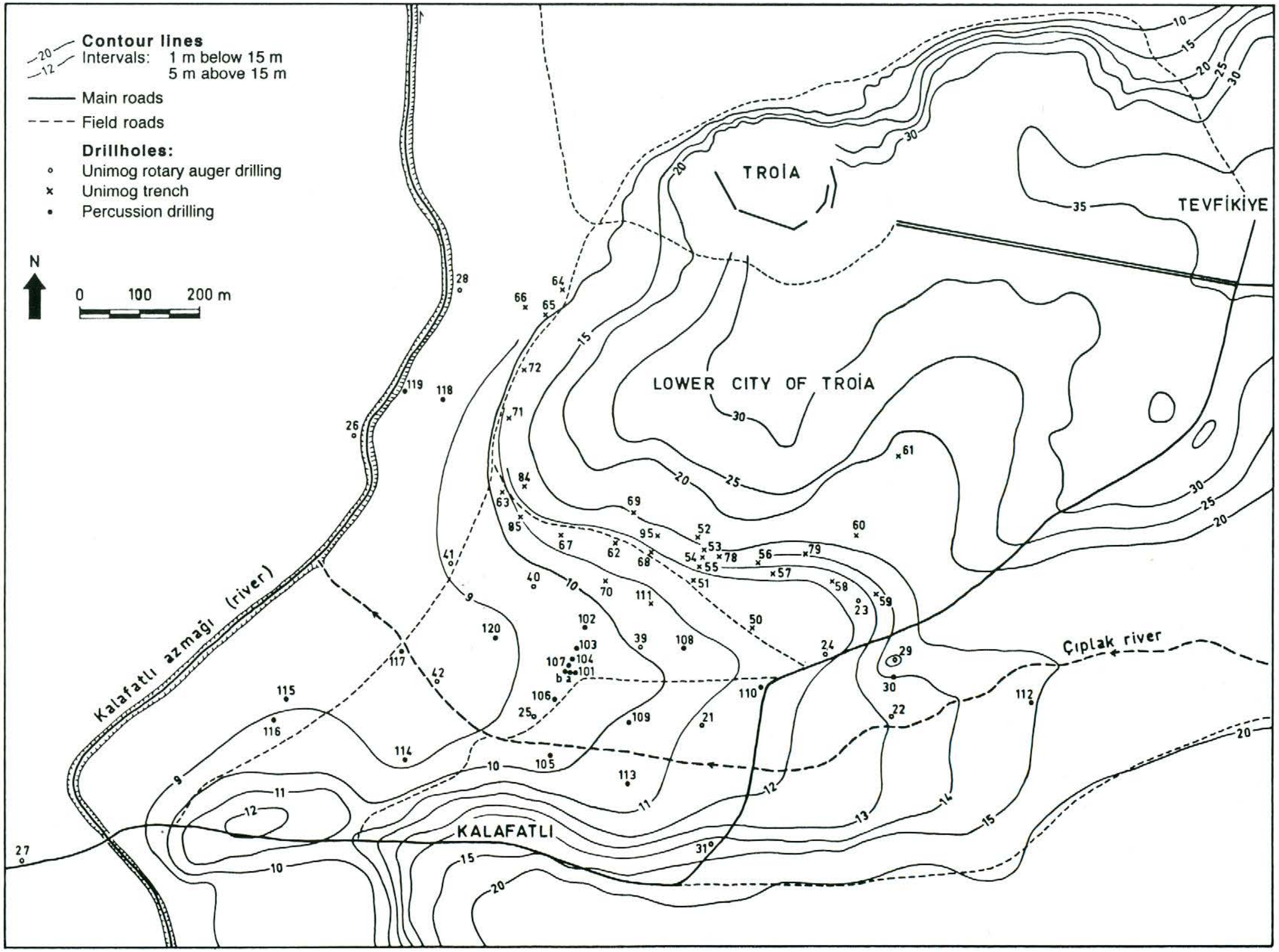

Fig. 3 Topography of the flood plain in the lower Çıplak valley between the Lower City of Troia and present-day Kalafatlı village, and the drillhole locations. (Based on 1/5000 scale of maps and data obtained by topographical measurements of the Troia Excavation).

Fig. 4 Panoramic view to the North from minaret of the Kalafatlı mosque. Lower City of Troia was situated on the western tip of a low plateau visible in the distance, center. Present plain is formed by floods of the Çıplak river, which today has only a small channel. (A line between fields from white car to the right). One can imagine, however, that the area of the plain was a bay extending close to the small tree on the river course to the right. Drilling work for number 113 continues in front of the car. Gelibolu peninsula and the Çanakkale Strait on the far left. Yenikumkale (or only Kumkale) village visible in the background.

Manfred Korfmann. A set of this equipment was generously provided for our studies by the Troia Project.

By 1996, 33 drillholes and trenches had been made on the flood-plain of the Çıplak river and along its slightly inclined northern extension near the foot of the Lower City of Troia (Figs. 2 and 3). Some of the drillholes were bored in the lower part of the plain using an Unimog rotary-auger which penetrated down to a depth of 20.5 m. Trenches dug by the Unimog reached a depth of about 2.5 m, and drillholes were made with hand equipment down to bedrock along the foot of the slope. In 1996, 20 additional drillholes were made in the same area using the new percussion equipment. The total length attained by these new drillholes was 235 m, with the deepest being 27 m. Thus, quite detailed information was collected on subsurface sedimentary units in a relatively small area. Those results considered to be of greatest geomorphological and archaeological importance constitute the central theme of this paper.

