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Thesis title:

Food and Fodder from the Early Bronze Age I Village at Arslantepe (Malatya, Turkey): an Archaeobotanical Approach.

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Contents

Abstract

The eastern Anatolian site of Arslantepe has a very long sequence of occupation with the evidence of an early centralized society with socio-economic elites in the Late Chalcolithic 5 (3400-3100 cal. BCE). It is followed by a phase, in the Early Bronze Age Ib (3000-2800), where manifestations of centralized social structure have not been evidenced so far. At this time, named Arslantepe period VI B2, the site is occupied by local farming communities who lived in the area before, with some influence coming from Transcaucasia. The reconstruction of socio-economic development, with need for further investigation, is being here addressed through an archaeobotanical approach. The village's life was ended by a severe fire which preserved a vast amount of carpological material, i.e. seeds and fruits which are being analyzed in the present work. By addressing the archaeological contexts the material was recovered from, and artifacts it was related to, functions of the rooms and cereal-based diet are being discussed. By comparing the data with the previous periods of occupation at the site, agricultural activities, like growing of the crops and foddering of animals, are further discussed, and in that way further tackling the economy of Early Bronze Age societies of the Near East.

1. ARCHAEOBOTANY

Archaeobotany, also referred to as paleoethnobotany, is the analysis of fossilized plant remains that were once used by humans, or are in any way connected to past human populations. It is *"the study of the remains of plants cultivated or utilized by man in ancient times, which have survived in archaeological context"* (Renfrew 1973:1). The main aims are to get a better understanding of the diets and the usage of plants as building or clothing material, the reconstruction of past environments, the development of agriculture and the evolution of interactions between humans and plants. Being a sub-field of both archaeology and botany, archaeobotany is a highly interdisciplinary and complex domain. Since the research materials need to be recovered from archaeological contexts a lot of careful methodological procedures, such as awareness of the state of the fossilized remains, are required on site. On the other hand, the material being studied in the laboratory is best approached by a trained specialist, since the knowledge of the morphological traits of macroremains, as well as microremains, is necessary for the successful identification, and the knowledge of ecology of different plant species is crucial for interpreting their presence in the contexts connected to humans. Afterwards, a person not introduced to past cultures and the development of interaction of humans with plants could not be able to give a complete and comprehensive interpretation of the acquired data. It is clear how important it is either for specialists to be trained in both fields, or for botanists and archaeologists to work together.

1.1. History of the discipline

The fossil plants in archaeological sites did not receive the proper attention straightaway due to their usually small size and a limited probability of being preserved, unlike other artificial finds, like pottery or metal objects, or biological ones like bones. Besides, it was not immediately obvious that through their analysis important questions about past human activities could be elucidated. The first interest in the study of archaeological plant remains started in the 1820s when the German botanist Charles Kunth collected and studied desiccated plants from Egyptian tombs. Later, in 1866 the Swiss geologist Osvald Heer analyzed waterlogged material from lakeside settlements. Very rich assemblage helped him discuss cultural relations, seasonality in land use and differences in old and modern plants. For this he is often referred to as the father of Paleoethnobotany. In the late nineteenth and the first half od the twentieth century such studies continued, and the interest in archaeobotany spread throughout Europe and the Mediterranean basin, but also across the Atlantic (Renfrew 1973, Pearsall 2000). Despite the first studies on Peruvian mummies, botany did not have influence in archaeological studies of the New World up until the 1930s when analyses of desiccated material from rock shelter sites carried out by Volney Jones helped the interest in archaeobotany to grow (Watson 1997). At this time it also began clear that pollen analyses could contribute to archaeological studies. In 1950s and 1960s much of the work was concentrated on the area of the Near East where archaeobotany started being recognized for answering many main questions concerning the development of agriculture and the rise of complex societies. Mainly with the development of the flotation technique for recovering fossil plants, a considerable increase in the number and quality of archaeobotanical studies came. From this point, botanical samples stopped being collected only from extremely dry or waterlogged sites, but also from a great diversity of sites with different preserving conditions (Pearsall 2000). Later on, in the 1990s when flotation and the basic recovery of the macroremains became a common practice, new chemical and physical methods were being introduced and archaeobotany got another big swing. Since then, besides pollen analysis, other groups of microremains are being taken into account, such as phytoliths, starch grains, diatoms and more recently ancient plant DNA (Hastorf, Archer 2007).

1.2. Analytical approach

The archaeobotanical research follows the same steps conducted for analysis of any other archaeological material. First the material needs to be recovered in the field, and then taken to the laboratory to be analyzed and after the data needs to be interpreted. The main division in the type of the material is made based on the size of the remains. Therefore, the macroremains are the fossilized plant parts visible by the naked eye, usually bigger than 0.2 mm, and the microremains are the plant parts visible only by the use of a microscope, usually smaller then 0.2 mm. In the macroremains we expect to find wood, seeds, fruits and more rarely flowers, leaves and fibers, while in the microremains we classify pollen, phytoliths, microcharcoal, diatoms, or biomolecules like starch grains and DNA. Different preservation conditions request a different approach in the recovery of plant material. The modalities of preservation will be explained in more detail in the next chapter. Anyhow, flotation is the basic procedure to recover macroremains in the field where the soil samples are gently being dissolved in water and the light fraction remains are expected to float which makes them easy to collect. The heavier parts (heavy fraction) will sink to the bottom and then wet sieved on a 2 mm mesh. The samples are let to dry slowly and when dry they are packed into bags with all the information connected to the archaeological context. For collecting microremain samples special equipment, like a core or grab sampler, is needed and the samples are usually taken from every archeological or geological layer. Off-site sampling for microremains is also done, usually by taking up to several meter long cores from adequate soil (Pearsall 2000). When taken to the lab a specialist will observe the macroremains with the naked eye or under a stereomicroscope. For the observation of microremains light or scanning electron microscope is used. Using reliable literature and a comparative reference collection, specialists observe the morphological and anatomical features in order to identify the remains. Apart from mere identification studies, DNA analysis and the study of carbon and nitrogen stable isotopes in fossil plants are a commonplace nowadays. Another important archaeobotanical approach is dendrochronology, a method used for dating with the help of tree-growth rings (Hastorf, Archer 2007). When data is compiled, the proper interpretation taking into account context of the samples is essential for answering related questions. The main topics encompassed by archaeobotanical studies are the past human diets, the building techniques and artifact production, the seasonality in the site occupation, the reconstruction of the past environments, dating; which further elucidate subjects concerning interactions of humans with the environment, economic and ritual habits, and social and political structures (Jacomet 2013, David et al. 2016).

1.3. Fossilization mechanisms

The understanding of the mechanisms that enabled the fossils to be preserved is of great importance for accurate and complete interpretation of the data. Preservation of biological remains is highly dependent on burial processes (the speed and energy of deposition) and postdepositional conditions (the pH, humidity and coarseness of the sediment) and presence/absence of light and microorganisms that could feed on the remains, but also the presence of conserving substances such as resins, silica or calcium carbonate (Pearsall 2000). There are several modalities of fossilization, which occur in specific natural and cultural environment and preserve the organic remains in different ways and, therefore, favor specific types of plants (Van der Veen 2007). The most common ones are charring (carbonization), mineralization, waterlogging and mummification (desiccation). Less commonly biological material can be fossilized by freezing, compression or impression.

Carbonization in archaeological contexts takes place upon heating under a limited supply of oxygen usually due to fires. The organic material in the plant is charred, reduced to only carbon, and saved from the attack of bacteria, fungi or other decomposing organisms. Plant parts preserved in this way can survive in most environments (Zohary, Hopf 2000). This modality of preservation is one of the most common and is responsible for preserving all the material analyzed in this study. Therefore, more attention will be given to its description and the effect on botanical remains. Carbonized botanical material is most commonly found in hearths and ovens or in storage areas if a house fire occurred (Renfrew 1973). The most frequent type of charred plant remain is wood (charcoal), because it was used as fire fuel, and as one of the main building materials as well. In addition, we can often find plant parts deriving from food preparation like cereal grains, chaff, husks, accidentally collected weeds etc. (Jacomet 2013). When analyzing charred material the specialist must not rely on the size or the shape of the remains themself, but should observe diagnostic morphological features, because heating and burning of plants might greatly affect them.

Mineralization occurs when cell walls or cavities get filled up by inorganic substances coming from the water or sediment in which the plant was submerged. These minerals may contain silica, carbonates, oxides or other types of compounds which enclose and bind the plant structure (Pearsall 2000). Archaeological mineralized fossils are most commonly found in middens, cesspits, latrines and sewer systems, or in a vicinity to a metal object that could release minerals. The biggest number of remains preserved in such a way belongs to hard parts of plants that are ingested and therefore get in contact with cess. These in Europe mostly consist of grape and fig pips, *Apiaceae* (fennel, coriander) and *Rosaceae* (apple, pear, plum) seeds. Nevertheless, caryopses of cereals are rarely mineralized (Jacomet 2013).

Anaerobic conditions in wells, sewer systems, peat bog, lake bottoms or seas contribute to a number of archaeobotanical studies. Waterlogging occurs on sites submerged in still water and many European sites have a rich plant collection as a result of it. Waterlogged preservation helps plant material retain even the most fragile components and therefore offers a possibility for recovering a wider spectrum of remains than charring or mineralization, like seeds, fruit, wood and leaves (Jacomet 2013). These fossils give an opportunity to be studied in the same way as recent plants (Pearsall 2000).

Preservation by desiccation takes place under conditions of extreme dryness, thus we can expect these types of fossils only in very arid areas, like desserts and caves. With no moisture bacterial and fungal activities are blocked and no decomposition happens which leaves the fossils in perfect condition. Several assemblages, many of them in the Egyptian tombs, of grains, wood and seeds, but also soft parts of fruits, leaves and flowers survived many millennia due to this process (Zohary, Hopf 2000).

Low temperature extremes in cold latitudes or high mountains can make decomposing organisms inactive, thus make the organic material preservation possible. A famous example of such fossilization is the prehistoric Iceman found in the Alps. Apart from the anthropological evidence due to the perfect preservation of the human body, in this case his stomach contents, parts of clothes, shoes, tools and weapons represent irreplaceable archaeobotanical evidence (Jacomet 2013).

Compression is a fossilizing process of carbon enrichment and ejection of hydrogen and oxygen, which make up the organic part of the plant. This occurs in anaerobic conditions and results in a drastic reduction in volume. This process can leave the fossils recognizable but the degree of crushing from compression can as well make the identification impossible. It affects all the plant parts equally (Pearsall 2000).

