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Höyük, Toumba and Mogila: a settlement form in Anatolia and the Balkans and its ecological determination 6500–5500 BC

by Eva ROSENSTOCK

Tells and flat sites: problems of interpretation and classification

Settlement mounds or tells are virtually the only known form of settlement site in the Near East, yet can be hardly found at all in Central Europe. Their occurrence in Anatolia and the Balkans has been the subject of increasing archaeological interest during the last decade. Following research by Childe, explanations for their presence there have included specific, shared ecological conditions and resulting material culture similarities among their occupants (e.g. Childe 1950, 41ff; Childe 1957, 84; Tringham 1971, 89; Treuil 1983, 272). Other theories emphasize settlement site as a kind of archaeological type that could be transferred like anything else in the Neolithic package, such as painted ceramics or bone ladles (e.g. Milojčić 1949, 16, 49; Childe 1950, 41ff; Tringham/Krstić 1990; Chapman 1997; Bailey 1999). This study investigates to what extent tell occupation is an "*accidental by-product of a sedentary community*" (Sherratt 1994, 172), with the aim of better understanding the rôle of socio-cultural factors.

Flat sites and tells coexist in Anatolia and the Balkans and it is characteristic of transitional landscapes like these that the standard archaeological definition of the tell, as derived from archaeology among the steep tells of Mesopotamia and Syria-Palestine:

"*…the superimposed remains of human settlements, repeatedly destroyed and rebuilt over periods of time which may in some cases amount to as much as nine thousand years*" (Lloyd 1963, 10)

does not do justice to rather inconspicuous sites like Hacılar or Anzabegovo. Nevertheless, local toponymy offers a variety of terms designating this shared anthropogenic landform. Originally derived from a Turkic root **üy-* "to heap up" (Clauson 1972, 270ff; Eyuboğlu 1988, 328), the Turkish word *höyük* in Anatolia, like arabic *tell* (Wright 1974, 123ff), applies exclusively to artificial settlement mounds like e.g. Çatal Hüyük. The Persian loan-word *tepe*, however, is used for tumuli, settlement mounds and natural hills alike (Ghoraschi 1992, 43), thus blurring the distinction between mounds like Yumuktepe and flat sites on hilltops such as Fikirtepe.

Toumba, as in Toumba Dramas or Veluška Tumba, is a traditional term for settlement mounds in Greece and Macedonia. Its etymological context, ancient Greek τύμβος "tumulus" (Gemoll 1997, 753) explains why it is used for sepulchral mounds as well. In place-names like Prochoma – and maybe even Homa Hüyük in Central Anatolia – we encounter another, less prominent ancient toponyme. A derivation of χόω "to heap up" is already found in Herodotus' description of the mound of Bubastis (Herodotus Historiae II, 138; Lloyd 1963, 14), and χῶμα was used to translate hebrew תל "tell" in the Septuagint (e.g. Jos. VIII, 28). Mounds like Kouphovouno still reflect βουνός, which derives from βύω "to swell", can denote any kind of hill (Gemoll 1997, 162, 165; Hofmann 1950, 38) and is often used in the Septuagint for artificial ones (e.g. Gen. XXXI, 46ff).

While some scholars claim a genuine Greek origin for μαγόυλα (Malingoudis 1981, 140), as it is found in, for example, Otzaki Magoula, a Slavonic origin from **mogyla*, denoting artificial hills as in Azmaška Mogila, seems more plausible (Vasmer 1955, 143f; Udolph 2001), especially since the term also appears in Romanian (e.g. Vădastră-Măgura Fetelor) and Hungarian (such as Vésztő-Mágor). While *domb* as in Kökénydomb is regarded as a genuine ugric word for all kinds of hills (Benkő et al. 1967, 658), Felsőhalom shows with Hungarian *halom* a loan-word from Slavonic "hill" occuring in Russian холом as well as in southeastern European settlement toponymes like Hum (Benkő et al. 1967, 37).

A sample of 367 settlements with known extent of accumulation from Anatolia and the Balkan[1] peninsula shows that according to folk toponymy[2], while a height of at least 1 m of debris is necessary to constitute a tell, most examples are more than 3 m high (Fig. 1a). The fact that there are numerous settlements well above 10 m in height that are not furnished with a tell-indicating toponyme could be explained by their location. In hilly terrain a mound is more likely to be overlooked than in a plain. This is supported by the observation that relatively low settlements of up to 2 m in height are only classified as a mound when their area is not more than around 1 ha. Thus it is the obtrusiveness of the monument that accounts for its classification in folk toponymy, rather than the depth of its deposit, which may be aspects only visible to the digging archaeologist.

Consequently, site classification according to the archaeological publications looks quite different (Fig. 1b), even though it must be kept in mind that many flat sites have, indeed, no accumulation at all and therefore do not appear in the diagrams. While the minimum tell height here is 0.8 m, every settlement over 3 m has been classified as a tell in at least one