Geomorphology of the Çıplak Valley

In the Troia area, low plateau ridges have formed on sandy-clayey-limy shallow marine sediments which were originally deposited and stratified on the bottom of a shallow marine embayment extend-

Fig. 5 Panoramic view East of the Çıplak valley. Low plateau surface, on which the Çıplak valley was formed, can be followed by oak trees and fields. In the far distance is the minaret of the Çıplak village.

Fig. 6 Percussion drilling work for number 103. Gentle southern slope of the Lower City of Troia in the background and Tevfikiye village on the right.

ing from the north (Black Sea-Marmara) during the Neogene (Upper Miocene)[7]. As a result of uplift movements in the region during subsequent geological periods, the old sea-floor rose, forming a wide low surface of land; then, the surface continued to rise, breaking into long fault blocks. Present-day plateau ridges and valley depressions formed on these uplifted and down-faulted blocks of old marine sediments. One of the three main ridges in this area is the Yeniköy (Sigeion) ridge to the west, which extends north-south and separates the Karamenderes (Scamander) plain from the Aegean Sea. Two other ridges extending east-west occur to the east of the Karamenderes plain. In the north, the Yenikumkale ridge separates the Dümrek (Simois) plain from the Çanakkale Strait (Dardanelles) (Fig. 1). Troia is located on the western tip of the southern ridge. Transverse profiles of the ridges are asymmetric. The northern slopes of the Yenikumkale and Troia ridges are steep, while the southern slopes are gentle because of the southward-tilted structure of the faulted Neogene blocks. The horizontal position of the sedimentary strata in the higher northern parts of the ridges is the reason for the flat morphology. The strata curve downwards in the southern part of the ridges. Consequently, the southern slopes are gentle.[8]

The western part of the Troia ridge, in fact, consists of two secondary branches with the same general structural characteristics. These secondary branches are separated by the Çıplak valley. Kalafatlı village is located on the western tip of the southern ridge. The Kalafatlı ridge also has an asymmetric shape (Fig. 2). As with the Troia ridge, it is lower than 50 m in the west. The northern slope is steep and straight, while the southern slope is gently inclined and indented. With this morphology, the Çıplak valley can be viewed as a small model of the Dümrek valley to the north.

The Troia and Kalafatlı ridges join together near Çıplak village to the east, and the plateau surface widens. This surface gradually rises to 100–120 m toward the east. It is dissected by the upper tributaries of the Çıplak river in a dendritic drainage pattern. The drainage basin of the Çıplak river is actually not broad. The longest tributaries extend up to 1–2 km east of the Gökçalı village. Thus, the Çıplak river drains a small area of about 15 km^2 (Fig. 2). Furthermore, this river flows intermittently when enough rain falls. It is not a powerful river, then, in terms of water volume or inclination characteristics. On the other hand, lithology generally consists of slightly consolidated, easily erodable fine sandstones, as well as clayey and limy sedimentary rocks. Despite the low energy flow, erosion and sediment transport in the Çıplak basin are severe. The poor vegetation found today in the area is in part responsible for the strong erosion. The basin is currently used as pasture and for dry-farming. Oak bushes and woodlands, which consist of sparse groups of oak and pine, occupy some parts of the region (Figs. 4 and 5).

The upper tributaries of the Çıplak river meet near Çıplak village with a single east-west valley stretching directly to the west (Figs. 2 and 5). An alluvial valley bottom begins west of Çıplak village and develops into an approximately 300 m wide flood-plain to the north of Kalafatlı (Fig. 4). Surface elevation is about 8 m in the west, near Kalafatlı azmağı, and 12 m along the inner section of the flood-plain. A secondary depression extends toward the northeast. The bottom of this extension and the narrow part of the Çıplak valley are covered by more colluvial sediments. Surface elevations in these areas gradually rise to about 20 m. The course of the river is quite low and unclear near the bottom. During land-improvement works in this area in the 1950's, the Çıplak river was turned into a drainage ditch. This ditch joins the Kalafatlı azmağı (river) to the west.

Alluvial Stratigraphy and Paleogeographical Development of the Lower Çıplak Valley

It is known that the sea level, which was 100 m below its present level during the last glacial period, rose rapidly in the Early Holocene. According to ^{14}C evidence, the sea intruded from the Çanakkale Strait into the old Karamenderes valley depression about 10,000 years ago. This estuarine bay reached to nearby Pınarbaşı in the south during the Middle Holocene, about 7,000–6,000 years ago. Naturally, the main bay at the mouth of the Karamenderes river must have intruded into the lower tributaries to the east. Marine sediments of a secondary estuarine bay extending into the Dümrek valley, in fact, have been discovered by drillhole studies.[9] It is also known from our old drillholes that marine intrusion spread into the lower half of the Çıplak river to the south of Troia. The data, however, were insufficient to delineate the extent of this old marine intrusion. It has now been possible to elucidate the stratigraphical and paleogeographical characteristics of this area with additional information obtained from 20 new drillholes which were made in the 1996 field season (Figs. 3 and 6). The main stages, separated according to changing environmental characteristics, are explained below in chronological order.