The last mechanism I will mention leaves indirect evidence, due to the fact that the material of the plant itself is not present but only its impression. Plant impressions can be found in a very fine sediment, such as clay or travertine, but also on artifacts, usually pottery, daub or adobe (Renfrew 1973, Pearsall 2000). Most types of remains can leave impressions like leaves, flowers, wood, chaff, seeds etc. They have a very strong advantage if found on artifacts because they can be automatically associated with the context, where they might result from deliberate human action (chaff put in clay for better features) or involuntary processes (grains impressed into cookware) (Zohary, Hopf 2000).

1.4. Carpology

As mentioned before, types of archaeobotanical remains can be microscopic or visible by the naked eye. Depending on the type of material being analyzed several different branches of botany and, thus archaeobotany, are named. Carpology is responsible for the studies of fruits and seeds, palynology analyzes pollen and spores, xylology studies wood and its anatomy, while anthracology focuses on charred wood (charcoal). Apart from these, archaeobotanists also involve in analyses of leaves and cuticles, diatoms and phytolits (Pearsall 2000). This study focused only on the carpological charred material from a prehistoric archaeological context; therefore it is important to further explain some terminology and methods encountered in studies of seeds and fruits.

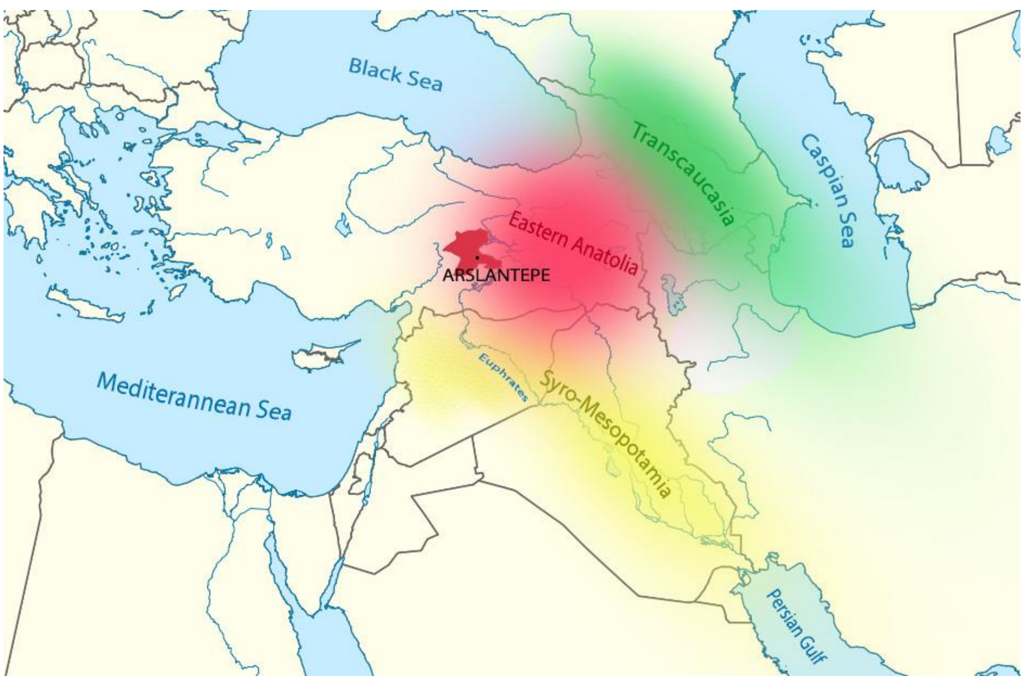
A fruit is a seed-bearing structure encountered in angiosperm, i.e. flowering plant, species. It develops from the plants ovary after the flowering period and the pollination (David et al. 2016, 442-450). The wall of the ovary- pericarp can differ depending on the plant species: it can be hard or soft, thin or thick, fleshy, leathery etc. Common fruit types are nuts, legume pods, caryopses, berries and drupes (Pearsall 2000). Their shape and size can be used for identification, but since after charring they may not remain constant, some morphological features and surface texture can be diagnostic characteristics. Likewise, the number and the arrangement of seeds inside a fruit can also vary among species. They can be dispersed differently: ejected from the fruit, like the legumes, or dispersed still attached to the fruit itself, like the cereal grains (David et al. 2016, 442-450). Finds of whole fruits happen on a rare occasion, usually in desiccated or waterlogged contexts. The only types of fruit commonly encountered within charred assemblages are caryopses, due to their compact structure.

A seed is a reproductive structure of spermatophyte plant species, i.e. seed plants. It is an embryonic plant that is formed in the ovary in the process of fertilization of the ovum by pollen. They are composed of the embryo, the storage tissue (endosperm) and the protective coating (testa) (David et al. 2016, 442-450). The embryo contains the primary root (radical), the primary shoot (plumule) and the primary leaf (cotyledon). In species that do not produce endosperm, such as legumes, cotyledons also serve as a source of nutrients for the future plant, in which cases they are thick, and oftentimes preserved after deposition. Depending on if there are one or two first leaves present we have monocotyledons or dicotyledons. The amount of the endosperm and its position in relation to the embryo differs among plant species. On the testa we can observe coloring (not visible in charred specimens) and ornamentation on the surface, but also the shape and the position of the seed attachment scar (hilum) (Pearsall 2000). Apart from size and shape of the seed, if we find any of these traits observable they become very important in classifying the seeds, whether they are recovered whole or fragmented.

Apart from seeds and fruits, carpological analysis can include the study of plant parts connected to the fruit. In charred material, for example associated with cereal and other grasses we analyze chaff, which consists of the leaflike structures (glumes, rachis fragments, lemmas, awns) serving as protective layers for the grain (David et al. 2016: 447). Therefore, many plant parts that come as a product of food production and consumption fall into analyses of archaeobotanists. It must be taken into consideration that various plant parts and same plant parts in various species do not have the same fossilizing potential and thus can cause over- or underrepresentation in the archaeological material.

2. ARSLANTEPE

The site under investigation in this study is Arslantepe, meaning “the lion’s mound” in Turkish language. It is a 30 meter high settlement mound (*tell*- hill in Arabic) that covers an area of about 4.5 hectares situated 12 km away from the right bank of the Euphrates river in the fertile Malatya plain, southeastern Turkey (Figure 1). This plain is flanked by the Euphrates River on the east and by the slopes of the Anti-Taurus mountain range on the other sides. The climate of the area is semi-arid (the mean annual precipitation is 400 mm) with a fairly high average annual temperature (10-14°C). Isotopic studies on fossil plants recovered at the site showed that the precipitation was higher between 3350 and 2000 BCE, and a period of drought is evidenced between 2300 and 2200 BCE when the humidity was similar to today (Masi et al. 2013). The plain is, nevertheless, fed by many natural springs which make it popular for apricot growing nowadays.



[Figure 1- A map showing the position of Arslantepe. The dark red outlined area is the modern-day Malatya Province in which the Malatya plain is situated. The colored areas are the zones of influence on the Arslantepe communities evidenced in the material culture]

The *tell* has a several millennia long sequence of uninterrupted occupation that ranges from at least the fifth millennium cal. BCE in the Chalcolithic, up until the year 712 cal. BCE when the Neo-Hittite town of Malitiya (or Melid) was destroyed by the Assyrians. There is some evidence that might imply a short occupation in the Neo-Assyrian period. The site was definitely reoccupied in the Roman era, and was ultimately used as a cemetery in the Byzantine period (Frangipane et al. 2012). The carefully documented sequence follows a story of times of turmoil and complex events that often led to cultural changes. Nevertheless, clearly dominant by its size in the Malatya plain, Arslantepe repeatedly had a leading role in the region (Figure 2).

2.1. History of research

[Figure 2- The artificial mound of Arslantepe with the archaeological excavation]

The site owes its name to a monumental gate, the Lion's Gate that was discovered in one of the first archaeological campaigns, which were carried out in the 1930s by a French team under the guidance of the explorer Delaporte. In the first course of the archaeological research mostly Iron Age buildings and monumental complexes were brought to light, and the focus was put on the northeastern zone of the hill. After the Second World War the French mission came to an end (Frangipane et al. 2012). The interest in investigating the "lion's mound" was revived in the early 1960s when a first Italian archaeological mission headed this way. The modern-day excavations are still under the Italian supervision and are one of the main archaeological projects of the Sapienza- University of Rome. The initial directors were Prof. P. Meriggi and S. Puglisi, and the later continued working until Prof. A. Palmieri took over the project. After, in the 1990s, Prof. M. Frangipane became and is still the head of the project. The Italian mission continued in the parts where the French explored, discovering mostly remains of the Iron and Late Bronze Age complexes. In the later campaigns, from 1970s onwards, the studied periods were mostly prehistoric and protohistoric, found in the western and southwestern area of the mound, *where the earliest settlements made up the original nucleus of the tell* (Frangipane et al. 2012: 971) (Figure 2). The succession of the Late Chalcolithic, Early Bronze and Middle Bronze Age was recorded by extensive excavation on a broad area of the hill. Up to a hundred of ^{14}C dates put these periods between the end of the fifth to the beginning of the second millennium cal. BCE. In the recent years more accent is put on two periods at the extremes of the sequence: the period before the formation of the Neo-Hittite kingdom of Malatya and the Late Chalcolithic period (LC3-4 and 5, 3900-3100 cal. BCE) (Frangipane 2001, 2012, Frangipane et al. 2012).

2.2. Chronology of the site

The earliest occupation at Arslantepe occurred at least in the fifth millennium cal. BCE. A first well documented phase is dated to the Late Chalcolithic 1 and 2 periods, about the end of the fifth millennium (4300-3900 cal. BCE). This period is termed Arslantepe VIII and comprises of three levels of mostly domestic buildings. The pottery from this phase is of local style existing in the Malatya plain, which belongs to a wide post-Ubaid group connecting it to numerous parts of Upper Mesopotamia and Eastern Anatolia (Frangipane et al. 2012) (Figure 1).

The Arslantepe VII period (Late Chalcolithic 3-4) is dated from 3900 to 3400 cal. BCE. In this phase archaeologists noticed *a clear differentiation between functionally and symbolically diverse areas* (Frangipane et al. 2012: 972). The settlement became big enough to cover almost the whole surface of the hill. The presence of a first emerging elite is hypothesized based on a monumental building complex situated on the top of the artificial mound. It is believed that there were residences for the elites and a kind of a temple that served as a center for redistribution of goods and meals. This ceremonial redistribution is evidenced by a large number of *cretulae* and mass-produced bowls accumulated and found *in situ*. The period VII pottery still represents the local style as in the previous period, but is, seemingly, being mass-produced. A type of handmade Red-Black Ware, also present in the central-eastern Anatolian repertoire, appeared at the end of this phase (Frangipane et al. 2012).

