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Size Matters!
Scale and Demography of the Deli Halil Settlement

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Abstract

Size is vital for identifying a settlement, along with layout and demography. If the power and wealth of a settlement depends on the extent of its territory and population, then size matters. A settlement is inhabited by a number of people who consume and produce artifacts in demand. To a degree, a settlement is also dependent on the production of its hinterland. It must be self-sustaining to the extent of having resources: water, and land for farming and grazing.

Three years of the Osmaniye archaeological survey recorded a Late Antique settlement on the slope of an inactive volcano. Deli Halil, named after the volcano, is an unfortified settlement that covers quite a large area close to the ancient city of Epiphaneia and its harbor, Burnaz. The present study aims to estimate the demography of the Deli Halil settlement, taking into consideration its structures and the size of the area. The significant number of residential structures and storage cellars of the Deli Halil settlement are expected to illuminate issues concerning its demography and identification.

Demographic estimation can enhance our understanding of the ancient settlement of Deli Halil. It is important to know the number of structures, size of the area covered and number of inhabitants to give us some grasp of the administrative, economic, social and political status of a settlement. The quality and density of structures and population provide an insight into the planning of a settlement, demonstrating its sociological and administrative organization. It is crucial to retrieve this information from archaeological documentation in order to understand the status of the Deli Halil settlement compared with other settlements of various sizes in its territory, in particular its relations with the region's metropolis, Epiphaneia. The present study is concerned with assessing the demography of the ancient

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settlement at Deli Halil with regard to its size and the number and density of its structures, to support further examination of the settlement. Area and population size are significant, as they are important parameters for defining the economic and social structure of its inhabitants, as well as its administrative status.

The ancient settlement of Deli Halil, situated on the south slope of a 460 m high volcano, is within the town of Toprakkale of the Osmaniye Province and has been documented by the Osmaniye Archaeological Survey (Fig. 1).[2] The geomorphological rises of the volcano, the Deli Halil basalt formation, begin at the coast, at the northeasternmost point of the Gulf of Issos, stretch eastwards to the first heights of the Amanus Mountains and delineate the southern border of East Plain Cilicia, separating it from the Issos Plain. The ancient settlement, at a height of 347 m, has a broad view of the Gulf of Issos, Burnaz, the harbor of the Epiphaneia on the southeast outskirts of the Deli Halil volcano, the southern entrance to the Kısık Pass and various other settlements of the Issos Plain.

An intensive archaeological survey of the ancient settlement included mapping of the volcanic land and the widespread remains of streets and structures of the settlement in three separate sections using geographic positioning systems. The layout of the settlement has been drawn in places where archaeological contexts remain intact, and all the rectangular and round structures of the settlement have been measured; *in situ* and scattered architectural elements have been recorded, as well as potsherds and various ornamented terracotta fragments. Archaeo-geological examination of the volcanic land and its vicinity was conducted to understand the impact of land type on the foundation and sustainability of the settlement.

The layout indicates a settlement built on terraces conforming to the topography in which streets intersect where the land is relatively level. Fortification walls and public structures are absent, other than a temple for worship. The settlement layout presents a premeditated plan laid out in one phase with structures that are similar in plan, building technique and function.

Rectangular structures are built with dry wall masonry technique without mortar, whereas round structures are built using mortar and their interiors are

2 The Deli Halil ancient settlement was first identified as such by the remains of its masonry, which presented a visible and recordable layout in 2008, by the Osmaniye Archaeological Survey Project, conducted by the present author. Preliminary reports of the Archaeological Survey of the site have been published in proceedings of the Survey Results Meeting of the Turkish Ministry of Tourism and Culture (see Tülek 2009; 2010; 2011; 2012). Archaeo-geological examination of the Deli Halil settlement has also been the subject of a project of the TÜBİTAK-SOBAG no. 109K025, which was completed in 2011. The ancient settlement of Deli Halil was mapped by cartographer H. Akan, and its drawings were accomplished by architect C. Sudaş. The present paper was prepared in the winter of 2013 with the support of the Library Research Grant given by the German Archaeology Institute to benefit library facilities of the Berlin Branch.