Pre-Holocene Formation

Drillholes in the lower part of the Çıplak valley also supplied good information about pre-Holocene geomorphological development. These recent investigations resulted in the identification of an intermediate terrestrial sediment unit between the Neogene bedrock and the Holocene sediments (Figs. 7, 8 and 9). This deposition essentially consists of sandy-clayey-limy material originating from disaggregated Neogene bedrock which was apparently transported a short distance and then tightly consolidated. This deposition layer can be distinguished from the Neogene base and the Holocene sediments by its reddish-yellow, mottled color and non-homogenous structure. Clean, coarse sandy bands from place to place indicate flood effects during deposition. Rather than being the alluvial fill of a river, however, this sediment unit has the characteristics of colluvial material washed from the slopes by sheet-floods. This unit occurs only below younger sediments on the slightly inclined northern slope of the valley. On the steep southern slope, the Holocene sediments are found directly above the Neogene base.

This information indicates that the lower part of the Çıplak valley underwent several deposition (filling) and erosion (emptying) processes before the Holocene (Pleistocene ?). The asymmetrical shape of the valley can be followed below the present alluvial fill. The steep southern slope is probably faulted. The first river, then, which shaped the depression into a valley, must have flowed along the southern slope in a path corresponding to its asymmetrical shape. The depth of this former river course is about 20 m in the middle part of the plain. In the successor phase, the valley depression filled with reddish-yellowish, mottled colluvium. This deposit does not show any sedimentary structure to indicate regular water flow. This implies an arid or semi-arid climate during deposition which may be a dry interglacial stage of the Pleistocene. Although there is no chronological evidence, the Riss/Wurm interglacial stage is quite consistent with this formation. In the lower part of the Karamenderes delta plain, an older marine sediment unit actually exists below the Holocene sediments. ^{14}C results date the age of this unit between 20,000–40,000 BP.[10] If the terrestrial sediment unit in the Çıplak valley is compared with the older Karamenderes marine sediment unit, a Riss/Wurm or an early Wurmian date can be accepted as plausible.

During the pre-Holocene, old colluvial fill in the valley underwent an erosional formation in two stages. A trough-like deeper section with steep slopes continues to a depth of 10 m. Since Holocene marine sediments have filled this part, the erosional trough must have been cut by water flow during the Wurmian period of low sea level. The upper part is wider and starts with a clear shoulder almost at present sea level, below the present surface of the plain. This upper part has been filled by younger (Middle-Late Holocene) fluvial-colluvial sediments. Sediment layers corresponding to cultural stages of Troia have been discovered in this same upper layer (Fig. 7).

Early Holocene Marine Transgression

A small bay formation in the lower part of the Çıplak valley in the early Holocene advanced parallel to the general post-glacial transgression in the region. There is a shallow marine sediment unit here below present sea level under the alluvial-colluvial upper section (Figs. 7 and 8). The base of this unit consists of coarse sandy-gravelly lag deposits. The main part is composed of a fine sandy, blackish, sticky mud with a high content of