Arslantepe Phase	Years (cal. BCE)	Period
VI D	2000-2500	Early Bronze III
VI C	2500-2750	Early Bronze II
VI B2	2800-3000	Early Bronze I
VI B1	3000-3100	Early Bronze I
VI A	3100-3400	Late Chalcolithic 5

[Table 1- the periodization of the Phase VI at Arslantepe]

The levels of the Late Chalcolithic 5 and Early Bronze Age are grouped within phase VI, with four main sub-divisions (A to D) (Table 1). The period VI A (Late Chalcolithic 5, dated from 3400 to 3000 cal. BCE) is characterized by a strong social stratification and existence of centralized power. An imposing architectural complex was unearthed, built shortly after a large temple from the previous period VII. This was made of storage rooms, ceremonial chambers, an audience courtyard and a throne room, as well as a true residential sector and is therefore, referred to as a palace (Frangipane 2012, Frangipane 2018). In the Late Chalcolithic 5, as Frangipane states, Arslantepe has a leading role and is *an intermediary center in the vast network of interregional relations involving the Syro-Mesopotamian communities and those living in the mountain areas of central-eastern and northeastern Anatolia* (Frangipane et al. 2012: 980). Hence, the pottery production is more diverse in this period. The local pottery was strongly influenced by the Mesopotamian Uruk culture and a new Red-Black Ware, which already appeared in small amounts in the previous phase was used as part of the local repertoire, thought it does not exceed 15% (Frangipane et al. 2012; Frangipane 2001, 2012, 2018) (Figure 1).

The Early Bronze Age I, or VI B, at Arslantepe is a relatively short period (3100-2750 cal. BCE) further divided into two sub-phases. An essentially different economic and social organization has taken over, coming as an aftermath of a destruction by fire of the palace and the whole settlement, accompanied by the collapse of the centralized system of the Late Chalcolithic society. In the VI B1 period (Early Bronze Age Ia, 3100-3000 cal. BCE) pastoralist groups, who probably previously inhabited the surrounding area, built a seasonal settlement on the abandoned ruins of the palatial complex. Their houses were constructed from wattle and daub with mud-coated walls, showing connections to the Transcaucasian architectural practices. The red-black pottery that was so far present in only small quantities, now became the only type, this time maintaining the technology and aesthetics, but introducing new shapes which clearly resemble the Northeastern Anatolian and Transcaucasian types (Frangipane 2001, 2012) (Figure 1).

The second phase of the period, named VI B2 (Early Bronze Age Ib, 3000-2800 cal. BCE), is where the charred plant material for this study was recovered from, and therefore another chapter is dedicated for better describing the context. It is a new building phase of mudbrick houses composing an agriculturalist village. Perhaps a new form of power is being reestablished which is depicted in the presence of a monumental wall around the central part of the mound. This upper part was, unfortunately, not enough preserved due to its destruction by the superimposing levels. The pottery assemblage illustrates *Uruk-derived cultural features of the Middle and Upper Euphrates Valley and the new elements introduced into the northern areas of the Upper Euphrates from Transcaucasian and related cultures* (Frangipane 2012: 981). Another phase lasting no more than 50 years is established as period VI B3, after a fire destroyed the VI B2 village. At this time, the site was again being seasonally occupied by pastoralist living in light-structured round huts (Frangipane 2001, 2012, Frangipane et. al 2012).

In the Early Bronze Age II (2750-2500 cal. BCE), or period VI C, a large building on the top of the hill was erected probably as a residence for an extended family or a kindred group. Transcaucasian handmade pottery was produced as well as a special local type (Frangipane et al. 2012).

In the VI D period (Early Bronze III, 2500-2000 cal. BCE), the village spread and roads and channels started appearing. At this time Arslantepe is the main center in the Malatya plain, but shows no evidence of centralized power. A big wall surrounding the whole settlement was built. Connection to previous periods is represented in the continuation of the same pottery forms (Frangipane et al. 2012).

The Middle Bronze Age, referred to as period V A, lasted from 2000 to 1750 cal. BCE and represents a continuation of the Early Bronze Age in the material culture and architectural practices, even though a new type of wheel-made pottery emerged under the influence of the Syro-Mesopotamian world (Frangipane 2012). During the second millennium cal. BCE, in the Late Bronze I, the area became influenced by the emerging Hittite state and at that time a gate with two towers was built with new town's defensive wall. This is the V B phase, which is dated to 1750-1600 cal. BCE. The succeeding Late Bronze Age II, the period IV at Arslantepe (the so called "imperial" period) is dominated by the expansion of the Hittite empire towards the Euphrates. It lasted from 1400 to 1200 cal. BCE and a citadel was constructed in the north-northeastern area of the hill (Frangipane et al. 2012).

Finally, in the Iron Age, after the collapse of the Hittite empire, a smaller citadel was built to the north of the mound, and a new local kingdom, the Neo-Hittite Melid, was founded. A sequence of levels made up of the remains of a thriving city represents the period III. As Arslantepe became the capital of this kingdom a series of imposing buildings, amongst which the previously mentioned Lion's Gate, were built. This town was destroyed by Sargon II of Assyria in 712 BCE, when the prosperous times of Arslantepe were put to an end. In the later phases only minor occupations were evidenced in the Roman and Byzantine era (Frangipane et al. 2012).

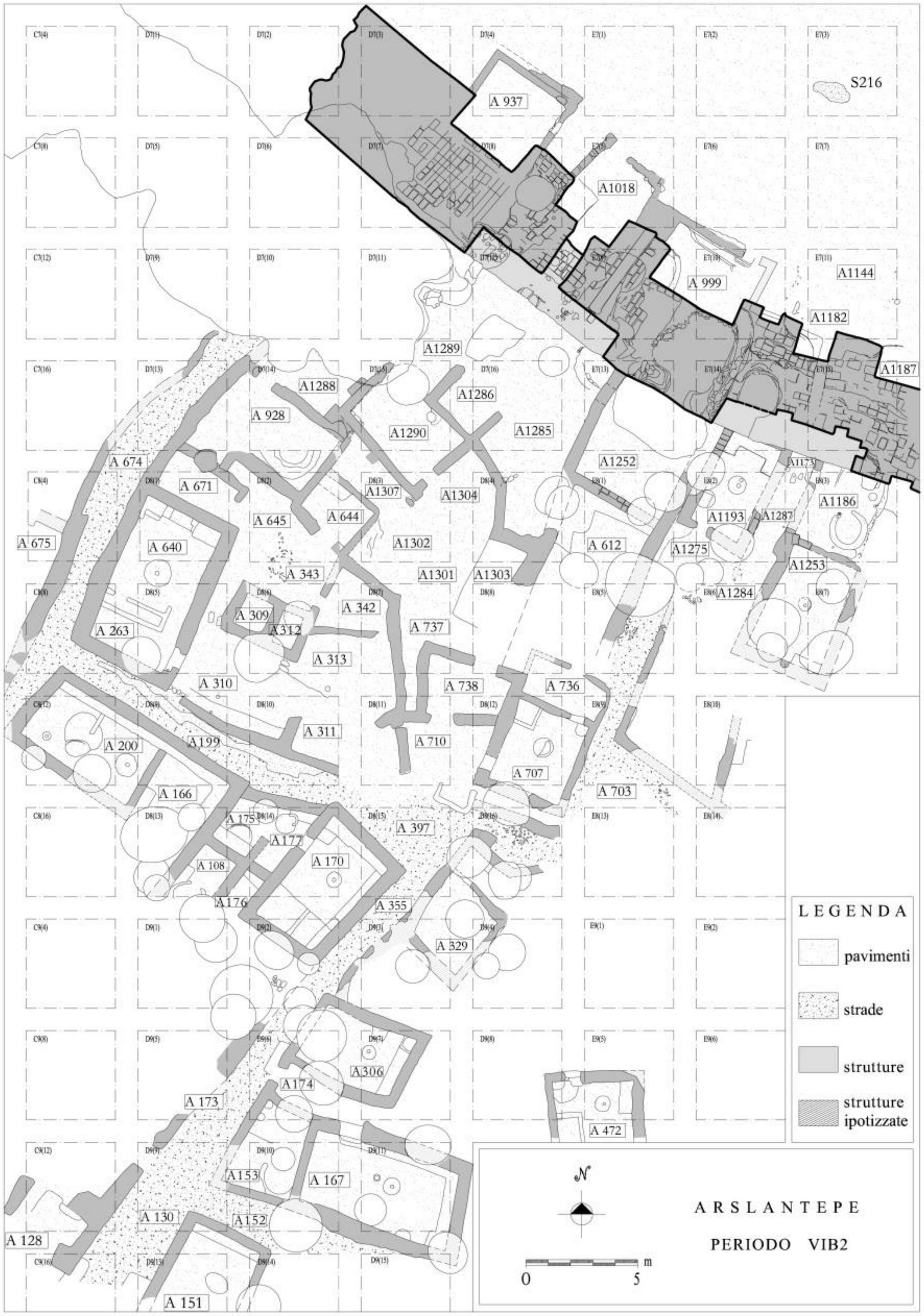
2.3. The Early Bronze Age Ib (VI B2)

The Early Bronze Age I at Arslantepe (periods VI B1 and VI B2) is characterized by an abrupt change in the social structure in respect to the previous "palatial" phase of Mesopotamian-type centralized system in the Late Chalcolithic 5. Frangipane believes that this came as a conflict between the elites ruling from Arslantepe and people inhabiting the areas under its influence. She defines two groups that could be continually interacting with the Arslantepe dwellers. First are *mobile pastoral communities of "local" transhumant shepherds or nomadic people* occasionally crossing the region, and the second are *an essentially sedentary local rural groups, probably living in villages and farms scattered throughout the plain* (Frangipane 2012: 237). The presence of the mobile communities can be recognized by the existence of the Red-Black pottery and in the main building techniques, which relates them to the Northeastern Anatolian and Transcaucasian cultures. On the other hand, she links the sedentary communities to the *Syro-Mesopotamian Late Chalcolithic cultural traditions* (Frangipane 2012: 238). A lot of destruction and abandonment layers in a short time span, and the building of a great defensive wall in the VI B2 period indicate a restless period in which the idea of power could switch from an elite personage responsible for distributing food and organizing labor to a military chief defending the area. Therefore, the subsistence pattern also does not stay the same, especially when diversely subsisting communities are continually re-occupying and possibly coinciding at the site (Frangipane 2001, 2012, Frangipane et. al 2001, 2012, 2018; Piccione, Lemorini 2012, Piccione et. al 2015). On the contrary, few behavioral elements and cultural traits stayed unchanged for the reason that these people shared the same area influencing and building their cultures together for millennia. This is especially evidenced in the emergence of a new agriculturalist mudbrick village of the VI B2 period (Frangipane et al. 2012, Frangipane 2012).