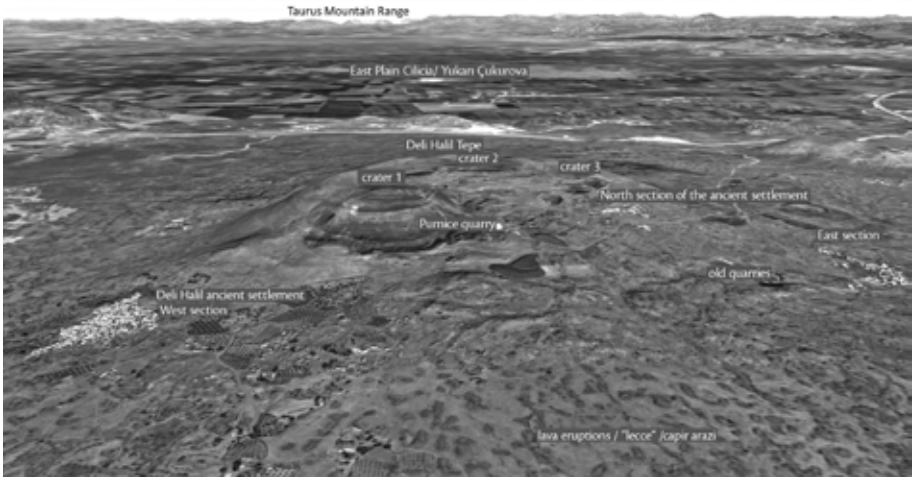


Fig. 1 Deli Halil volcano and landscape of the Ancient Settlement of Deli Halil.

covered with a thick layer of fine plaster demonstrating that the different building techniques were both known and their application was a deliberate choice. The construction material is uniformly black-brown basalt rock; both an amorphous-shaped very light type and very heavy column-type basalt have been used to build walls.

Founded on a basalt bedrock the settlement yields no former layers of culture to illuminate past foundations. The rough surface of the volcano comprises pyroclastic heaps of lava eruptions difficult to walk and live on. Dating of the settlement to the beginning of the fifth and the end of the sixth century CE is mainly based on pottery; ornamented terracotta fragments, pottery of common ware, fine ware, and transport amphorae are contemporaneous and uniformly belong to one phase. The absence of fortification walls is a feature of contemporaneous settlements in the region, such as Akören.[3]

Strategically located up on the volcano, the Deli Halil settlement controls the Burnaz harbor at the northeasternmost point of the Mediterranean Sea, watching over the main sea route and maritime trade, as well as the intersection of land routes which merge in the Issos Plain as the pilgrimage route heading to Jerusalem via Antioch. It also guards the route leading to Kısık Pass, the only access from the Issos Plain to the east Cilician Plain, taken by caravans heavily loaded with goods for the Cilician Plain.

3 Wulf-Rheidt 2003.



Fig. 2 Plan of the West Section of the Deli Halil settlement.

Ancient settlements are usually located where there is arable land, where fresh water for drinking, home use and irrigation is available and where main routes can be conveniently accessed. Fertile land for agricultural activities, farming, and grazing for animals is necessary for a food supply sufficient to sustain the population. Water

is vital not only for human consumption and home use, but also for husbandry and farming. Population sustainability can also be achieved to some extent by producing food and goods, either with local resources or those from other sites. A convenient location with easy access to the main land and sea routes is a must for a settlement to provide raw materials for production and trade surplus goods. The Amanus region was a very well-known supplier of both timber and olive oil in the Late Antique period.

Founded on basalt bedrock, the Deli Halil ancient settlement does not have a large enough area of fertile soil to cultivate and supply food for its inhabitants. The small olive groves of the present day indicate that in the past, olives could have been cultivated. Peasants can only pasture small herds, since there is not enough land for big flocks of livestock to graze. Rainwater runs over the surface of the basalt bedrock, enabling water to be collected in cisterns. The basalt bedrock varies in thickness from 200 m in the upper parts, to just 25 m at the outskirts.[4] Cracks in the bedrock only allow water to deposit beneath the layers, however, drilling a well requires modern technologies.