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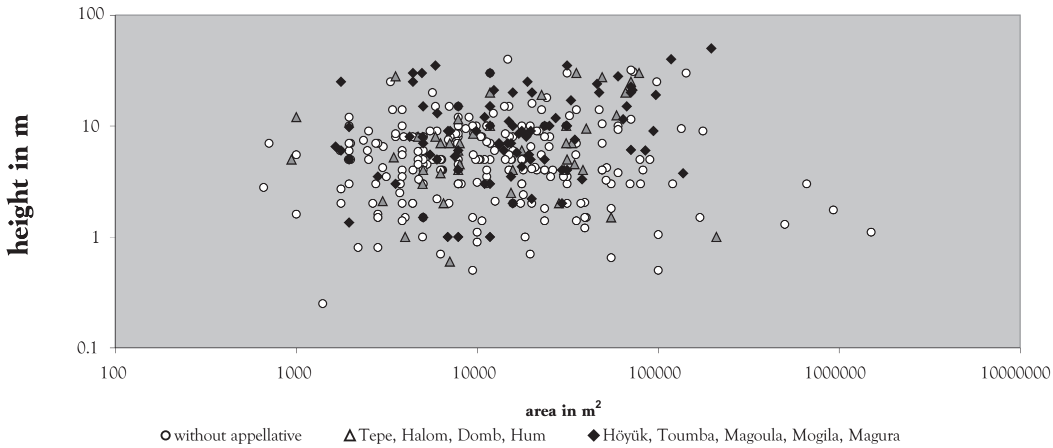
1 In this paper "Anatolia" is defined as the Turkish peninsula west of the İskenderun Körfezi and "Balkan" includes the modern territories of Hungary and Romania.

2 A cautionary remark about the possibility that in a number of instances the traditional appellative might have been added by the researching archaeologist must be placed here: Kotsakis 1999, 66.



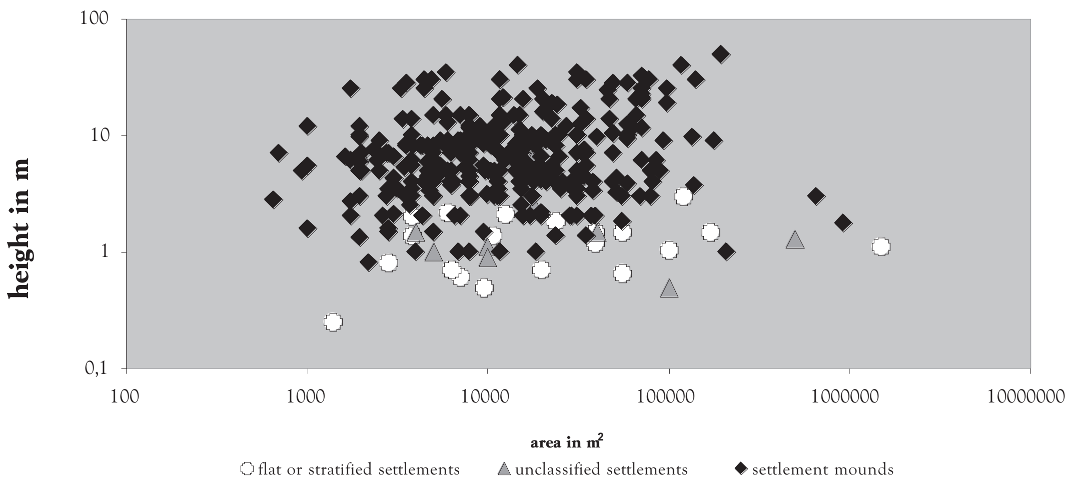


Fig. 1a Höyük, toumba and magoula as a class in folk toponymy (n=367)
While appellatives used for both artificial and natural hills (e.g. tepe or halom) and sites without an appellative in folk toponymy can be found with sites of all sizes and depths of deposit, distinct appellatives for tells (e.g. höyük or magoula) refer to settlements with a steep external aspect rather than with a thick deposit (data: Rosenstock in prep.).
Fig. 1b Settlement mounds as a class in archaeological terminology (n=367)
According to archaeological classification, ca. 1m of deposit is the minimum to qualify a settlement as a tell, and 3m are the maximum for flat settlements (data: Rosenstock in prep.).

publication, including a number of settlements falling for the most part within this span that are classified as both flat and tell settlements, sometimes even by the same authors. This grey zone reflects the minimal requirements for tell accumulations published by Todorova (1982, 1), Lichardus-Itten (1993, 102) and Mikov (1959, 88) and permitted Lichardus-Itten (1993, 102), among others, to claim a lack of Early Neolithic tells north of the Aegean core zone.

The tell character of Early Neolithic settlements forming the earliest occupation of commonly acknowledged mounds has also been denied. This was not only facilitated by the lack of substantial architecture at most of these sites (e.g. Sherratt 1983, 192; Parzinger 1993, 367), but also by the fact that the majority of these settlements shows a hiatus separating them from the rest of the tell matrix, whose build-up began not before ca. 5000 BC. While in Goljamo Delčevo the Criş occupation was sealed from the later phases by an alluvial layer (Todorova 1982, 80ff) that is likely to have created a new virgin surface for the next settlers, we can of course question if the Tisza people of Hódmezővásárhely-Kotacpart knew that the existing 0.75 m of Körös debris (Banner 1934; Kosse 1979, 129, 181) represented an abandoned settlement when they founded their tell. If the awareness of a settlement tradition, as has been proposed (e.g. Chapman 1991, 93; Bailey 1996, 303) was a criterion for settlement site selection, we ought to also get into discussions as to whether situations like the PN occupation on top of PPN Jericho are really to be regarded as a part of the tell (Kenyon 1981) or simply a hilltop site using the defensive qualities of a somewhat strange soft knoll in the landscape.

Consequently, and also as a result of the sparseness of flat sites, a sparseness which prompted their negative definition as "*höyükleşmemiş genellikle tek tabakalı yerleşmeler*" (Harmankaya et al. 1997, 25), archaeological practice in the Near East and Anatolia treats every settlement in a tell as part of it. The early Obeid occupation of Ur is separated by some meters of alluvium from the later accumulations and is still regarded as belonging to the tell (Woolley 1955). The fact that Hacılar was abandoned during the Early Neolithic after the Aceramic phase[3] did not prevent Mellaart from calling this early settlement part of the mound (Mellaart 1971), although an accumulation of 1.5 m is in, for example, chalcolithic Ağcıtepe, regarded as fine for a flat settlement (Harmankaya et al. 1998). After all, as Chapman (1997, 142) put it, every tell was, in its beginnings, a flat settlement.