After the occupation of the previous phase, which left traces of light structured buildings, mainly evidenced in the presence of postholes, a somewhat permanent settlement was built. The archaeologists evidenced two building phases in the VI B2 period. The first one is characterized by the erection of a monumental defensive wall (M120), guarding the upper part of the hill. At that time, the village was consisting of only light-structured huts, which left traces of postholes, akin to the ones from the previous phase. Only one area of mudbrick constructions existed in the external part, where common activities perhaps took place. In the subsequent phase this area was certainly used for metallurgic activities and butchering of animals. In the second building phase, an agriculturalist village of mudbrick houses was erected and expanded outside the wall (Frangipane et al. 2012). This second phase has been extraordinarily well preserved due to a fire which sealed the whole village with material *in situ* and along with it countless samples of charred plant remains, which are the subject of study in this research.

The mudbrick wall (M120) was built on the same course as a smaller fence-type structure made from posts in the VI B1 period, which served to enclose the top part of the mound where a single hut, maybe belonging to a chief, was discovered. The foundation of the wall was 5 meters thick and made out of stone, and the upper part was 4 meters thick, out of mudbrick, with additional buttresses (Frangipane 2012, Frangipane et. al 2012) (Figure 3). In the phase under study here, this monumental wall somewhat lost its primary defending function since a whole village exists outside the area it is guarding. Houses and other types of buildings were built directly against it, where its sides served as one of the walls of the added rooms. Other than this, channels that served as drainage systems, the entrance and two openings, which seem like arrow slits, were covered and lost their function. The unearthing of the area inside would undoubtedly serve to better explain the function of the wall in this phase, but unfortunately the excavation conducted so far had no fortune of finding any structures in this area due to it's destruction by the layers of the following periods (Frangipane, Balossi- Restelli: personal communication). Four rooms were discovered leaning on the internal side of the wall, three out of which were incorporated in this study since a great number of seeds was recovered from them. The external village is composed of mudbrick structures, narrow perpendicular streets and large open areas, perhaps courtyards. The unearthed area solely occupied over 1500 m^2 of the southwestern slope of the mound (Piccione et al. 2015). It is clear that domestic activities took place in these buildings, since many of them contained cooking pottery, circular hearths and plant and animal remains. The houses usually contained rectangular or sub-rectangular features which are interpreted as *siloi,* i.e. grain containers, or cupboards for storing dry goods. Many of them contained large amounts of archaeobotanical remains (Piccione, Lemorini 2012). The houses are densely

[Figure 3- The monumental defensive wall- M120 viewed from the west side of the VI B2 settlement. The stone foundation is uncovered at the bottom, as well as the top mudbrick part. Some adjacent rooms from the second building phase of VI B2 are also visible on the inner side] arranged, usually forming complexes of one to three rooms connected with a courtyard. The tight streets dividing the domestic complexes served as drainage systems too, using the natural slope towards the south (Frangipane 2012, Piccione et al. 2015) (Figure 4). Many kilograms of charred carpological remains were recovered from the house floors, as well as from the streets, which could indicate that, apart from *siloi* and jars, Arslantepe dwellers kept their harvest products on the roofs or attic spaces of the houses, which ended up here after the collapse of the structures in the fire. This is also supported by the spatial analysis of the remains of pottery and the way they were scattered (Piccione, Lemorini 2012). In the northern sector of the settlement specialized areas for metallurgic and butchering activities were identified. All this evidence illustrates the economic and subsistence patterns of the Arslantepe dwellers in the Early Bronze Age Ib.



[Figure 4- The map of the excavated VI B2 village in the second building phase. The defensive wall is present on the north side, and the dark outlined area represents the shape of the wall in the first building phase. The walls of houses are represented in gray, the floors and courtyards in white dotted and the streets are dotted and grey. The legend is in Italian menaing: pavimenti- floors, strade- streets, strutture- structures and strutture ipotizzate- hypothesized structured. The rooms are labeled with the capital letter A (stands for *ambiente*- room, environment) and a number]

3. MATERIALS & METHODS

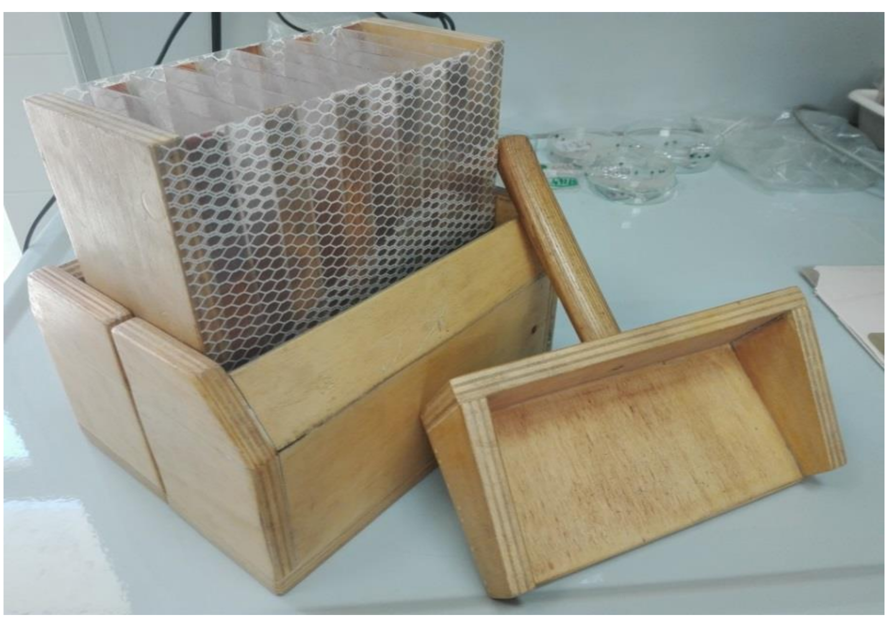
The archaeobotanical analyses have been carried out in the Laboratory of Paleobotany and Palynology of the Department of Environmental Biology of the Sapienza University of Rome. My research is a part of the EACEA funded Erasmus Mundus Master Programme in Archaeological Materials Sciences. All the studied materials come from the site of Arslantepe and only the carpological studies, i.e. analysis on seeds and fruits, are being discussed here. The plant remains analyzed in this thesis were recovered starting from the year 1987, then in 2005, 2010 and 2011. Apart from the presented samples, other archaeobotanical analyses on seeds and fruits from the VI B2 period were conducted previously, and the results are only partly published (Piccione et al. 2015). My work was mainly focused on finalizing the carpological analyses on the samples from the second building phase of the VI B2 village. Therefore, areas and rooms that had not yet been studied, or where analyses were conducted only on a minor number of samples, were chosen.

3.1. The samples and contexts

A total of 57 samples containing carpological material were analyzed in this study. All the botanical material was preserved by charring. Some plant remains were recovered by dry sieving the soil samples on site with decreasing mesh size (5, 2, 0.5 mm), but in the majority of the cases the seeds were so abundant that they could have been handpicked and packed right away, as can be seen in Figure 5. The richness of the material and the context were the parameters influencing the size of each sample, which accordingly varies in kilograms. Following a specific protocol, developed through years of archaeobotanical researches, the flotation was not performed since water might act as a damaging factor on the charred seeds, and hand picking and sieving turned out to be very adequate. All the samples were assigned a label indicating their stratigraphic and topographic position, and their relation to the domestic features if existent. The plant remains collected from the floors themselves, or from *siloi*, are considered to be *in situ* since the whole layer was often sealed by the collapsed roofs of the buildings during the terminating fire. Above the wooden roof parts another layer, full of carpological material, was often recorded. The connection to the artifacts was also carefully examined, but the abundance of remains in a small area made it impossible to link all the botanical samples to the possible pots they were kept in (Piccione et

[Figure 5- A floor from a house of the VI B2 village with a substanttial amount of charred cereal grains and legume seeds]

al. 2015). All the samples were assigned a number (archaeological number) in the field, but upon arrival to the laboratory they were inserted into a database and assigned a new botanical number which will be used here. The vast amount of the remains influenced the decision to make sub-samples of 1/2, 1/4 and even 1/8 of the original bags recovered in the field. This



[Figure 6- The wooden riffle box used for sub-sampling. The shovel is used to hold the sample and to pour it into the box. The divider has ten divisions which send the material into two separate containers] was completed in the laboratory with a wooden riffle box (Figure 6) before the analysis. Thanks to this process a random division of the sample is done which enables the chosen part to be representative of the whole sample. Nevertheless, sub-sampling was conducted only if greatly needed and the majority of the samples were completely analyzed.

For the concise interpretation of the archaeobotanical finds it is important to discuss the context they are recovered from, which was here enabled by the detailed documentation during excavation. The analyzed samples are coming from eight different contexts within the VI B2 village. The contexts for analysis were chosen in order to complete the carpological studies from this period of the site, and possibly to closer determine the function of the great defensive wall in the northern part of the village. Three rooms are the ones identified on the inner side of the monumental wall (A999, A1018, A1187) and one on the outer (A1186). Another context with carpological remains connected to the wall is a narrow opening into it, which was walled in this phase, marked as A1315. Apart from the rooms closely related to the wall, another secluded room (A472) in the very south of the excavated area was a part of this study. Besides rooms and structures, streets and open areas sometimes contained carpological samples. Only two such contexts were left unanalyzed and were addressed in this study (A130 and A152) (Figure 7). Other open spaces in front of the rooms concerned in this study were also checked for carpological remains but were barren of seed or fruit remains.

3.1.1. A130 and A152

Open spaces and streets of the VI B2 village at Arslantepe yielded several samples. Archaeologists collected five samples containing carpological material from the southwestern part of the excavated area in the streets A130 and A152 (Figure 7), with one (the botanical number is 238) and four (241-244) samples, respectively. All the samples were collected from the floor, i.e. the last layer before lifting the material of the floor itself.

3.1.2. A472

A room on the south of the village, secluded from the rest of the excavated area had a substantial amount of seeds. The room is not connected to any other structures, at least on the side which was excavated, but instead there is an open area with no buildings in front. The entrance is on the north side and is approached by two steps. In the center of the room there

[Figure 7- Two details from the VI B2 village. The contexts where the studied samples are coming from are marked in red color. The squares of the grid in which the rooms are located, as well as the features inside the rooms are visible] was a fireplace, on the west side leaning on the wall there was a bench and in the southwest a basin-type structure and a bench on the west side (Figure 8). In the room, among so much botanical material a big piece of crude copper was found. The seeds were distributed in several layers, indicating that there was a large amount of staples on the ground as well as the upper floor, which might have been an attic or an open roof. Some of the botanical material from this room was previously studied but the data and the material were not accessible. For this reason, the data gathered is not fully comprehensive, however it will be mentioned and discussed since it adds up to the understanding of the agricultural and food processing activities of the Arslantepe inhabitants in this period. Due to the fact the material was so abundant and some parts analyzed before I chose to study the samples that were not yet studied at all. Since there was so much material, many samples were divided into multiple bags, which I analyzed all for the chosen samples. The total of 19 analyzed samples from A472 are the ones with the following botanical numbers: 668, 669, 673, 676, 681,682, 684, 685, 687, 690, 693-695, 699-704.