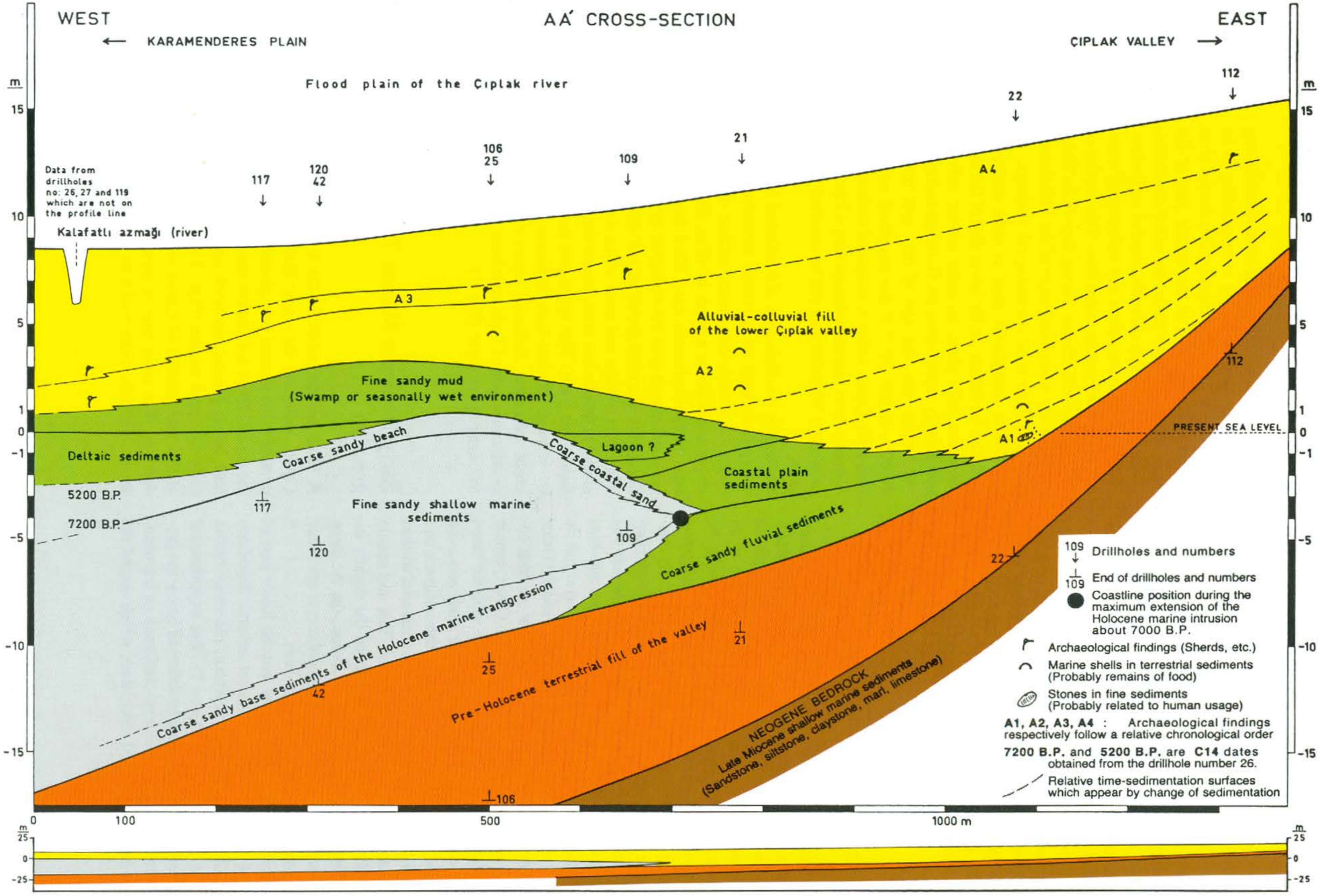

Fig. 7 West-East cross-section along the flood-plain in the lower Çıplak valley (A–A' line on Figure 12).
The lower flat cross-section is the same as the main cross-section above, but here, the horizontal and vertical scales are equal (1/2500). This is added to explain real distance-thickness proportion of marine sedimentary units in the area (Marine unit is filled grey). Since various sedimentary units cannot be shown on this vertical scale, exaggeration is necessary. Vertical exaggeration is 25 times on the above cross-section.

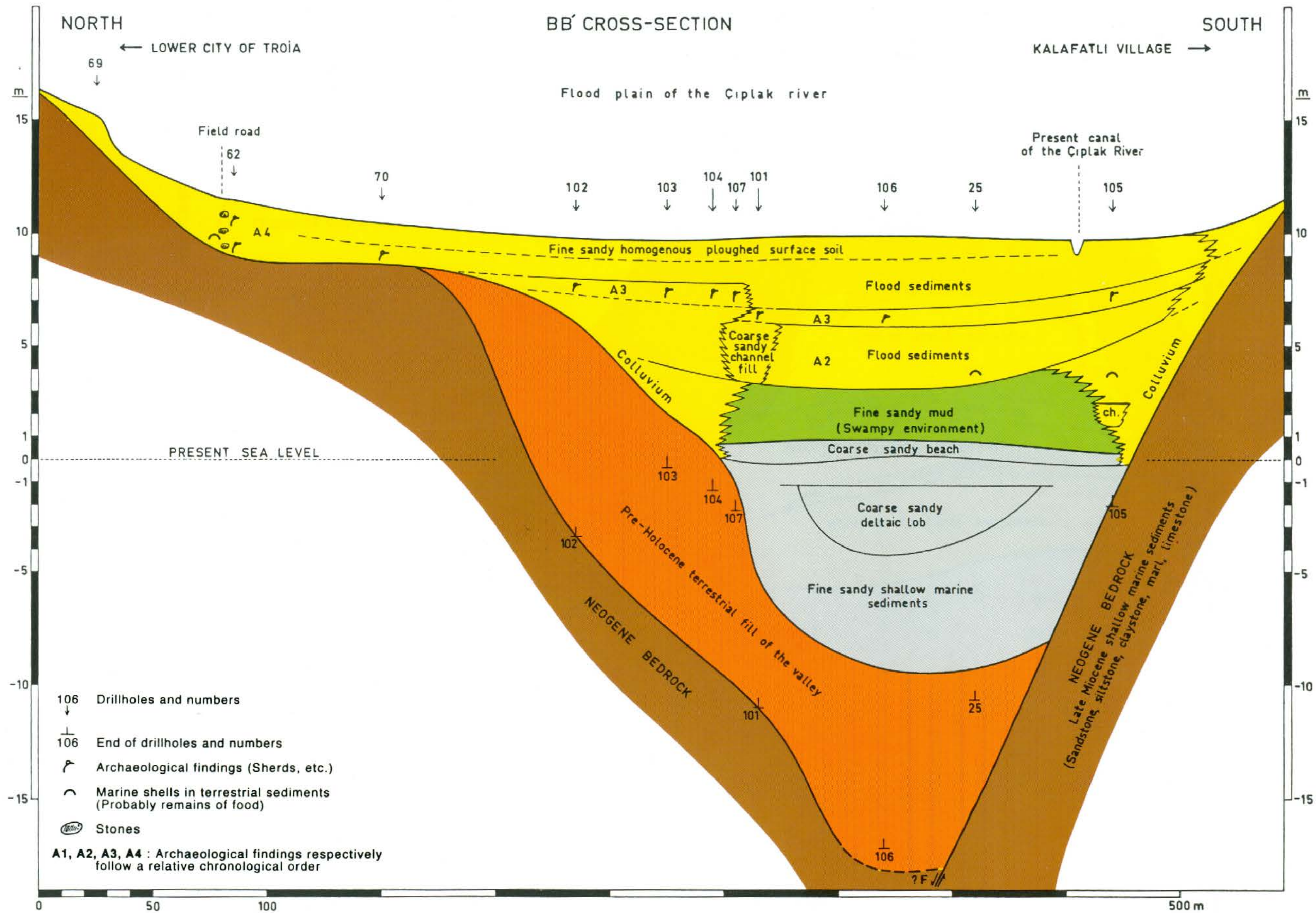

Fig. 8 North-South cross-section across the western part of the flood plain in the lower Çıplak valley (B–B' line on Figure 12).