A site without any water source and with insufficient arable land, as is the case with the Deli Halil settlement, could be anticipated to be a temporary settlement or a settlement for a purpose. A collection of a considerable quantity and quality of potsherds in the archaeological survey testify to the livelihood of the settlement over a period of around two hundred years, from the beginning of the fifth to the end of the sixth centuries CE. Sherds of fine tableware almost uniformly belong to Red Slip Phocaean ware, while most of the amphorae fragments bear features of North African production of the Late Antique period. The well-planned layout indicates that the settlement was not founded *ad hoc*, and that the location of the site was chosen deliberately.

Remains of the settlement stretching from east to west on the south slope of the volcano survive in three clusters named the East, North, and West Sections (Fig. 2). The distance between the East and North Sections is only 300 m, whereas the distance between the North and West Sections is roughly ±1,000 m. The archaeological survey indicates a densely built settlement on a premeditated plan, in which rectangular structures are aligned side by side along intersecting streets or horizontal terraces accessed by ramparts. The plan of the settlement displays rectangular structures, as well as remarkable round structures that functioned as both cisterns and storage cellars (Fig. 3). The surviving walls of some of the buildings rise to a height of 1.5 m, enclosing the perfectly laid out rectangular structures of houses, each preceded by a courtyard with a cistern and storage cellar (Fig. 4, Fig. 5). It is a large settlement, with olive presses and mills, and the number of storage cellars exceeds the number of residences. Parts of ruins retaining