Thus, folk classification together with Near Eastern and Balkan archaeology represent – with variations according to the respective archaeologist – stages in the abstraction of the tell concept. This abstraction follows a line from the simple obtrusiveness criterion via the external habitus of the monument, similar to the common archaeological practice of classifying grave forms in a system where tumuli are analogically opposed to flat graves (Eggert 2001, 67ff), to internal and often interpretative points such as building material, settlement structure or settlement continuity. To overcome these pitfalls we can choose either a pragmatic or an abstract approach. The former treats every settlement within a monument that has been classified as a settlement mound by either an archaeologist or folk toponymy as a tell settlement, thus creating a maximum estimate. Since this option permits samples from a variety of geographic regions with varied quality and intensity of investigation – including survey results, small sondages as well as well-dug places – it encourages a densely populated distribution map. The abstract approach, however, views flat sites and tells not as distinct classes, but as the well-defined extremes of an accumulation continuum. Since the settlements data about the extent of accumulation is available for only a fraction of we will use this approach for testing our results.

[3] See Duru 1989 for another dating of layers 7-1.

Settlement forms, architecture and ecological conditions

In the 2nd half of the 7th and 1st half of the 6th millennium BC, the Late Neolithic and Early Chalcolithic as well as the Ilıpınar X-V and Fikirtepe cultures[4] in Anatolia present a dense settlement pattern in the southern half of the peninsula, while the north is only sparsely settled. Only a few sites reach into the North Anatolian Mountains, which might at least partially be the result of certain chronological biases (Schoop 2002), but it is interesting to note that they are all flat sites. In the Balkan peninsula, the southern and eastern cultures, such as the Early Ceramic and the Sesklo sequence in Greece and Karanovo I and II in Bulgaria, are characterised by a high proportion of tell settlements. Interestingly, with the exception of Vashtëmi (Korkuti 1995, 41ff), no tells are observable in the Impresso-dominated west. A few tell sites first settled in the Balkan Early Neolithic-Monochrome, Starčevo, West Bulgarian Painted Pottery, Körös and Criş and related cultures stand out in the Northern Balkans. Irrespective of their interpretation as whether they belong to tells or not (s.a.), the area north of the Danube-Sava line at the beginning of the 6th millennium is in any case dominated by flat settlements.

Since these east-west and north-south inclinations are highly suggestive of ecological patterns prevailing today, we first have to assess the validity of modern data before we compare them with settlement patterns of the 7th and 6th millennia BC. This time span falls within the Holocene climatic optimum, when the average temperatures were up to 3°C warmer than those of today and precipitation rose by approx. 30-100 mm/a (Frenzel 1992; Flohn/ Fantechi 1984). However, as there is no detailed climatic information available, and as it is suspected that these changes were mostly proportional (Frenzel 1992, 134; but compare Bryson/ Bryson 1999), the method applied here is acceptable and has been successfully employed elsewhere (e.g. Sielmann 1971; Müller 1994). As soils are always under transformation, they can react very sensitively to changes in climate, vegetation and human impact (Limbrey 1975, 83). The influence of agriculture, however, mostly affects the plough horizon without changing the main characteristics of the soil type (Scheffer/Schachtschabel 1992, 437ff). Due to the fact that the forest cover of the lowland regions in particular has experienced severe deterioration since the 4th millennium (Willis 1994, 778ff), more extensive changes have to be expected in the Mediterranean soils zone as opposed to the brown soils zone of the mountains. As the main difference between these two soil types lies in the fact that the latter was prevented from complete maturisation by the effects of the last glaciation (Limbrey 1975, 204ff; Kuntze/Roeschmann/Schwerdtfeger 1994), it should be possible to rely on this very basic distinction. The steppe zones of the Balkans and Central Anatolia were only sparsely forested even at the beginning of the Holocene (Božilova/Filipova 1986; Woldring 2002).

Analyses of a map showing the distribution of the settlements in relation to soil types in the Balkans (Fig. 2) make it clear that there is a preference for Mediterranean soils such as terra rossa and terra fusca, which are characteristic of arid regimes. It should be noted that flat

[4] For a different dating of Fikirtepe see Nikolov 1993.