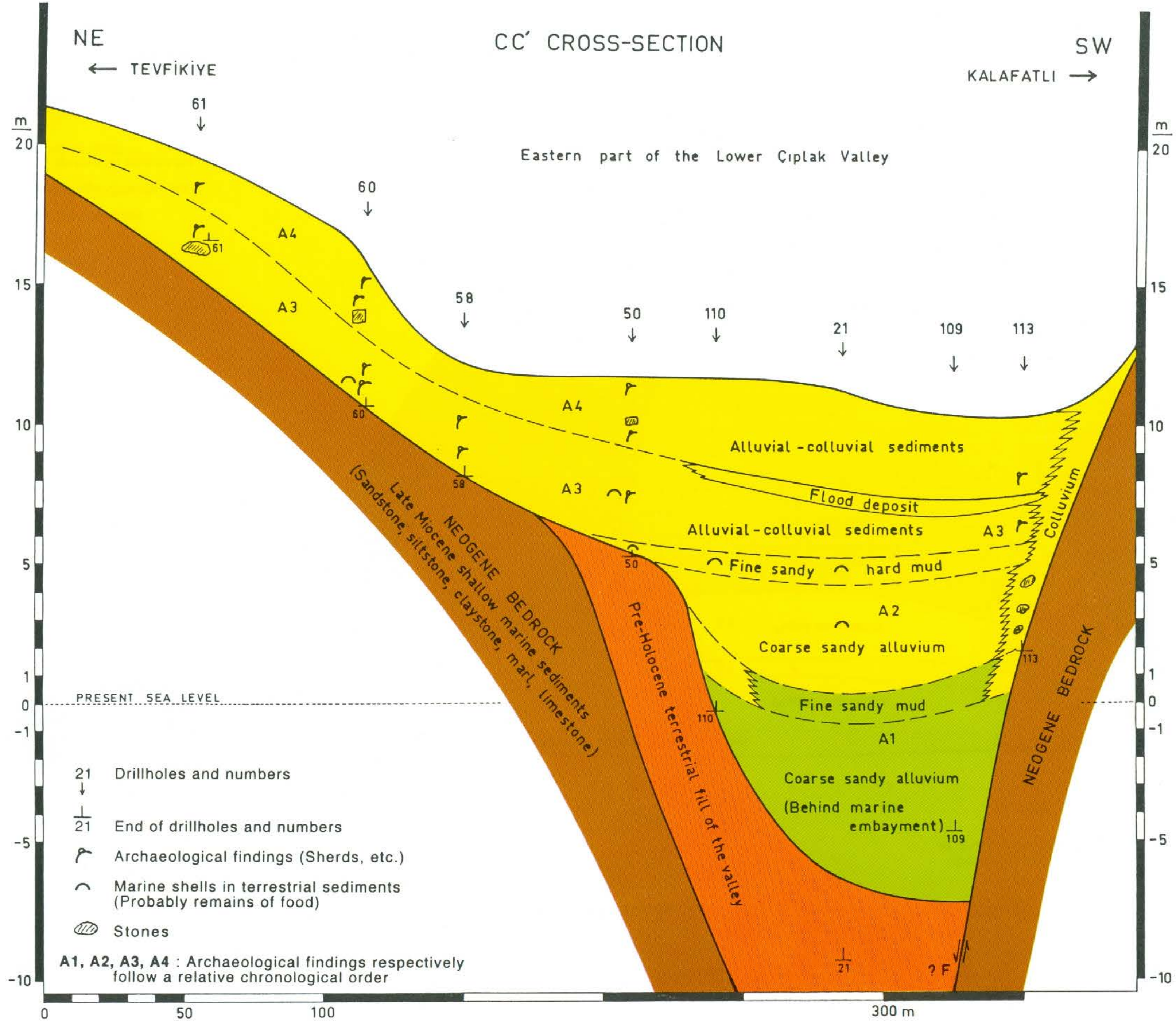

Fig. 9 NE-SW cross-section across the eastern part of the flood plain in the lower Çıplak valley (C–C′ line on Figure 12).

organic colloids. A coarser sandy deltaic lobe can be distinguished in the middle part. Depending on the bottom topography, the thickness of the marine unit is about 15 m in the west (east of Kalafatlı azmağı). The inner (eastern) edge of this old bay lies between drilling points number 109 and 21 (Figs. 4 and 7). During the period when the sea reached its maximum extension into the Çıplak valley, coarse sandy river sediments were deposited behind (east of) the coast. Although no ^{14}C date is yet available from this area, two ^{14}C dates obtained from drillholes to the near west of the Troia ridge are comparable and indicate that the sea reached its maximum extension into the Çıplak valley around 7000 BP. The sea level did not reach its present-day position at that time but continued to rise. Despite the slowly rising sea, the coastline filled with the alluvium of the Çıplak river and retreated toward the west.

Middle Holocene Marine Regression and Alluvial Progradation

Drilling evidence indicates that a coastal barrier-lagoon form of geomorphological development dominated during the regression stage in the Middle Holocene. A careful examination of the sea level revealed that marine sediments did not occur higher than the present sea level, and the highest position of marine sandy sediments, probably coastal sand deposits, was located almost at present sea level (Figs. 7 and 8). This confirms that the sea level during the Holocene was never higher than its present position. No new evidence, however, was found here concerning the Bronze Age marine regression discussed in previous publications.[11] This is to be expected, because this area is a quiet secondary embayment of the main Karamenderes estuarine bay. Nevertheless, the surface of the fine sandy marine sediments inclines westward in the west and is covered by coarser sandy deltaic-coastal sediments. This feature can perhaps be interpreted as the result of a small decline in sea-level during the Bronze Age which, in turn, speeded the alluviation process and advanced the presence of coarser coastal sedimentation on the bottom of the main Karamenderes embayment.