4 Yılmaz 2011.

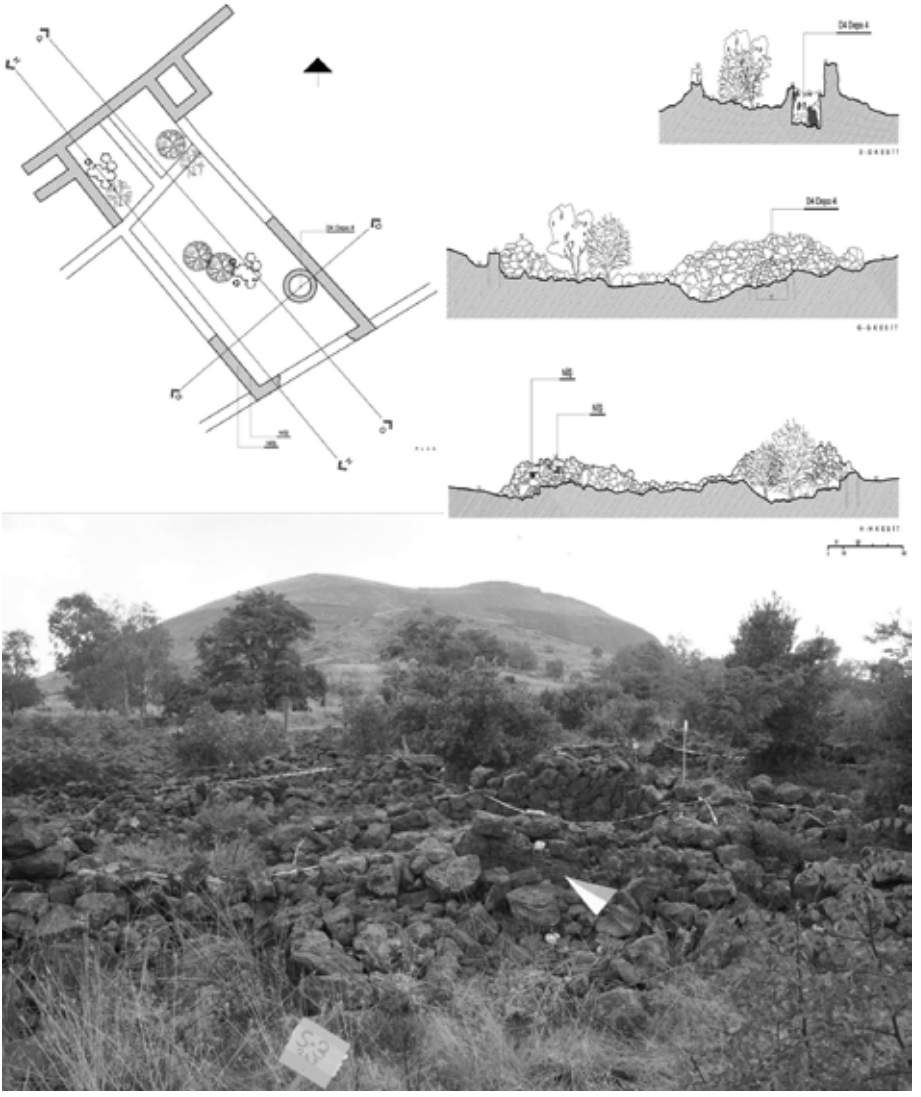


Fig. 3 Plan of House nr. 74 with storage cellar courtyard in the West Section of the Deli Halil Settlement.

their archaeological context intact and unspoiled have been documented in the archaeological survey. Archaeologically intact, preserved areas of ±2.36 ha have been measured in the North Section, ±10.36 ha in the East Section and ±13 ha in the West Section. It has been conjectured that the North and East sections were originally one body of the settlement, but today they are detached and heavily damaged due to the dirt track and gorges of the pumice quarries.

The West Section of the settlement yielded 96 rectangular structures and 115 round structures, housed in 19 insula, laid out on three terraces and 15 streets covering 13 ha, which is one third of the settlement proper. The total documented area of the North and East sections of the settlement is 40 ha, meaning that the ancient settlement was originally roughly 80 ha in size. Although the area covered by the Deli Halil ancient settlement is about one fifth that of its metropolis, Epiphaneia, it seems too large to be just an ordinary small village, a *kome*.

The fifth century CE was a period of economic boom in the Eastern Mediterranean and the Levant, as well as a time of prosperous village settlements in the Late Antique period. Archaeological studies of Late Antique settlement patterns of both North Syria and the Antioch periphery demonstrate an increase in the number of settlements and a population boom, parallel with economic improvement.[5] The increase in the number of settlements, as well as the population of the settlements, is evidenced in the villages of North Syria, the Lime Massif,[6] with populations varying from 1,000 to 5,000.[7] In Egypt in Late Antiquity, provincial metropolises were recorded as occupying 80 ha and housing 16,000 people, such as Shivta, which occupied an area of 90 ha, and Karanis, at 80 ha. A village in the countryside was estimated to house 2,000 to 2,500 people.[8]

Demographic examinations of Late Antique settlements—villages or fortified towns—in Asia Minor are still too few to determine methodologies to guide the present study or providing examples for analogy.[9] Studies demonstrate that a typical Anatolian village of the sixth century CE housed 250 to 700 people, and a big village would have 1,000 people.[10] A Late Antique settlement in the territory of Lampsacus in northwestern Anatolia, present-day Lapseki, with roughly 1,000 people, was considered a big village, *kome megale*.[11] Another sixth century CE village, Arif in Lycia, southwest Anatolia, situated at 800 m above sea level, was a fortified town measuring 100 x 250 m, covered two and a half hectares and was estimated to house some 800 people.[12] Mokissos in Central Anatolia, a sixth century CE fortified town of the emperor Justinianus, covered

5 Özgen and Gates 1992; Wilkinson *et al.* 2004; Lehmann *et al.* 2007; Ongoing Osmaniye Archaeological (2007-2013); Ongoing Archaeological Survey of the territory of Antioch by Pamir (2013).