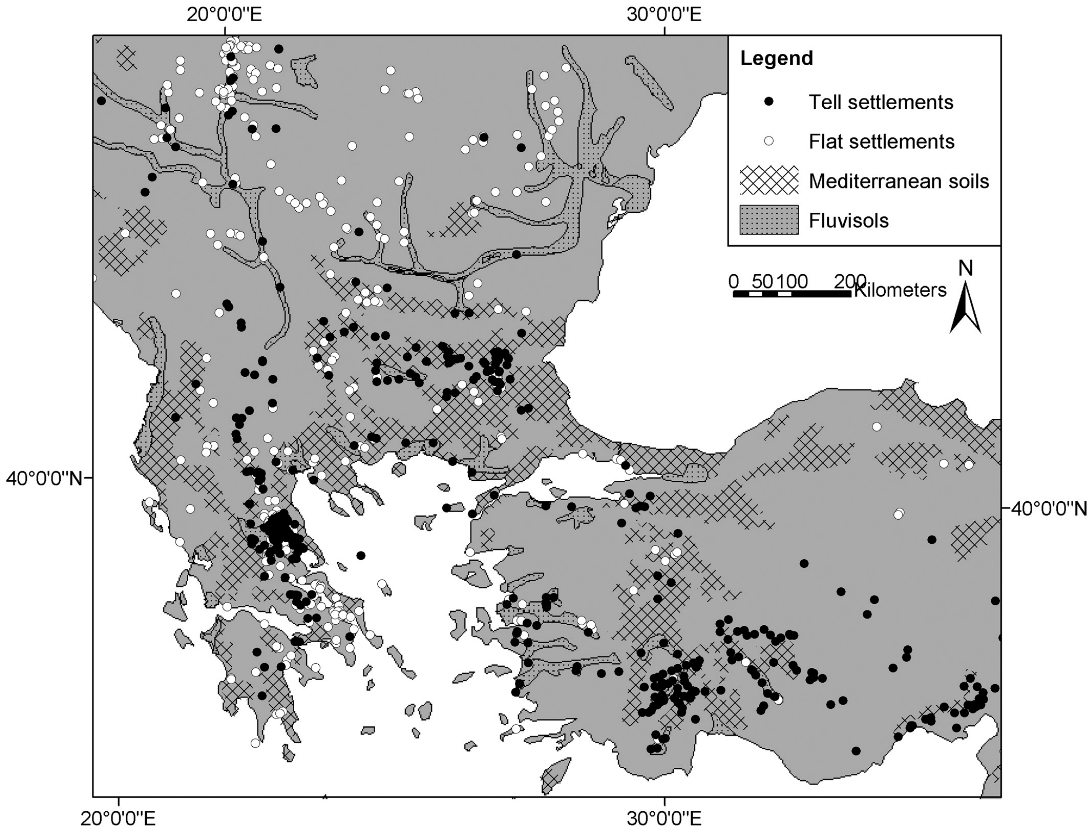


Fig. 2 Settlements and soil types
Tell settlements tend to cluster in areas with mediterranean soils, whereas flat sites show a wider distribution (data: FAO/UNESCO 1992; Rosenstock in prep.).

settlements do not avoid the other soils, mainly brown cambisols and luvisols typical of temperate regions and steppic phaeozems und chernozems (Scheffer/Schachtschabel 1992; Kuntze/ Roeschmann/Schwerdtfeger 1994; FAO/UNESCO 1971) as much as the tells seem to. The correlation with mean annual precipitation values (Fig. 3) is much more obvious: tells are rarely found in regions with more than 1000 mm/a, and they have a strong tendency to be located in areas with not more than 600 mm/a. Tells also tend to cluster in areas where the mean annual temperature is above 10°C, are hardly found between 5 and 10°C and never in areas with an annual mean temperature of less than 5°C (Fig. 4). Considered in isolation, neither of these two characteristics can be seen as very significant, but it is remarkable that most tells are either in regions with less than 600 mm/a of precipitation and an annual mean temperature of at least 5°C, or in regions where a maximum precipitation of 1000 mm/a meets temperatures that reach a minimum annual mean of 10°C. These regions fulfil or are close to Lang's criterion of a precipitation/temperature ratio of less than 60 for arid or semi-arid regions (Blüthgen/Weischet 1980, 604). There are a few exceptions

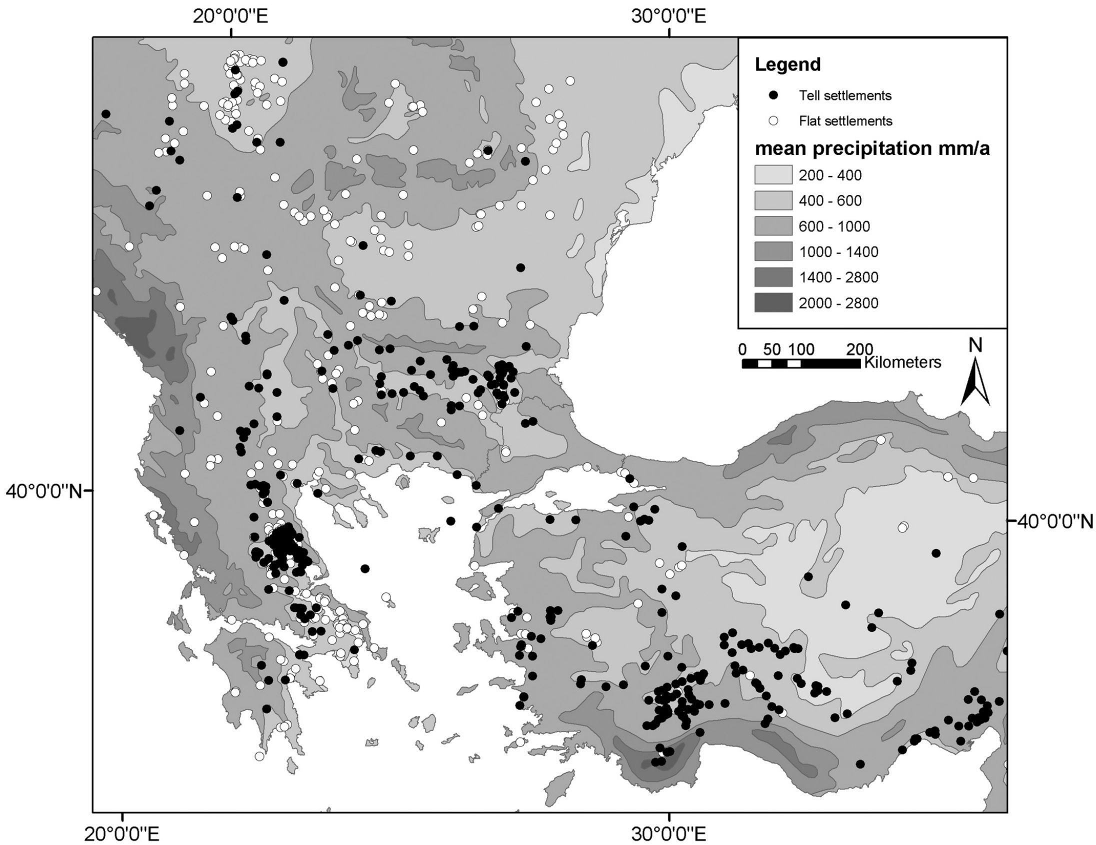


Fig. 3 Settlements and precipitation
Tells are usually found in regions with less than 600 mm precipitation per year and avoid areas with more than 1000 mm (data: Esri 1997; Rosenstock in prep.).