The accumulation of even finer alluvial muddy sediments deposited during the rise in sea-level stopped, and the coastline started to retreat (Fig. 7 and 10). The fine sediments possess some characteristics associated with swamp or wetland environments. In many places, they contain limy concretions and are quite hard due to the high carbonate content. Thus, some paleo-climatical interpretations are possible. Summers, then, must have been hot and dry at that time and a high rate of evaporation caused a carbonate concentration by capillary processes. This coincides well with the climatic conditions of a period when the temperature reached its maximum point since the last glacial time, within the Climatic Optimum of about 6000–5000 BP.

The fine grained muddy section of sediment fill in the lower Çıplak valley constitutes a transition zone between marine or related wetland sediments beyond the coast, and completely terrestrial (alluvial-colluvial) upper sediment units. Although no archaeological material was found in this unit, some marine shells which had been transported into terrestrial mud suggest that human occupation sites existed in the surrounding area at that time and that shell-fish were consumed there.

Sherds, marine shells from food remains, and a large stone were found in drillhole number 22 just on the pre-Holocene terrestrial fill of the valley at a depth of 13 m below the present surface, which coincides with the present sea level (Fig. 7). This material, however, could not be evaluated archaeologically because of the disadvantages of the rotary-auger drilling. Its vertical and horizontal position conform to a marine retreating stage. Thus, one can imagine a shallow, quiet marine embayment to the west, which made obtaining marine food convenient, a small lagoonal or swampy back-shore environment to the east, and human occupation sites on the alluvial cover of the Çıplak river near the slopes of the valley. The various pieces of data generated thusfar correspond to one another to form a single coherent paleographical picture. This probably represents the earliest settlement phase in the area, dating to around 7000–6000 BP. (although no absolute date is available).

Fig. 10 A gouge-auger sample from drillhole number 117 at a depth of 950–1000 cm. Darker-finer-cohesive and lighter-coarser-looser sediment bands indicate a fluctuating, unstable environment. This section coincides with the end of the marine sequence, and belongs to a deltaic-coastal environment.

Late Holocene Alluvial-Colluvial Sedimentation and Its Archaeological Implications

The upper sediment unit on the plain between Troia and Kalafatlı forms a cover about 9–12 m thick (Figs. 7 and 8). Although some parts of this unit are sedimentologically different, it is difficult to separate and delineate them vertically and horizontally. This entire unit consists of a mixture of sandy muds which were carried from the east by the Çıplak river, and colluvial muds, which were washed down by surface waters during heavy rains especially from the low inclined northern slopes of the plain. Fine to medium sands, originating from the Neogene sandstones, predominate this sediment unit. Grain size distribution, then, is not indicative of dynamic processes such as the power of water, inclination of the river channel, or modes of transportation. Although there are some coarser sandy bands in the mud which originated from conglomerate layers in the Neogene bedrock, these bands are also generally muddy. Since the Çıplak river has a small drainage basin, and flood conditions exist only during heavy rains, it is difficult to recognize old river channels. In former times, a small river channel must have also existed along the present river course sufficient just to drain normal rain water. During heavy rains, however, the channel must not have been big enough, so that the sandy-muddy waters flowed all over the surface and spread to the lower parts of the plain.

Given the mixed nature of this unit, a gradual shift in grain size from coarser to finer (from the lower levels upward) can be distinguished by careful examination. This change can be explained by the stronger floods of earlier times. In addition, the rising surface of the Karamenderes plain, caused by alluvial sedimentation in the west, may have

Fig. 11 A gouge-auger sample from drillhole number 101. It is taken from 300–350 cm below present surface by percussion drilling. A sample is taken from a colluvial sediment unit which contains a high density of small grains of sherds, charcoal, and marine shells (remains of food). This unit covers a fairly wide area to the south of the Lower City.

affected the flow-power necessary for sediment transportation in the lower Çıplak valley. Marine shell fragments, which must be food-remains carried from habitation sites in the surrounding area, are sparsely distributed in the coarser sandy lower part.

Grain size is generally finer in the uppermost 3–4 m layer. Although sherds can be found scattered throughout this section, an especially distinctive archaeological layer along the foot of the southern slope of the Lower City of Troia is distinguishable (Figs. 8 and 11). It is about 1 m thick and occurs between 2 and 4 m below the surface. Its dark brown-gray mottled color is darker than the lower and higher sediment units and contains a sizable number of sherd grains generally smaller than 1 cm. The rounded-angular shape of the grains indicate transportation by surface waters. This layer must have been deposited in connection with a specific event which occurred at a habitation site on the upper part of the slope in the Lower City. This event could have been a massive conflagration or demolition. A great number of charcoal grains, only a few millimeters in size, suggest destruction by fire. The dark color of the layer is attributable to this mixture of various grains. Because of the small, eroded nature of the sherd grains, a date has not yet been established. Several larger, sparsely distributed sherds have been dated to the Hellenistic-Roman periods by archaeologists at Troia.