6 Tate 1997, 74-75.

7 Laiou 2005, 38.

8 Morrison and Sodini 2002.

9 Harrison 1979; Wulf 2003; neither of the studies present a demographic examination.

10 Trombley 1985, 331.

11 Trombley 1985, 341.

12 Harrison 1979, 234.

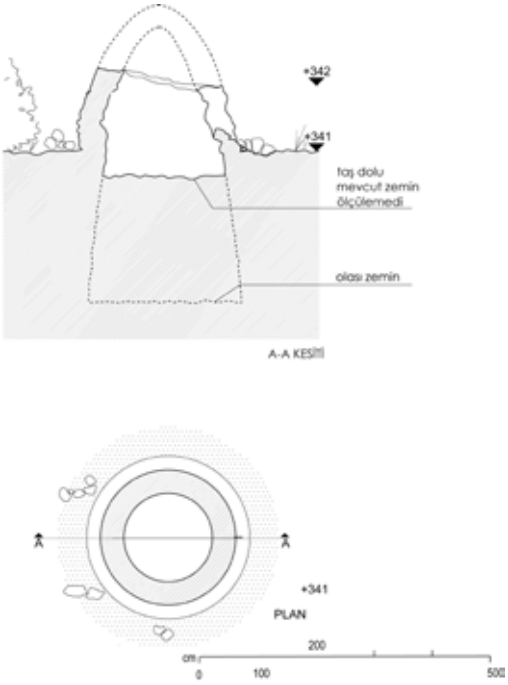


Fig. 4 Plan of the storage cellar nr. 1 in the East Section of the Deli Halil Settlement.

50 ha, and Justiniana Prima occupied around 10 ha.[13] Akören II in East Cilicia had 90 houses with roughly 700 people.[14]

Development of the countryside and the rural economy in the sixth century CE is also observed in settlements called *metrokomai*, which had no form of civic structures or public squares, but were densely built, with a population of 1,000 to 5,000.[15] Akören, an unfortified sixth century CE early Byzantine village in Cilicia in the Taurus mountain range, which is 100 km north of Adana at an altitude of 300 m similar to the Deli Halil settlement, covered an area of 300 x 150 m. The settlement of Akören yielded 90 residential structures, and archaeologists examining the site estimated 5-8 people per household and a population of 450-700 people.[16] Olive presses and millstones were recorded at the village, also similar to the Deli Halil settlement. Archaeological examination shows that the Deli Halil ancient settlement, covering around 80 ha on basalt bedrock, is also unfortified. Although the settlement covers a large area, its population may not have been very dense, considering that it is a rural settlement with no arable land.

13 Kirilov 2007, 14.

14 Wulf-Rheidt 2011, 198

15 Dagron 1979, 29.

16 Wulf-Rheidt 2003, 302.

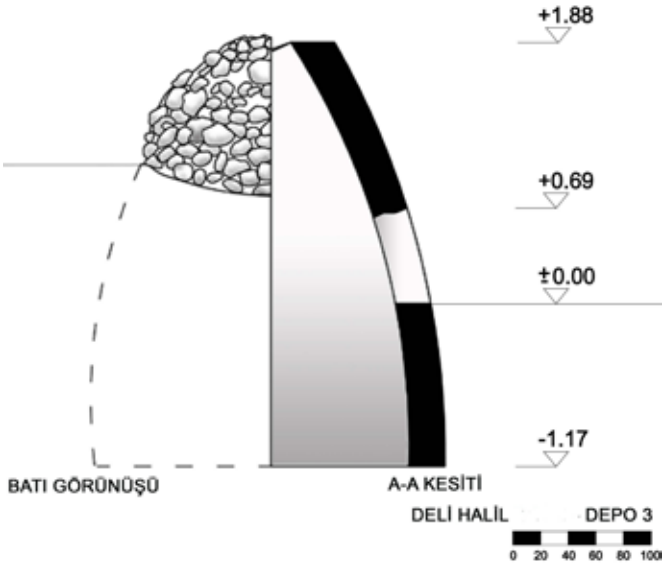


Fig. 5 Plan of the storage cellar nr. 3 in the North Section of the Deli Halil Settlement.