Since, besides a certain degree of refuse middening (Chapman 2000, 356), the main constituent of settlement debris is brought about by the inorganic remains of disintegrated houses (Davidson 1976; Miller Rosen 1986; Brochier 1994; Haită 1997) and thus layer buildup in a site is expected to correlate with the mud content of its architecture (Korfmann 1983, 221), we need to focus primarily on Anatolian and Balkan architecture in the 2nd half of the 7th and 1st half of the 6th millennium BC. Although it is extremely varied (Aurenche 1981; Treuil 1983; Lichter 1993), we can principally distinguish three types based on the extent to which mud is used in their construction. In some sites, such as Hacılar or Otzaki (Mellaart 1971; Milojčić/v. Zumbusch-Milojčić 1971), walls were made completely of mud brick, with or without rows of stone as a foundation. On occasion, for instance in Achilleion (Gimbutas et al. 1989), the walls were not built with dried bricks, but with wet mud slabs packed directly above one another to form the wall. Since these types do not require a supporting timber frame, we can subsume these massive mud houses under one single construction type. Stone foundations were recorded as mud architecture in this study because functionally they are often used to prevent splashing water from destructing the mud walls (Hölscher et al. 1948, 37).

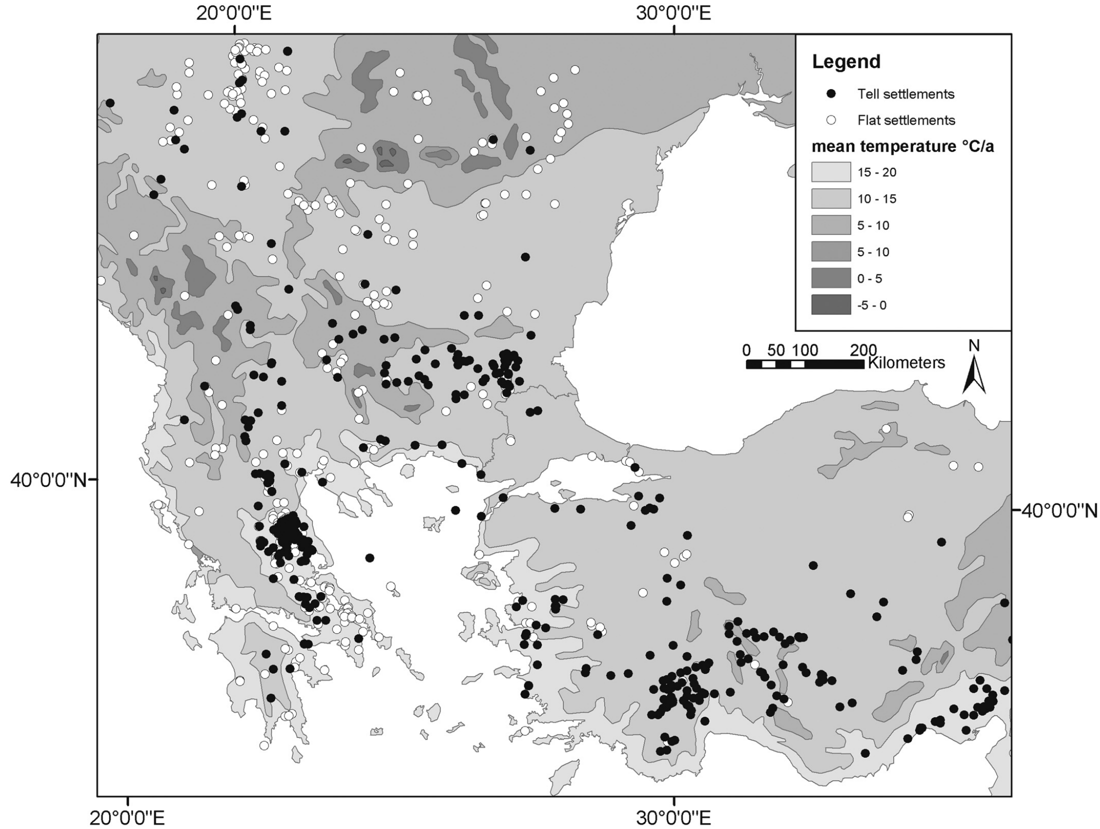


Fig. 4 Settlements and temperature
Tells cluster in areas with more than 10°C mean annual temperature and are never found in regions with less than 5°C (data: Esri 1999; Rosenstock in prep.)