[Figure 8- A photo taken from above on A427 (north is up) after the removal of archaeobotanical material and the fireplace. The entrance with two steps is on the north. E1- the basin structure and Q1-the bench are visible]

3.1.3. A999

The room A999 was built on the inner side of the defensive wall (M120) directly leaning on it. The entrance was placed on the northern side and it was approached over a step. The room had no other features apart from a basin-shaped structure in its southwestern corner (marked E1) as can be seen in Figure 9. This structure is interpreted as a *silos* or a granary, due to a great number of charred grains recovered from it. The filling contained earth with seeds and pieces of adobe which are considered to come from the original dome of the granary. Seven samples of various sizes, depending on which part of the room they come from, were recovered- 2000, 2001, 2006, 2007, 2033, 2723, and 2725. All the samples were analyzed fully apart from the biggest one (2033) which originates from the *silos* and contains four bags of grains. The vas amount of material influenced the decision to make subsamples. The first bag (2033/1) was the largest one and was subsampled into 1/8, the second largest (2033/2) was subsampled into 1/4 and the third (2033/3) into 1/2 of the original size. The fourth (2033/4) was analyzed fully. Due to the homogeneity of the classified grains I believe no relevant information was overseen.

3.1.4. A1018

Another room built leaning on the wall on its north side, with the entrance in the northwestern corner, contained botanical samples full of carpological material. The floor in front of the entrance was covered with a lot of carpological material which make up the sample 1990. It came in two bags of which one was subsampled with 1/2 studied. On the opposite side of the entrance there is a niche which is actually a remnant of what was probably a door or a gate of the monumental wall which was walled in this period. It was assigned a label A1039. On the threshold of this niche a botanical sample 1985 was recovered. Upon the lifting of the wall a pestle and a pot were found inside this area (Figure 9). An element (E1), identified as a sort of a bench, was present in the southwestern corner of the room and is visible in Figure 8. When archaeologists started removing it they discovered that in the previous phase there was a granary below, and they recovered several bags of earth with seeds from it which make up the samples 2293, 2296 and 2328. The sample 2731 comes from the floor of the room and the 2732 was recovered upon lifting the wall next to the E1 structure.

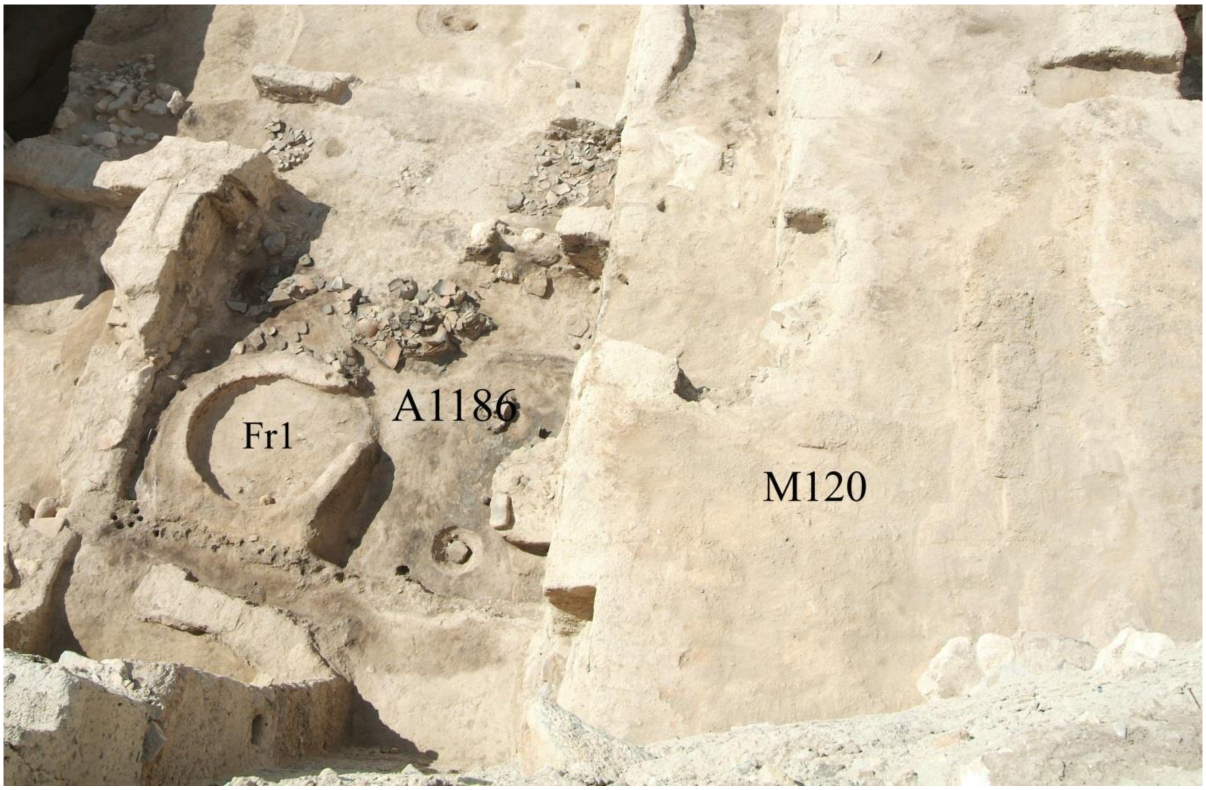
[Figure 9- View from the northeast of the rooms A1018 and A999 with the respectively structures E1- the bench and the *silos.* The walled gate of the monumental wall, A1039, is visible as well]

3.1.5. A1186

While excavating the room leaning on the outer side of the defensive wall, by the presence of an oven (Fr1) and grinding stones archaeologists came to the conclusion that it was a kitchen (Figure 10). This kitchen was connected to other rooms and, in that way belonging to a complex of several structures, was a part of a house. There are two samples, both coming from the floor of the room, assigned Y68 and Y67 in the field which means they were collected as an object. The exact position of the samples is not available. They were given the botanical numbers 2728 and 2729, respectively. The sample 2729 was sub-sampled into 1/2.

3.1.6. A1187

The third room on the inner side of the wall with macroremains interesting for this study is A1187. It is the most western room in the excavated area as can be seen in Figure 7. This is not formally a room with walled sides, but was a kind of a roofed storage area, which is signified by the presence of postholes. It had smaller dimensions than the other two rooms on the inner side of the wall and contained many vessels and large storing jars (they are marked with the letter X in Figure 12). Example of such pot is presented in Figure 13. Two samples were analyzed, one coming from a pot (X22) - 2726, and another collected from the floor in the northeastern part of the room- 2727. The sample collected from the floor was marked as Y7 during the excavation (it was taken as *in situ*) and was recovered from under a beam. The remains from the sample recovered on the floor were too abundant and therefore sub-sampled into 1/8 of their total amount.



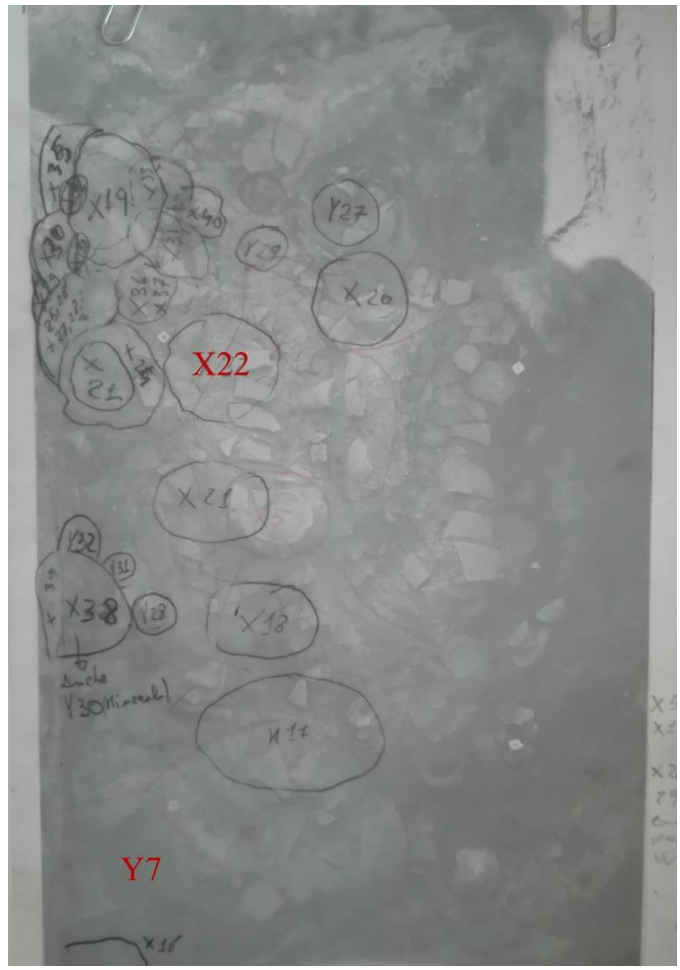
[Figure 10- View from the east. The photo shows the room A1186 connected to the big wall- M120. Fr1 is the large circular furnace. The eastern wall was made out of posts, which is evidenced by the presence of postholes seen next to the furnace]

3.1.7. A1315

The samples assigned to this context do not come from a room, but were recovered upon the lifting of the great wall from a layer leaning on its foundations. They were found in a small corridor (outlined in red in Figure 7) that starts from a niche in the room A1182, where no carpological samples were unearthed. This small opening might have been used as a storing space or perhaps a very narrow passage through the wall. It was walled, most probably in the VI B2 period when the village on the outer side of the wall started appearing.

Seven samples of earth with seeds were collected amongst a lot of samples of cooking pottery and some bone and flint finds. They come from a layer directly above the floor which was paved with mud. The samples were assigned the following botanical numbers: 2301, 2309, 2318, 2325, 2345, 2367, 2737, with the last one subsampled and 1/4 of the original amount analyzed.