Demographic analysis of past populations is a topic of scholarship producing a plethora of publications.[17] The historiography of demographic studies primarily demonstrates an interest in the growth of past populations to present day values. In general, the scope of demographic studies is limited to examining the size, structure and development of human populations.[18] Scholars employ numerous methodologies to study the size of past populations, which results in the use of eclectic approaches.[19] Data available for the size of past populations is inadequate, since it is not intended for demographic purposes. For example, in the demographic estimations of Classical Period settlements, the contribution of each settlement to the Delian League is used as data that is reliable enough to calculate the population size of the participating cities.[20] In the Roman Imperial period, the first census was taken at the time of Emperor Augustus, recording people for tax collection. Data provided from such censuses are used in present day studies to estimate the demography of the Roman settlements. Similarly, records of the church synods provide insight into the size and strength of towns, since they had a hierarchical structure based on the size of the population. Accounts of the conversion of pagans to Christianity provide an estimation of the size of the Early Christian population.[21]

17 Among many studies, those of Russel 1958; Naroll 1962; Hansen 2008 and Zorn 1994 have been of benefit to this study.

18 Scheidel 2001, 1.

19 Russel 1958.

20 Hansen 2008, 280.

21 Trombley 1985, 330

However, all of these records either omit women, children, the elderly and slaves, or they record men and women as citizens but exclude the rest, since they were created for specific purposes.

In addition, scholars of historical demography and archaeologists try to make use of other forms of data, such as skeletal remains recovered at ancient sites, to estimate the size and demographic characteristics of that settlement. Present day ethnographic data also provide an analogy and an understanding of sites that retain environmental and economic conditions, as well as lifestyles that are comparable to past settlements. Thus, ethno-archaeology is frequently consulted in demographic estimates of ancient settlements.[22] Analysis of food consumption based on remains and residue that is indicative of rates of consumption is another method used by archaeologists. The space occupied by inhabitants and the number of people per household are also taken as reasonable and reliable parameters in calculating the number of people living in an ancient settlement.[23] In all of these approaches, ethnography provides supporting data for analogy, particularly when there is no evidence of a constant number of persons in one ancient household. Macro- and micro-level approaches are employed in demographic studies: the first for regional population estimations and settlement patterns, while the second is a site-specific approach more concerned with the socio-economics of a particular settlement.[24]

The micro-level approach, which is a site-specific level of estimation, should be appropriate for demographic estimation of the Deli Halil settlement, since the major concern is to identify the nature of its livelihood and the reasons for its establishment at the given location. Methods applied in the micro-level approach for estimating the demography of a site include area estimation, dwelling-based estimates and availability of natural resources.

The 'area estimation' method takes a density coefficient for an area of 1 ha and calculates the number of people according to the size of the settlement. However, in area estimation, the method of calculating the amount of floor space occupied by an individual has been elaborated further by calculating the amount of roofed space required per person in a house.[25] With regard to dwellings and households, an additional method has also been employed in estimating the number of persons that constitute a family. Estimating the number of family members in a household draws directly on ethno-archaeology, particularly where the structure of family and society has changed little.

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22 Wulf 2003, 302. Wulf estimated the demography of Akören relying on ethno-archaeological data.

23 Zorn 1994, 32

24 Zorn 1994, 31.

25 A method developed by Naroll (1962) and later improved by Le Blanc (1971).

'Dwelling based estimation' of demography has mostly been applied at settlements where partial archaeological excavations yield one third or one tenth of the entire settlement. The number of residential structures in an excavated area of a certain size is taken as the criterion for estimating the total number of houses in the settlement.[26] The shortcoming of this method is that the residential structures may not be found in the same density and scale all across the settlement, as is the case at the Deli Halil settlement.

'Natural resource estimation' considers the capacity of farming and grazing land, as well as the availability and capacity of water sources. Natural resource estimation requires knowing the climatic conditions and annual rainfall of the area in the past, based on the present day.[27] The number and capacity of cisterns and grain stores at the Deli Halil settlement immensely facilitate the estimation of demography.