This particular layer is encountered first in drillhole number 101, between 3–4 m below the surface (Figs. 3 and 11). The same layer, however, was found 2–3 m deep in other drillholes to the north of drillhole 101. The distance between drillholes was reduced about 10 m in order to pinpoint the exact position of the layer. As a result, an interruption and a sharp change in level were revealed for this layer between drillholes 101 and 107.

A loose, coarse, sandy-gravelly sediment section just below the layer containing sherd grains was described as channel-fill from an old river here. Consequently, muddy floods coming from the Lower City, including a large number of sherd grains, spread over the foot of the northern slope to the river, where they were then transported to the west along the channel. The level of the mud layer to the south of the old channel is therefore about 1 m lower than the northern one (Fig. 8).

All of these sediment layers, which are distinguishable by their finer texture, contain a high density of sherd grains resting directly on top of a coarse, sandy alluvial sediment unit. Thus, it can be assumed that this area initially suffered frequent and severe floods which only gradually weakened during the Hellenistic-Roman periods of denser habitation.

In addition to the drillholes on the plain, four more drillholes were bored at the bases of the western edges of the Troia and Kalafatlı ridges to determine the connection between the lower Çıplak plain and the Karamenderes plain to the west (Fig. 3). These investigations revealed that the bedrock topography in both locations consists of narrow platforms about 3–4 m below the surface which then steeply descend. Similar platforms were found all along the feet of the slopes in this area. They are primarily associated with horizontal or low inclined layers of the Neogene bedrock and their geomorphological formation. A similar platform, found north of the Troia ridge, was covered by shallow marine and coastal sediments during the maximum extension of the sea in the Middle Holocene.[12] Near an adjacent slope, its terrestrial cover contains slope-washed habitation material such as sherds and burned debris.

A similar bedrock platform has been discovered several meters below the present surface along the southern foot of the slope of the Lower City. Various investigations undertaken in this area include drillhole and trench analyses, and geophysical prospection to examine bedrock topography, sediment cover, and land-use pattern.[13] The rather wide surface of the platform here was exposed in previous habitation periods. Colluvial sediments containing habitation material such as stone blocks, broken tiles, sherds, bones, etc., directly cover the surface. The density of this material in the colluvial sediments decreases toward the middle-lower part of the plain to the south.

In 1995, based on geophysical interpretations, some artificial cuts in the bedrock were found stretching longitudinally along the foot of the slope in an east-west direction. Dr. P. Jablonka proposed that the ditch was first dug in the Bronze Age, Troia VI.[14] During the Hellenistic period, the ditch was both widened and deepened. The fill of the deeper ditch contains mud deposited in calm water. It has no flow structure. Nevertheless, an undisturbed seasonal mud-crack structure is apparent. This ditch, then, cannot have been dug as a water canal. In the wider upper part of the ditch, some bands of mud containing a high density of small sherd grains, similar to those found near the lower plain, have been detected. The discovery of such sherd grains in both locations may indicate a connection between the two areas.

Since the surface at the foot of the slope to the south of the Lower City is under cultivation today, all coarse material has long since been ploughed and cleaned from this area. Thus, the soil on the surface exhibits a finer texture and a more homogenous structure.

Surfaces on both sides of the Kalafatlı azmağı to the west of the Kalafatlı ridge are covered by wind-blown loose sand (Figs. 2 and 12). This condition results from sandy river sediments in the lower Karamenderes plain being brought by the northerly winds which dominate this region. Evidence obtained from the new drillholes 115 and 116 show that the sand cover is about 1.5–2 m thick on the surface and covers finer sandy-silty flood plain sediments. Bedrock was reached at a depth of 360 cm in the deeper drillhole, number 116. A layer of muddy colluvium over the bedrock is about 1 m thick. Large stones and sherds in this section must be associated with a habitation site just behind the low inclined slope surface. The findings from the drillhole, however, were insufficient to date and archaeologically interpret this site.