[Figure 11- View from the north of A1187. The room does not have the north wall]



[Figure 12- The position of pottery finds on the floor of A1187. The sample 2726 is coming from the pot X22. The position of the sample 2727(Y7) is indicated]

3.2. The identification

The identification of the carpological remains was performed by the observation of the morphological traits by the naked eye or with the help of the low magnification stereomicroscope (Figure 14). In addition, the Leica M205C stereomicroscope (Figure 15) was used for acquiring high-quality photographs and gave the possibility of observing the samples on the digital screen with the aid of the Leica IC80 HD camera and the program Leica Application Suite 4.5.0. The photos were processed in the Helicon Focus program, which allowed a series of photographs with different focus lanes to be merged into one with the focus of the whole surface of a grain that is three-dimensional. The diagnostic features of each fruit and seed were compared with the reference collection of archaeological, but also modern, samples and with the help of reference atlases as well as detailed articles. The main guides were the *Identification of Cereal Remains from Archaeological Sites*, 2006 by S. Jacomet and the *Digital Atlas of Economic Plants in Archaeology*, 2011 and the *Manual for the Identification of Plant Seeds and Fruits*, 2013 by R.T.J. Cappers, R.M. Bekker and R. Neef, but also *Domestication of the Plants in the Old World* by Zohary and Hopf, 2000. Big help in the identification also came from the consultation with the specialists. After the separation and the identification, usually at the species level, the seeds and fruits were counted. Fragmented pieces of cereal grains and legume seeds were also classified when the diagnostic features were present, and afterwards weighed. The grams of fragments were converted to the assumed number of seeds or grains after the estimate of how heavy is an average specimen of the given species. This average weight of a seed or grain was acquired by weighing 20 perfectly preserved ones of different sizes and afterwards dividing the number by 20. For caryopses of cereals the weight of one grain is 0.01 grams for all the species, while for seeds of legumes it varies among peas (0.05 g) and the rest of identified taxa (0.04 g). The seeds and fruits unsuccessfully diagnosed on the species level were attempted to be assigned to a genus. If non-classifiable at the genus level as well, the remains were left classified as indeterminable. The samples were then packed in bags of

[Figure 13- A restored vessel from A1187. It is alarge pithos type of a vessel and was used for storing.]

aluminum foil with species names and number of specimens and grams marked, and the data was inserted into a database containing all the information on the archaeobotanical samples from all the Arslantepe periods.

[Figure 14- The identification method. The samples are placed in the Petri dish for easier management and are carefully turned with a brush to be examined and to prevent their damaging. On the left a separation by the naked eye with the help of seed atlases is performed, and on the right the identification with the aid of a stereomicroscope]

[Figure 15- The Leica M205 C stereomicroscope]

4. RESULTS

The archaeobotanical analyses performed as described in the previous chapter yielded results including 16 plant taxa. About 25,000 countable seeds and grains were identified, with the addition of around 150 grams of fragmented seeds. All the counts are presented in the Table 2 by the context the material is coming from. In this table the real count, as well as the estimated number of seeds and fruits, is reported. Each context with individual samples will be presented in the following tables. Among crop species the two main groups are the cereals ascribed to the *Poaceae* family and the legumes ascribed to the *Fabaceae* one. The cereals are represented by *Hordeum vulgare* L. (barley), *Triticum monococcum* L. (einkorn), *Triticum dicoccon* Schrank (emmer) and *Triticum aestivum/durum* L. (wheat). The majority of remains from the studied samples are represented by cereal grains (97% of all the material analyzed), of which 64% is barley and the rest are various species of cereals (einkorn- 24%, emmer- 10.5% and wheat- 1.5%). Among the legumes species *Pisum sativum* L. (pea), *Lens culinaris* Medik. (lentil) and *Cicer arietinum* L. (chickpea) are present, but vetches, which belong to *Vicia/Lathyrus* genera are also abundant. Legumes had an important place in the diet at Arslantepe comprising 2.5% of the seeds and fruits I have analyzed in this study. 76% of all legumes are peas, while 22.5% are vetches, 14% are chickpeas and only 2.5% are lentils. Although all my attempts (including the request of an expert opinion, and I thank dr. Diego Sabato for his advices), I wasn't always able to disentangle between the genera of vetches due to the lack of diagnostic elements. Nevertheless, 23 (out of 141) seeds were successfully attributed to *Lathyrus*.

The rest of the carpological material (0.74%) includes single finds or small groups of plant remains belonging to wild or cultivated species of edible plants. Seeds and fruits of plants in the *Rosaceae* (Rose) family are represented by 8 achenes belonging to *Rosa* (rose) genus and 1 endocarp of *Crataegus* (hawthorn) genus. 4 fruits of *Polygonum* genus have been identified and 1 belonging to *Vitis vinifera*. Indeterminable specimens have been recovered from some samples. Apart from a find of 43 forks of wheat in a pot with cereal grains, and two more forks in another context, no other plant parts besides fruits and seeds were identified. There were only 5 seeds of weed species found, belonging to *Galium* sp. In the following paragraphs the identified plant remains will be presented by the room they were recovered from for an easier understanding of the distribution of the samples within

Arslantepe VI B2										
taxa / context		A130	A152	A472	A999	A1018	A1186	A1187	A1315	TOTAL
Triticum monococcum	n°	-	-	4,672	2	55	2	885	106	5,722
	g	-	-	15.44	-	-	-	1.12	0.26	16.82
	est.	-	-	6,216	2	55	2	5,342	195	11,812
***Triticum monococcum* (forks)**	n°	-	-	-	-	-	-	27	2	29
Triticum dicoccon	n°	2	1	1,872	7	3	3	559	49	2,496
	g	-	-	4.61	-	-	-	0.76	0.06	5.43
	est.	2	1	2,333	14	3	6	1,979	67	4,405
***Triticum dicoccon* (forks)**	n°	-	-	-	-	-	-	13	-	13
Triticum aestivum/durum	n°	-	6	2	-	2	-	333	-	343
	g	-	-	-	-	-	-	0.52	-	0.52
	est.	-	6	2	-	2	-	3,080	-	3,090
***Triticum* sp.**	n°	-	-	-	-	-	-	11	-	11
	g	-	-	8.7	-	0.09	-	0.93	-	9.72
	est.	-	-	870	-	9	-	214	-	1,093
Hordeum vulgare	n°	-	58	1,631	9,947	762	1,602	1	1,291	15,292
	g	-	-	8.17	78.74	5.2	8.78	-	4.8	105.7
	est.	-	58	2,448	28,409	1,541	3,697	1	2,827	38,981
Lens culinaris	n°	-	-	1	4	10	-	-	-	15
Pisum sativum	n°	-	-	395	1	4	-	-	-	400
	g	-	-	1.8	-	-	-	-	-	1.8
	est.	-	-	431	1	4	-	-	-	436
Cicer arietinum	n°	-	-	73	-	-	-	-	-	73
	g	-	-	0.21	-	-	-	-	-	0.21
	est.	-	-	78	-	-	-	-	-	78
Vicia/Lathyrus	n°	-	-	100	1	41	-	-	-	142
	g	-	-	0.36	-	0.11	-	-	-	0.47
	est.	-	-	119	1	45	-	-	-	165
***Vitis vinifera* sp.**	n°	-	-	1	-	-	-	-	-	1
***cf. Rosaceae* sp.**	n°	-	-	10	-	1	-	-	-	11
***Polygonum* sp.**	n°	-	-	4	-	-	-	-	-	2
***cf. Sambucus* sp.**	n°	-	-	-	1	-	-	-	-	1
***Galium* sp.**	n°	-	-	-	-	-	-	3	2	5
Indeterminable	g	-	-	6.01	-	-	-	-	-	6.01

[Table 2- A list of plant taxa and the number of retrieved remains for each context analyzed. For some taxa counts of whole grains (n°), grams of fragments (g) and estimated numbers of seeds or fruits (est.) are given, while some have no weighed fragments or whole grains and no estimations are needed. All the numbers account for seeds or fruits of the given plants, except for where the plant part is indicated (i.e. forks of einkorn and emmer)] each context. All the data in the further text represents the estimated numbers, which were obtained as explained in the previous chapter.

The street samples from the southwestern area of the village contained only cereal finds. The sample from A130 contained just two caryopses of *Triticum dicoccon* while in the street A152 there was only one caryopsis of the same species. Apart from emmer, the samples from A152 contained 6 caryopses of *Triticum aestivum/durum* and 58 caryopses of *Hordeum vulgare* (Table 2 and 3).

The samples from the secluded room A472 of the VI B2 village contained many species and more diverse taxa than any other room analyzed. Among the cereal species the most abundant one was *Triticum monococcum* with 6,198 estimated grains. Besides these, an estimation of 2,439 of *Hordeum vulgare* and 2,198 of *Triticum dicoccon* caryopses were recovered. Very abundant finds of legumes were documented, especially *Pisum sativum* of which there was 446 estimated seeds (Figure 16). Besides peas, the recovered pulses include 80 seeds of *Cicer arietinum* (Figure 17), and 108 of *Vicia/Lathyrus* in addition to one seed of surely *Vicia faba*. Interesting finds were 10 fruits belonging to the *Rosaceae* family. 9 of these are belonging to the species of wild roses (*Rosa* sp.- Figure 18), while the last one is an endocarp of the *Crataegus* genus, commonly called hawberry. 4 achenes belonging to the *Polygonaceae* family were also identified, of which 1 is of *Polygonum* sp., knotweed (Figure 19). 1 fragile seed of *Vitis vinifera*, the grape vine, was also found among the recovered seeds (Table 4).