Studies taking the 'density coefficient method' as an approach either use the estimated number of people living in a certain unit of area or the number of houses at a site as a coefficient of the number of people living in a household. The approach that takes the constant of the number of people constituting a household can be adopted in estimating the population of the Deli Halil settlement.

The Deli Halil archaeological survey results give us the number of houses in one third of the area of the West Section. However, the constant of the number of people living in a household must be estimated. Studies have used different numbers for estimating household size, depending on the variable of city or rural life.[28] For the estimation of pre-modern Middle Eastern populations, the constant of 4-5.5 for a household has been taken.[29] Regarding the eastern Cilician Plain, particularly inhabitants of the modern Erzin Plain, the geographical setting of the Deli Halil settlement, a number of 5.5 people living in a household should be a valid and relevant constant.[30] The constant of 5.5 applied to the 96 houses of the West Section of the ancient settlement of Deli Halil gives 528 people, being only one third of the population; thus in total we can estimate 1,584 people living in the West Section of the settlement.

'Area estimation' can be also employed when calculating living space with regard to how many people live in 1 ha.[31] In case of the Deli Halil settlement, the

26 Zorn 1994, 33.

27 Zorn 1994, 32.

28 Russel 1958.

29 Hansen 2008, 280.

30 The author is a native of the town of Erzin town.

31 Shiloh 1980, 25; Figures provided by Finkelstein contradict the results of Shiloh (Finkelstein 1990, 50).

above approach of taking the number of households can be pursued further. If 528 people lived in 13 ha of the Deli Halil settlement, then there were 48 inhabitants in 1 ha. Indeed, the density coefficient figure of 48 inhabitants in 1 ha matches the calculations of Broshi.[32] A constant density coefficient of 48 is in line with the figure that has been calculated, and found mostly reasonable, as the basis of population data in Middle Eastern cities.[33] The West Section of the Deli Halil settlement has been measured to be around 40 ha, meaning that 1,920 people lived in this part of the settlement.

As part of area estimation, an approach taking into account the roofed and unroofed living space required per person in a dwelling was first proposed by Naroll and was developed by others.[34] The archaeological survey recording the settlement elaborated on the plans of its units; thus data of roofed and unroofed space is available. Naroll took a coefficient of 10 m^2 living space required per person in the roofed area of a house.

For demographic estimation of the Deli Halil settlement, the adoption of coefficients taken for ancient settlements of neighboring regions and culturally close societies should be effective. The coefficient of 5.31 m^2 of living space required per person in a roofed area taken for the ancient city of Nippur sounds reasonable.[35] Roofed living spaces calculated in all 96 houses of the Deli Halil ancient settlement measure around 4,800 m^2, and dividing this by 10 m^2 living space per person would give a figure of 480 people as one third of the population; that is to say, a total of 1,440 people living in the West Section of the Deli Halil ancient settlement. However, as conjectured by the traditional way of life in the region, it seems appropriate to take a constant of 5.31 m^2 to calculate the required roofed living space per person. This gives us 903 people in one third of the West Section, and a total of 2,700 inhabitants living in the West Section of the settlement.

As for the consumption of natural resources, the West Section of the Deli Halil settlement yielded 109 round structures built in the ground and six round structures, cylindrical in shape, built above the ground. The round structures built in the ground have vaulted tops, whose surface is either flat or corbelled, but always with an opening at the top covered by a stone lid. The openings of the round structures built into the ground are either rectangular or circular in shape. Some of these circular openings have a nicely burnished stone bracelet, reminiscent of the wellheads common in traditional Anatolian vernacular rural housing. The round structures of the Deli Halil settlement are roughly the same size and

32 Broshi 1975, 6.

33 Shiloh 1980, 26.

34 Naroll 1962; Le Blanc 1971.

35 Stone 1981.

shape: cylindrical, bottle- or pear-shaped. They generally measure 3 to 3.5 m in diameter and 5 m in height. All the interiors are thickly and very well plastered. While the general masonry in the settlement uses the dry wall technique, these round structures are built with a strong mortar including grains of pumice, lime and terracotta, evenly plastered at 2.5 cm thickness. Each house contained one round structure built in the ground in its courtyard. Some of the round structures are clustered on terraces, and they are numerous around the oil presses. Some of the round structures are thought to be cisterns, since there is no natural water source. Evidently some of the round structures, even those built in the ground, may be storage cellars for storing goods.