Almost pure timber constructions, with posts and walls made from organic material like wattle or reed with only a thin mud daub, form the other extreme. They are encountered, for example, in Nea Nikomedeia (Pike/Yiouni 1996), Kolsh I (Korkuti 1995, 58ff) or Divostin (Bogdanović 1988). Although often also categorised as timber architecture, a type of house found in Bulgarian Thrace, such as at Karanovo (Hiller/Nikolov 1997) or Sofia-Slatina (Nikolov 1989), but also in the early phases of Ilıpınar (Roodenberg 1999, 195f.) should be treated as a separate category. There the diameter of the posts is often less than 10 cm, while the intervals between them are usually between 20 and 30 cm only – values that would rather justify them being classified as stakes. A thick mud plaster surrounds these stakes to form a wall of approx. 20-30 cm width, so that the mud content of the walls far exceeds the values a wattle-and-daub construction would reach. Unfortunately, information on wall construction and post diameters is often lacking in the publications, so that these specimens have to be classified as timber buildings: a certain bias placing combined timber/mud constructions at a disadvantage has to be kept in mind.

There is a very clear connection between annual precipitation and the building material used in the Early Neolithic settlements (Fig. 5): buildings containing considerable quantities

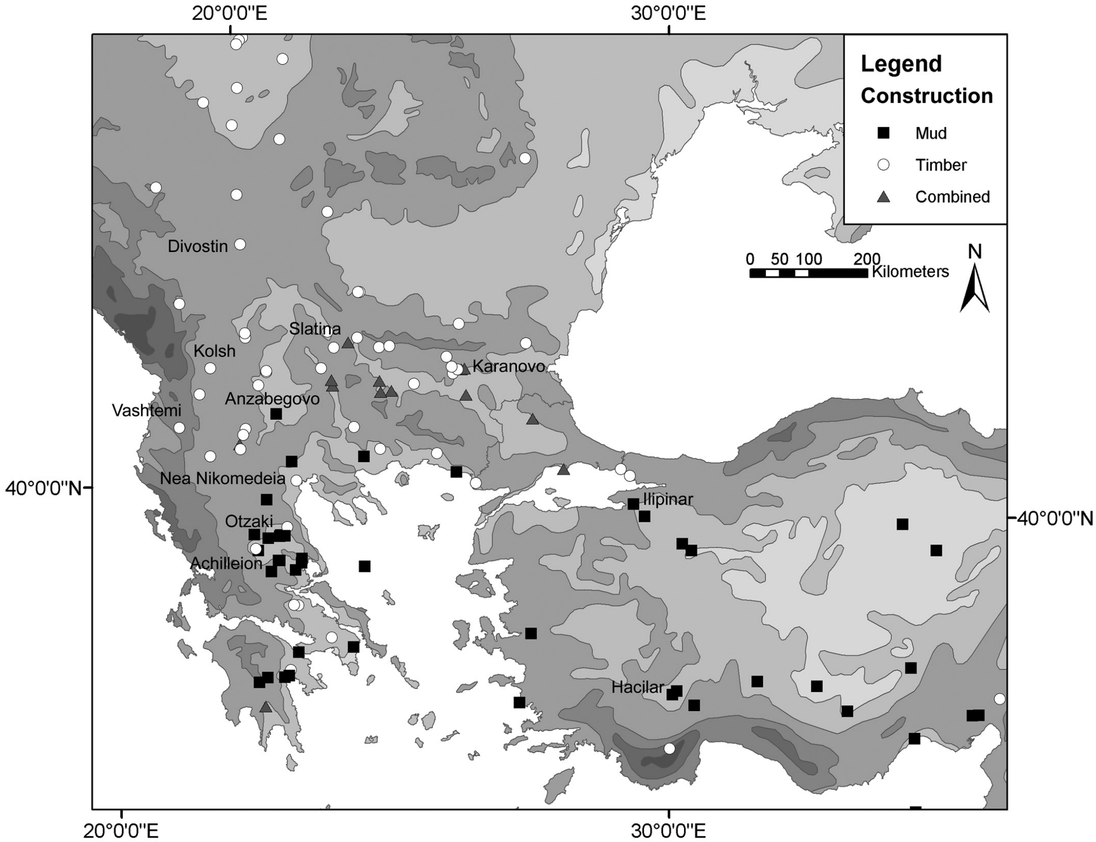


Fig. 5 Building material and precipitation and sites mentioned in the text
Mud architecture is not found in regions with more than 1000mm of mean annual precipitation
(legend: cf. Fig. 3. - data: Esri 1997; Rosenstock in prep.).

of mud are never found in regions above 1000 mm, and in the Balkans they only rarely cross the 600 mm-line. Pure timber buildings can be found everywhere, but represent the only construction type in considerably wet areas. Similarily, pure mud architecture is confined to areas with at least 10°C mean annual temperature (Fig. 6). In the Balkans, with the exception of Anzabegovo (Gimbutas 1976), it is even found in regions with at least 15°C/a only, while combined timber/mud buildings concentrate around 10°C mean annual temperature. It is interesting to note that the wider temperature range mud buildings display in Anatolia is obviously compensated for by the fact that most of these areas do not receive more than 600 mm of rain per year and that, for example, Sofia-Slatina, being in an area too wet and too cool for its architecture, is, after all, in an area dominated by chromic luvisols (Fig. 1).