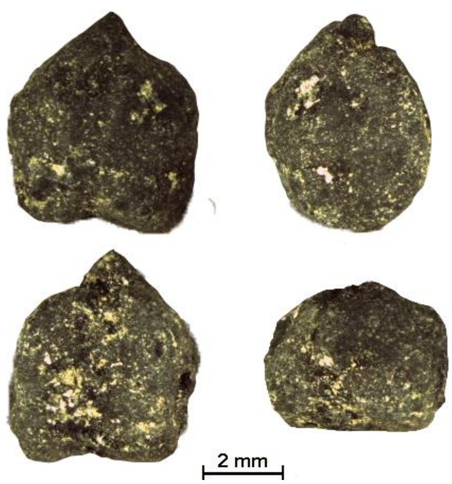
		A130	A152			
taxa / sample number		238	241	242	243	244
T. dicoccon	n°	2	1	-	-	-
T. aestivum/durum	n°	-	-	1	-	5
Hordeum vulgare	n°	-	-	1	6	51

[Table 3- A list of taxa and numbers of caryopses recovered from the street samples analyzed, for both mentioned contexts (A130 and A152)]

A472																				
taxa / sample number		**668**	**669**	**673**	**676**	**681**	**682**	**684**	**685**	**687**	**690**	**693**	**694**	**695**	**699**	**700**	**701**	**702**	**703**	**704**
T. monococcum	n°	591	18	75	511	36	904	34	431	28	217	749	30	12	667	179	77	29	67	17
	g	1.37	0.26	0.32	2.37	0.16	1.91	-	1.23	-	0.71	3.22	0.33	0.06	1.97	0.42	0.2	0.34	0.51	0.06
	est.	728	44	107	748	52	1,095	34	554	28	288	1,071	63	18	864	221	79	63	118	23
T. dicoccon	n°	333	39	50	202	8	262	4	162	20	123	266	10	5	225	57	47	17	36	6
	g	0.62	0.05	0.15	0.7	-	0.8	-	0.22	-	0.25	1.05	0.07	-	0.43	0.07	0.05	0.04	0.08	0.03
	est.	395	44	65	209	8	270	4	184	20	148	371	17	5	268	64	52	21	44	9
T. aestivum / durum	n°	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	est.	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triticum sp.	n°	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	g	0.9	0.15	0.33	0.43	0.17	1.2	-	0.72	0.16	0.31	3.09	-	0.04	0.56	0.22	-	0.17	0.25	-
	est.	90	15	33	43	17	120	-	72	16	31	309	-	4	56	22	-	17	25	-
Hordeum vulgare	n°	15	516	34	44	3	36	31	438	238	20	14	8	1	76	7	113	3	-	34
	g	0.07	3.14	0.18	0.09	-	0.15	-	1.93	1.34	0.06	0.09	0.1	-	0.19	0.08	0.67	0.05	-	0.03
	est.	22	830	52	53	3	51	31	631	372	26	23	9	1	95	15	180	8	-	37
Vitis vinifera sp.	n°	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lens culinaris	n°	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Pisum sativum	n°	43	36	10	48	1	57	87	13	15	18	37	3	3	27	10	5	-	5	-
	g	0.16	0.16	0.06	0.19	-	0.1	0.4	0.11	0.14	-	0.18	0.08	-	0.12	0.02	-	-	0.08	-
	est.	46	39	11	52	1	59	88	15	18	18	40	5	3	29	10	5	-	7	-
Cicer aretinum	n°	1	15	-	2	-	-	39	-	10	2	4	-	-	-	-	-	-	-	-
	g	-	-	-	-	-	-	0.21	-	-	-	-	-	-	-	-	-	-	-	-
	est.	1	15	-	2	-	-	46	-	10	2	4	-	-	-	-	-	-	-	-
Vicia faba	n°	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Vicia/Lathyrus	n°	-	4	1	13	-	15	12	16	3	1	13	-	-	9	4	3	-	2	3
	g	-	-	-	-	-	-	-	0.07	0.12	-	0.01	-	-	0.11	0.02	-	-	0.03	-
	est.	-	4	1	13	-	15	12	18	6	1	13	-	-	12	4	3	-	3	3
cf. Rosaceae	n°	-	-	-	-	-	-	9	-	1	-	-	-	-	-	-	-	-	-	-
Polygonum sp.	n°	-	-	-	-	-	-	3	-	1	-	-	-	-	-	-	-	-	-	-
Indeterminable	g	0.09	1.39	0.19	0.54	-	1.37	0.41	0.61	0.57	0.18	0.11	0.18	-	-	-	0.16	0.21	-	-

[Table 4- List of taxa and numbers of seeds and fruits recovered from the room A472. The grams of fragmenst are also presented when available. The estimated numbers are in the shaded rows]

[Figure 16- A pea seed viewed from the front (top-left), lateral (top-right), top (bottom-left) and bottom (bottom-right) sides. This very well preserved specimen, but without *testa* is coming from the 669 sample from A472.]



[Figure 17- A seed of *Cicer arietinum* presented from dorsal (top-left), lateral (top-right), ventral (bottom-left) and top (bottom-right) view. A very well preserved pointy beak is visible. It was recovered from the 669 sample from A472.]

[Figure 18- A seed coming from the assemblage of 7 *Rosa* sp. seeds, belonging to the room A427. The polygonal shape is visible both in dorsal (left) and lateral (right) positions.]

[Figure 19- A seed of *Polygonum*. In the dorsal position (right) it has a wide spindle-shape, while it is flat and somewhat concave in the lateral position (middle). The left picture is the cross-section of the seed. It comes from the room A472.]

The main taxon identified in the room A999 is *Hordeum vulgare* while grains of other species were found only in minor quantities, as can be seen in Table 5. One well preserved specimen is visible in Figure 20. The total estimated number of barley caryopses is 31,340, where 24,209 come from the sample 2033 (E1). Apart from barley caryopses, 7 grains of *Triticum dicoccon*, 2 seeds of *Lens culinaris*, 1 seed of *Pisum sativum* and 1 of

[Figure 20- A well preserved caryopsis of barley from the *silos* E1 of A999, sample 2033. The grain is presented in dorsal, lateral, ventral position and in cross section (from left to right). The diagnostic spindle shape and the presence of *palaea* and *lemma* are visible]

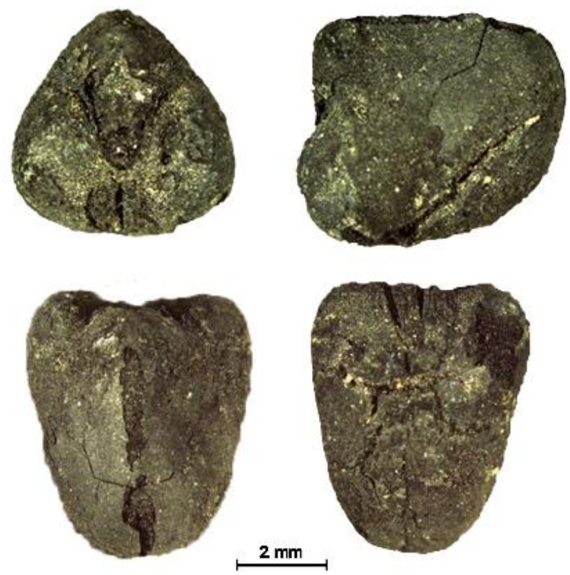
Vicia/Lathyrus were recognized in the same sample. Among the wild species only one seed of cf. *Sambucus* sp. was recovered (Figure 21). This genus contains many species of berries which are commonly known by the name elder or elderberry. The sample 2001 contained 2 *Triticum monococcum* caryopses apart from estimated 2,719 of barley. The 2006 sample had 527 barley caryopses and 2 lentils and 1 pea cotyledon. In the rest of the room there were 408 barley seeds. Other than caryopses and seeds no other plant parts were found in A999.

[Figure 21- The seed probably belonging to the *Sambucus* genus from the *silos* E1 in the A999 room. In the lateral position (second from left) it is rather flat while it has a drop shape with a straight bottom end in the ventral and dorsal position. The ornamentation in form of horizontal ridges is very well preserved]

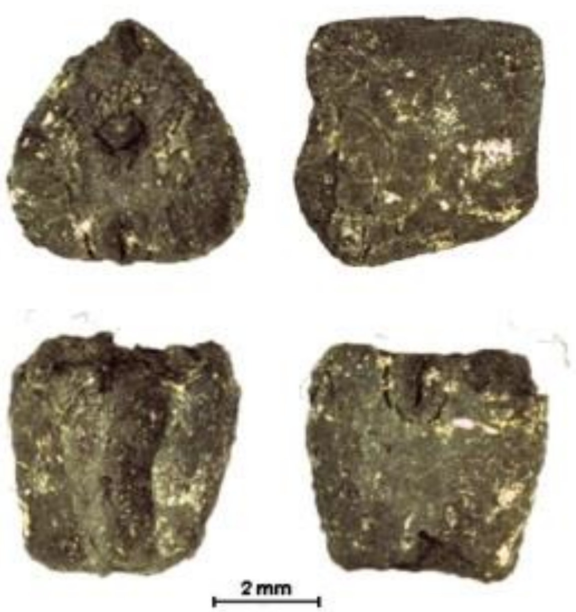
A999											
taxa / sample number		2000	2001	2006	2007	2033/1	2033/2	2033/3	2033/4	2723	2725
T. monococcum	n°	-	2	-	-	-	-	-	-	-	-
T. dicoccon	n°	-	-	-	-	2	4	1	-	-	-
Hordeum vulgare	n°	98	1,623	349	118	5,020	1,302	1,278	145	13	1
	g	1.5	10.96	1.78	0.28	37.3	11.22	12.16	3.54	-	-
	est.	248	2,719	527	146	5,939	4,848	9,976	3,992	13	1
Lens culinaris	n°	-	-	2	-	1	-	-	1	-	-
Pisum sativum	n°	-	-	1	-	-	-	-	-	-	-
Vicia/Lathyrus	n°	-	-	-	-	1	-	-	-	-	-
cf. *Sambucus*	n°	-	-	-	-	1	-	-	-	-	-

[Table 5- List of taxa with numbers of recovered specimens, as well as grams of fragments (g.) and estimations (est.) for barley from the A999 room.]

The room A1018 had a more versatile finds than the previous one, but still with barley being the predominant taxon (Table 6). In the sample 1990, which came from the floor in front of the entrance, 6 grains of *Triticum monococcum* and an estimation of 1,273 grains of *Hordeum vulgare* were preserved. In the sample 1985, which was recovered on the threshold of the niche A1039, mostly legumes were found. It contained 3 pea seeds, 7 lentils



[Figure 22- A pea of *Lathyrus* genus viewed from the front (top-left), lateral (top-right), top (bottom-left) and bottom (bottom-right) sides. The specimen was recovered in the A1018 room, as a part of the 1985 sample. The *hilum* is positioned at the corner of the front side and the bottom of the seed. The shape is resembling a triangle, which indicates it grew in the lateral side of the pod. It might belong to *Lathyrus cicera* or *Lathyrus sativus*]



[Figure 23- A pea of *Lathyrus* genus viewed from the front (top-left), lateral (top-right), top (bottom-left) and bottom (bottom-right) sides. The specimen belongs to the 1985 sample from the A1018 room. The *hilum*, positioned at the corner of the front and bottom side, is short and rounded which resembles the one of *Lathyrus cicera*. The shape is rather square, which indicates that it grew in the center of the pod.]

and a group of distinguishable 23 seeds from *Lathyrus* genus. Two such seeds are illustrated in Figures 22 and 23. 18 similar seeds were present but couldn't undoubtedly be diagnosed and were assigned to *Vicia/Lathyrus* sp. A well preserved lentil from the same sample is presented in Figure 24. Apart from the seeds in the *Fabaceae* family only one seed of einkorn was present. The samples 2293, 2296 and 2328 coming from the structure E1 (possibly a granary; see previous chapter) contained a total of 222 barley, 43 einkorn, 3 emmer and 2 *Triticum aestivum/durum* grains. Among legumes 2 lentil and 1 pea seeds are present. Besides crop remains, 1 seed of *Rubus* in the *Rosaceae* family was found. It has been identified as *Rubus ideaus* (raspberry) or *Rubus fruticosus* (blackberry) as can be seen in Figure 25. The floor sample 2731 had 20 barley, 3 einkorn caryopses and 1 lentil seed, while

[Figure 24- Lentil seed recovered from the A1018 storage room. It belongs to the sample 1985. A perfectly round shape is seen from the lateral view (left), while it is flat when seen from the front (right)]

[Figure 25- A seed of *Rubus*, possibly blackberry, coming from A1018, sample 2293 (E1 element). In the lateral position (right) it has a rather triangular shape, while it is flatter in the ventral position (left). The reticulate surface is still visible. A piece of charred material (probably the remain of fruit) was connected to it as visible on the left picture] in the wall sample 2732 17 barley grains were found. Again no weeds or chaff remains, such as forks, spikelets, rachis fragments or husks, were included in the samples.