109 round structures built in the ground have been recorded in the archaeologically examined one third of the West Section of the Deli Halil settlement. The measurements given above show that one round structure has a capacity of roughly 19 m^3. A standard coefficient for the water consumption required by an adult in a Mediterranean country is taken as 9 liters per day.[36] Considering average precipitation in the area falls over six months, water storage capacity for six months or 183 days should be 1,647 l per person. In the above demography calculations, if we take a population of 528 and multiply it by 1,647 liters, dividing this figure by 19 m^3 results in the need for 45 cisterns for the given number of people for six months. The highest number produced above in one of the demographic estimations can be taken as a parameter for calculating the number of water reservoirs required at the settlement: that is, 903 people need 1,487,241 l of water, meaning 77 cisterns. Regardless of whether the number of cisterns required is 45 or 77, the number of round structures exceeds the required amount, meaning that either 64 or 32 are storage cellars.

In sum, the Deli Halil settlement has a surplus number of cisterns to store water for its population for six months. A figure of 528 people sounds reasonable for the population of one third of the West Section of the Deli Halil settlement. The nature of the surplus round structures can be pursued by further examination of food consumption of other sorts: for example, grain supply.

The daily nutrition of the Deli Halil people definitely consisted of grain, olives and olive oil, evident in the excessive quantity of dolia fragments found at the site, as well as garum and probably North African wine, evidenced by spatheia and amphorae fragments.[37] Studies concerning food consumption in modern rural areas of Anatolia and the Near East in general take a constant of 140 kg grain consumption per person per year.[38] In this case, 528 people would need 73,920 kg grain per year

36 Zorn 1994, 42.

37 Tülek 2012, 374.

38 Zorn 1994, 43.

at the Deli Halil settlement. Since the Deli Halil settlement does not have arable land, the grain must have been brought from somewhere else, probably from inland of the eastern Cilician Plain, namely the chora of the ancient city of Hireapolis Castabala, and kept in storage. Four round storage cellars would suffice to store a year's supply of grain for 528 people in the Deli Halil settlement. This leaves 60 round storage cellars to store around 115 tons of olive oil, or 28 round structures built in the ground with a capacity of around 54 tons of olive oil. Olive oil was a major daily necessity of Roman society; it was not only consumed as food, but also used in oil lamps for illumination, and even used as medicine.

The amount of olive oil presumably kept in the round storage containers is still more than enough for the annual consumption of a population of which one third is roughly calculated to be 528 inhabitants. Annual per capita consumption of olive oil in a Mediterranean culinary society can be estimated at 10 kg; taking into account other forms of use, such as the Romans made, of oil triples this number, to a rough total consumption of 15 tons of olive oil a year. Still, a huge storage capacity is left, possibly for olive oil, if not also for grains.

Examination of potsherds collected at the settlement yielded an excessive number of fragments of fine tableware and amphorae that could only have been acquired via maritime trade from Phocaea and North Africa. The people of the Deli Halil settlement seem not only to have produced olive oil in their own mills, they may also have traded it via the Mediterranean. Most probably they acted as merchants, collecting olive oil and grain from both the hinterland of Epiphaneia and eastern Plain Cilicia, through Burnaz, the harbor of Epiphaneia. A cobbled Roman road stretching from the coast and heading 3 km in the direction of the Deli Halil Basalts is solid evidence of direct contact between its inhabitants and the harbor.[39] Although there is no evidence of the role they played in trading the grain of the eastern Cilician Plain and the lumber of the Amanus Mountains, the settlers of Deli Halil may have well dealt in all the goods and raw materials of the region and controlled the trade.

39 Özgen and Gates 1992, 390.

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