The role of ecological conditions in tell formation

As tells are usually regarded as a sign of more permanent and intensive settlement activity than flat sites (e.g. Childe 1957, 85ff; Tringham 1971, 91; Sherratt 1983, 191; Chapman 1991, 84; Whittle 1996, 44ff, 79; Perlès 2001, 174 – but see also Bailey 1999), their predominance in the most arid regions of Southeastern Europe could be explained by the requirements of

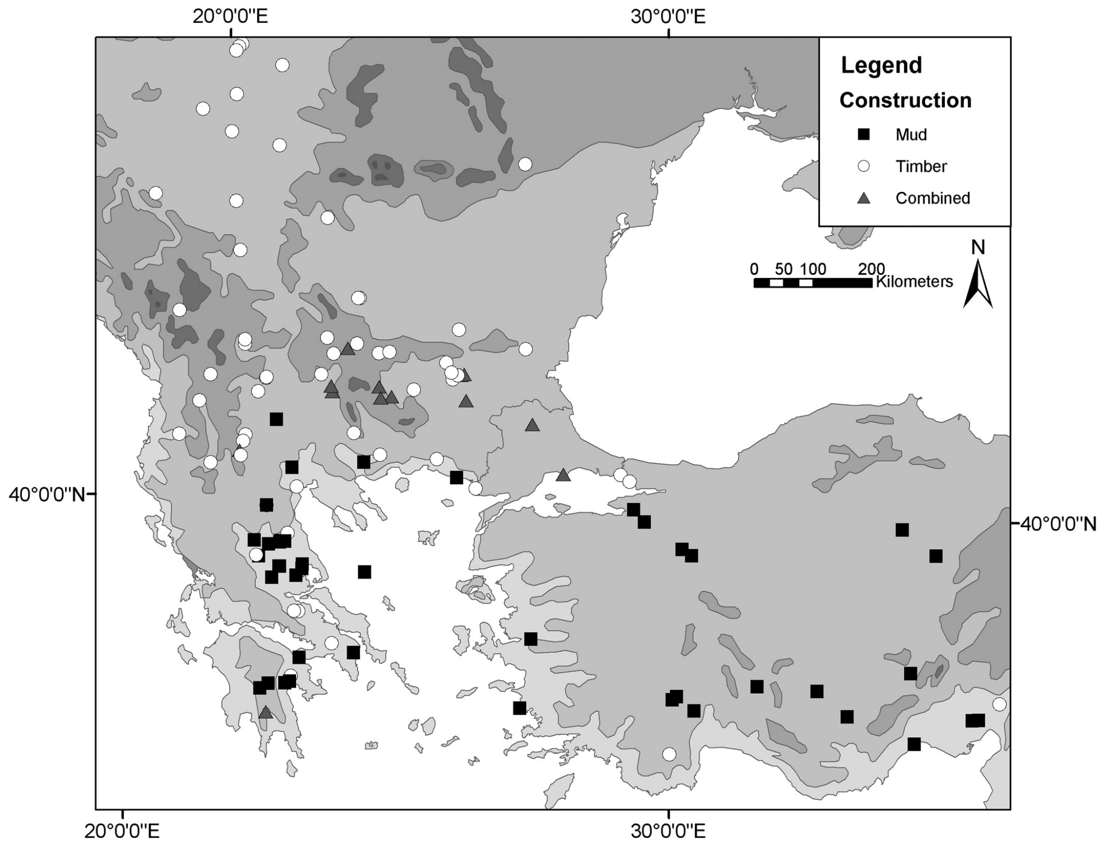


Fig. 6 Building material and temperature
Pure mud architecture is confined to areas with a mean annual temperature of more than 10°C (legend: cf. Fig. 4. - data: Esri 1999; Rosenstock in prep.).

the Near Eastern domesticates, with flat sites representing the adaptation to shifting agriculture thought to be necessary in more temperate climates (Childe 1957, 85ff; Perlès 2001, 118f.). However, this assumption is highly debatable, and as we saw in the preceding section, flat settlements and tells are not mutually exclusive features in their respective environments; rather, tell settlements seem to require more specific environmental factors than flat settlements do. It should also be noted that all settlements in our study area containing pure mud architecture are recorded as tells in the literature. Although the tells also form the majority of those sites that contained timber architecture, those sites not categorised as tells in the literature never made considerable use of mud in the construction of their houses. In 34 cases, information on the building materials and the respective depth of accumulation is available and proves a good correlation, although additional factors that can not be accounted for here, like the density of buildings in the settlement (Chapman 1991, 82f.) or roof construction, have to be kept in mind: while layers with up to 0.5 m usually contain timber framed architecture, accumulations of more than 2 m are dominated by pure mud architecture. The sample of combined mud-timber architecture being very small, we can only conclude that this type occupies an intermediate position (Fig. 7). Combining this picture and the correlations between the distribution of tell settlements and mud architecture with precipitation,

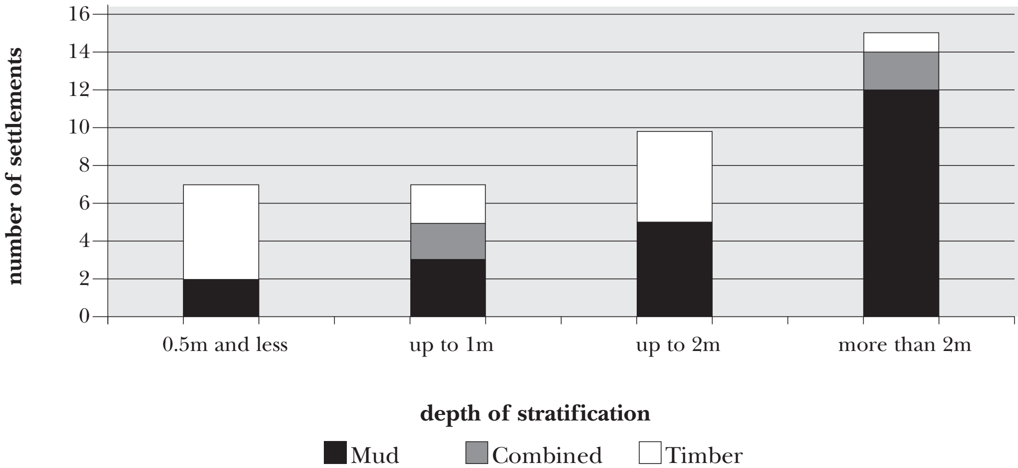


Fig. 7 Building material and layer accumulation (n=34)
While architecture with a low mud content is correlated with shallow settlement deposits, architecture with a high mud content usually occurs in deep deposits (data: Rosenstock in prep.).

temperature and aridity as well as terra rossa and terra fusca soils, it is possible to outline a scenario as to how ecological conditions favoured the development of tells in our study area.