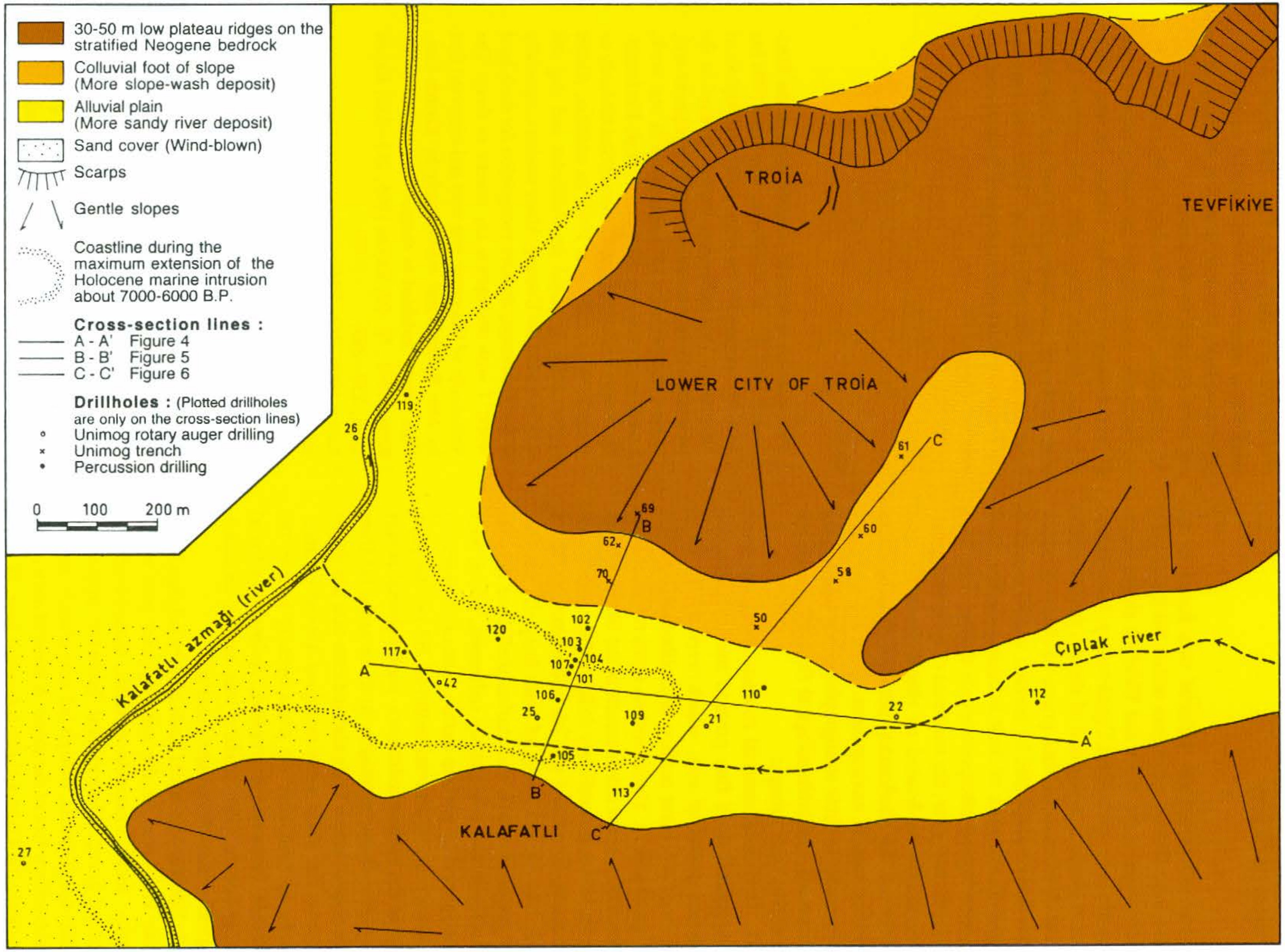

Fig. 12 Main geological and geomorphological units of the lower Çıplak valley between the Lower City of Troia and present-day Kalafatlı village, and coastline during the maximum extension of the Holocene marine intrusion about 7000–6000 BP.

Conclusions From an Archaeological Point of View

Some archaeological material was found in the alluvial-colluvial sediments which fill the depression between the Troia and Kalafatlı ridges forming the lower part of the Çıplak valley. Essentially, this material is composed of sherds, marine shells from food remains, and grains of charcoal which have been transported by surface waters mixed in mud. The number of finds is inadequate for either archaeological interpretation or dating. The finds suggest, however, the existence of several occupation sites once located on slopes throughout the plain and the relationship between their locations and the natural environment.

According to their stratigraphical positions in the sediments, the archaeological finds can be classified into four groups:

A1. The oldest material consists of a large stone surrounded by a fine grained mud, sherds, and burned grains of soil, which were found 13 m below the present surface in drillhole number 22 (Figs. 3 and 7). Their location dates the maximum extended marine environment in the Middle Holocene, which immediately follows the coastal environment, to around the 7th millennium B.C.

A2. The second group of finds basically consists of grains of sherds and marine shell food remains in alluvial-colluvial muddy sediments, which were transported by surface waters. Although generally common in all alluvial-colluvial fill on the plain above the marine sediments, such material is rare in some places, especially in those areas far from the slopes. These finds also indicate that the slopes around the plain were occupied almost continuously by man after the plain became land in the Middle Holocene regression, following alluvial progradation. This finding was neither archaeologically identifiable nor datable.

A3. The third group of finds clearly belongs to the Late Holocene. In the middle-lower part of the plain, these materials parallel those from the second group. They exhibit, however, archaeological stratification, though not very clearly, toward the northern foot of the slope. A layer of dark colored sandy mud is especially noticeable here, (Figs. 7 and 11) with a great number of small sherd and charcoal grains. They must be related to a fire or destruction in the Lower City. This layer is 1 m thick and is situated between 2 and 4 m below the present surface. It is interrupted at the edge by an old river channel to the south.

A4. Along the foot of the slope to the north, colluvial sediment covering the bedrock platform is full of archaeological material: stones, broken bricks and tiles, sherds, bones etc. The surface layer here, however, has been ploughed and cleaned of large material for cultivation. This area remains the focus of great archaeological interest and research today.

Notes

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2 Kayan 1991, 79–92; Kayan 1995, 211–235; Kayan 1996, 239–249.

3 Kayan 1996, 241–243.

4 Kraft – Kayan – Erol 1980, 779; Kraft – Kayan – Erol 1982, 26.

5 Kayan 1991, 90.

6 Kayan 1995, 211–235; Kayan 1996, 239–249.

7 Bilgin 1969, 128–135; Erol 1992, 157.

8 Kayan 1996, 241–243.

9 Kayan 1995, 221.

10 Kraft – Kayan – Erol 1980, 779.

11 Kayan 1991, 89; Kayan 1995, 230.

12 Kayan 1996, 246–247.

13 Becker – Fassbinder – Jansen 1993, 117–134; Becker – Jansen 1994, 105–114; Jablonka 1996, 65–96.

14 Jablonka 1996, 65–96.

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