Since a considerable amount of water is needed in the preparation of mud for construction (Hölscher et al. 1948), the presence of a perennial source, river or lake in close proximity is essential. Sherratt has already recognised a connection between tell distribution and floodplains (Fig. 2), although his interpretation pointed towards agriculture as the causal factor (Sherratt 1980). To construct houses from mud requires the absence of rain and frost in order to allow the material to dry. Arid regions where evaporation exceeds precipitation considerably facilitate this process. In addition, the amount of rain falling during the summer decreases significantly towards the south of our study area, and especially the east of the Balkans, which has fewer rainy days than the western coast. Except for the coasts most of the Balkans belongs to a variety of the moderate climate which is also present in Northern Anatolia (Furlan 1977, 297f; Blüthgen/Weischet 1980). Whereas mud bricks dry rather quickly, although this is only possible under very good conditions, the slow-drying mud slab and combined timber/mud constructions have the advantage that they can be easily protected from sudden rainfall by means of covers (Hölscher et al. 1948, 21). The fact that the latter construction types are more common in the northern end of our study area (Fig. 5) illustrates a possible connection between architecture and the reliability of a season of warm weather when damaging rain is not to be expected.

However, not only the construction processes, but also living comfort can determine the choice of building material. A temperature between 15 and 27°C, regarded as the comfort range for human beings (Hupfer/Kuttler 1998, 387; Volhard 1995, 151, 156), can be achieved by two climate-related strategies. In continental areas with a daily average temperature within

Material	ρ in kg/m³	λ in W/mK	S in kJ/m³K
Timber	600 - 800	0,13 - 0,21	1260 - 1670
Light loam	600 - 1700	0,17 - 0,73	700 - 1600
Heavy loam	1700 - 2100	0,73 - 1,13	1800 - 2000

Fig. 8 Physical characteristics of building materials
Timber provides good insulation with a low coefficient of thermal conductivity (λ), but cannot save much thermal energy due to its low thermal storage capacity (S). Depending on its content of organic temper as indicated by its density (ρ), loam provides good thermal mass at the expense of insulation (data: Volhard 1995; Rosenstock in prep.).

the comfort range but high amplitude between daily temperature maxima and minima far above and below it, heat attenuation is the suitable strategy. Where the average temperature is to any extent below this value, insulation helps to keep the warmth of the necessary fire inside the house. As Fig. 8 shows, organic building materials such as timber, wattle-and-daub or light loam with a high content of organic temper offer better insulation at the expense of attenuation, while heavier loams form bad insulators but good thermal mass. Since heavy loams are capable of supporting the roof weight, whereas light loams need an additional timber frame, this model offers an explanation for the correlation of pure mud, combined mud-timber and pure timber with temperature (Fig. 6).

This picture, however, is also modified by the availability of the necessary raw materials. In some instances early horizons of a tell settlement contain houses with a higher proportion of timber used in construction, while later the proportion of mud increases. In Ilıpınar X-VI (Roodenberg 1999, where a climatic reason is considered), Achilleion II/III to IV (Gimbutas/Winn/Shimabuku 1989) and Otzaki (Milojčić/v. Zumbusch-Milojčić 1971), for instance, we find that timber-framed architecture gives way to solid mud houses during the initial phases of the sites, whereas during the first horizons at Karanovo a decrease in the average stake diameter from approx. 13 cm to 9 cm is visible (Hiller/Nikolov 1997). Some explanations have pointed at the desire to express sedentariness or the "household" in more substantial houses (Tringham/Krstić 1990, 605ff). However, it should be kept in mind that, since settlement activity entails considerable clearance of forests for fields, fuel and construction, it could also be a result of exploitation of timber resources, an idea first advocated by Forrer (1927, 40). This seems particularly likely in dry areas (Perlès 2001, 118) with poor soils such as terra rossa and terra fusca. These soils, however, provide excellent loams that, due to their maturity and high content of iron oxides, maintain their volume under changing humidity conditions and are very suitable to avoid fissuring in house construction (Limbrey 1975, 204ff).

Ecological determinism, however, cannot account for all differences in human behaviour. Many tells arose from timber houses only, as in Vashtëmi, where about 1.5 m of debris accumulated from timber-framed wattle-and-daub houses during the Early Neolithic (Korkuti 1995, 41ff). The initial architecture in Achilleion was mud-slabs on stone foundations and was afterwards replaced for some time by timber constructions (Gimbutas et al. 1989). Does this provide evidence of newcomers who brought with them their own traditional building methods and after a time learned about the advantages of locally available building materials? The needs of domesticates, the geographical and climatic preferences of the people, and the ecological conditions determining certain types of architecture all have to be considered in the problem of how settlement mounds came into existence. Moreover, their inhabitants, who possibly expressed their habits and identities through architecture (Rapoport 1969) and even through the tells themselves (Chapman 1997, 152ff; Bailey 1999, 97), also contribute to this question to such an extent that one-sided explanations must fall short. Nevertheless, as this study has aimed to demonstrate, architecture determined by ecological factors played an integral rôle in their development that should not be underestimated.

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