A1018									
taxa / sample number		1985	1990/1	1990/2	2293	2296	2328	2731	2732
T. monococcum	n°	1	4	2	24	11	8	3	-
T. dicoccon	n°	-	-	-	-	3	-	-	-
T. aestivum/durum	n°	-	-	-	2	-	-	-	-
Triticum sp.	g	-	-	-	0.06	0.01	0.01	0.01	-
Hordeum vulgare	n°	-	442	147	64	43	35	20	11
	g	-	3.13	1.12	0.39	0.22	0.19	0.09	0.06
	est.	-	755	518	103	62	54	29	17
Lens culinaris	n°	7	-	-	1	1	-	1	-
Pisum sativum	n°	3	-	-	1	-	-	-	-
Vicia/Lathyrus	n°	18	-	-	-	-	-	-	-
	g	0,11	-	-	-	-	-	-	-
	est.	21	-	-	-	-	-	-	-
Lathyrus sp.	n°	23	-	-	-	-	-	-	-
Rubus sp.	n°	-	-	-	1	-	-	-	-

[Table 6- List of taxa and numbers of samples coming from the A1018 room. For fragments assigned to *Triticum* sp., *H. vulgare* and *Vicia/Lathyrus* the grams are presented, and for latter two the number of estimated grains also.]

The first sample recovered from the floor of the kitchen A1186 (sample 2728) contained 696 whole *Hordeum vulgare* caryopses and 5.67 grams of fragments corresponding to 567 grains. The other sample of the room (2729) was subsampled into 1/2 and contained an estimate of 2,434 caryopses of the same species (Table 7). Some of the grains in both samples were glued together and had a little distorted surface which can imply that they were covered in liquid at the moment of charring. Besides barley the first sample had only 2 stray grains of einkorn and the second had 3 of emmer.

A1186			
taxa / sample number		2728	2729
T. monococcum	n°	2	-
T. dicoccon	n°	-	3
Hordeum vulgare	n°	696	906
	g	5.67	3.11
	est.	1,263	2,434

[Table 7- List of taxa and numbers of caryopses belonging to the two samples from the A1186 room. For barley the grams of fragments and estimated numbers are also presented]

Samples recovered in room A1187 revealed a different taxonomic composition against all the other contexts here investigated as can be seen in Tables 2 and 8. The estimated number of cereal grains coming from the pot X22 is 342 for *Triticum monococcum*, 443 for *Triticum dicoccon*, and 86 for *Triticum* sp. (Figures 26 and 27, respectively). 16 caryopses of emmer were still paired together upon recovering. Some forks of the same species were found in the pot, namely 27 belonging to *T. monococcum* and 13 to *T. dicoccon*. Exceptionally, only one *H. vulgare* grain was included in the content of the pot. From the large sample coming from the floor of the room the estimated number of *Triticum monococcum* grains is 5,000 and that of *Triticum dicoccon* is 1,536 (Figure 28). The other cereal species present here was *Triticum aestivum/durum*. Their number is estimated to be as high as 3,080 grains. 0.16 grams of wheat fragments were not identified on the species level, while no barley remains were recovered. 3 seeds of *Galium* sp. were identified representing the only weed remains found so far.

A1187			
taxa / sample number		2726	2727
T. monococcum	n°	285	570
	g	0.57	0.55
	est.	342	5,000
T. monococcum (forks)	n°	27	-
T. dicoccon	n°	388	171
	g	0.55	0.21
	est.	443	1,536
T. dicoccon (forks)	n°	13	-
T. aestivum/durum	n°	-	333
	g	-	0,52
	est.	-	3,080
Triticum sp.	n°	11	-
	g	0.75	0.16
	est.	86	128
Hordeum vulgare	n°	1	-
Galium sp.	n°	-	3

[Table 8- List of taxa and the numbers of remains coming from the samples of room A1187. Besides the caryopses of cereals and seeds of *Galium* sp. the numbers of other plant parts are presented where it is indicated]

[Figure 26- The lateral, ventral, dorsal and cross section of *Triticum monococcum* from the sample 2726 (inside the X22 pot) from the storage area A1187]

[Figure 27- The dorsal, lateral, ventral position and the cross section of *Triticum dicoccon* from the sample 2726 (X22 pot) from the storage area A1187]

[Figure 28- The dorsal, lateral, ventral position and the cross section of *Triticum aestivum/ durum* from the sample 2727 from the storage area A1187]

The most abundant taxon recovered in samples from the wall opening A1315, used as storing area of room A1182, was barley with an estimation of 2,827 caryopses. It is followed by einkorn with 195 and emmer with 67 caryopses. Also 2 forks of einkorn were found in the sample 2325. Samples 2301 and 2345 each contained one seed of *Galium* sp. (Figure 29). No other taxa were identified (Table 9).

A1315								
taxa / sample number		2301	2309	2318	2325	2345	2367	2737
T. monococcum	n°	4	10	12	15	19	31	15
	g	-	-	0.04	0.05	0.04	0.07	0.06
	est.	4	10	16	20	23	38	84
T. monococcum (forks)	n°	-	-	-	2	-	-	-
T. dicoccon	n°	7	4	5	18	11	-	4
	g	-	-	-	0.05	-	0.01	-
	est.	7	4	5	23	11	1	16
Hordeum vulgare	n°	157	105	64	308	194	238	225
	g	0.22	0.33	0.16	1.23	0.91	0.68	1.27
	est.	179	138	80	431	285	306	1,408
Galium sp.	n°	1	-	-	-	1	-	-

[Table 9- List of taxa and the numbers of remains given for each sample from the A1315 context.]

[Figure 29- *Galium* sp. seed coming from the A1315 context. Small dimensions, perfectly spherical shape and a large hole are the diagnostic traits. Also the reticulate rough surface is visible]

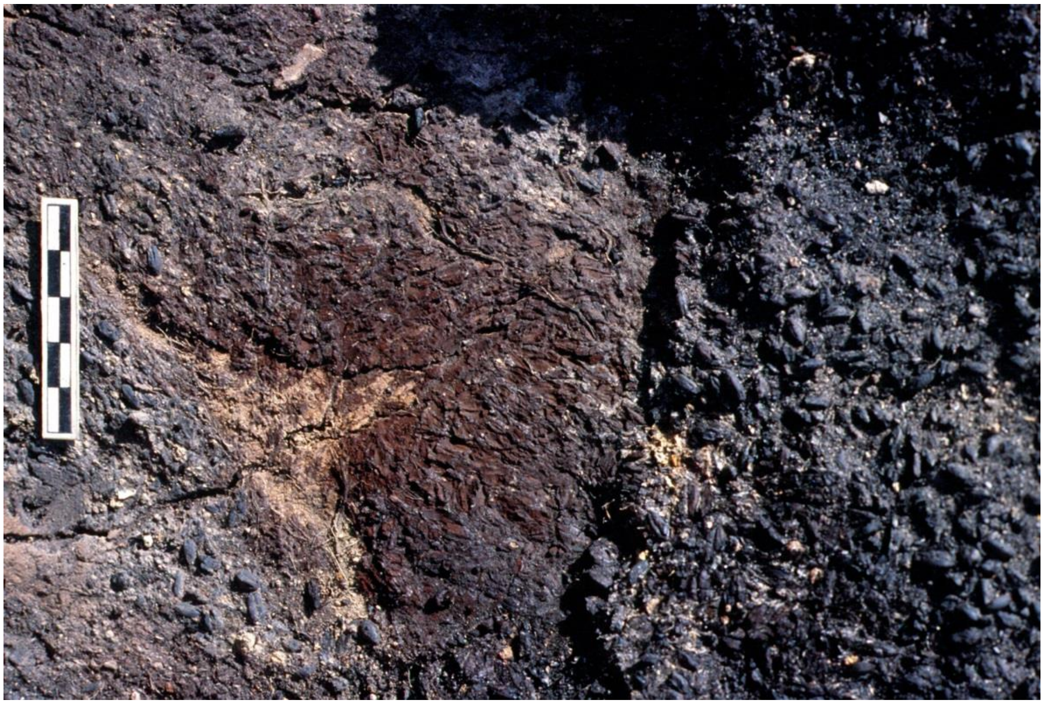
5. DISCUSSION

The analyses conducted on the 57 previously mentioned samples form the Arslantepe VI B2 village were aimed to conclude carpological analyses from this period and in that way delve deeper into understanding of the diet and the daily food processing activities of the Arslantepe inhabitants in the Early Bronze Age. This is possible due to an incredible preservation where a great deal of carpological material was charred in one event upon the burning of the whole village.

A trend in the aforementioned results is noticed concerning the purity of crop samples. The majority of samples contains only crop seeds and fruits, and lacks any other plant parts or weed remains. The estimation of about 38,000 seeds and fruits speaks about the burning being very favorable for plant material preservation. Still, the lack of certain plant parts or plant taxa among the recovered material may be a consequence of them not being used or brought to the living area in the past, or of them not being preserved by the fossilization process during deposition, in this case carbonization. It is important to determine what the cause is, in order to avoid giving false interpretation. Many studies, often including experiments, have been conducted to discuss the modes of preservation of botanical material. They tend to better explain how these processes affect the botanical material in a matter of changing its size and shape, but also in the matter of the selection occurring among the material, i.e. different plant parts or species being favored in specific conditions. As Hillman (1984) reports, burnings with limited supply of oxygen, often occurring in large-scale burning occasions (like house fires), influence charring of a great variability of seeds. Such an event affected the whole VI B2 village at the end of its existence. Such occasions apart from influencing plant taxa diversity in the material, should influence a big diversity in plant part preservation as well. Hillman claims that such material can contain even the most fragile parts like light chaff and straw. Boardman and Jones (1990) conducted experiments in order to explain under which conditions which plant parts of cereal can be preserved. They report that the straw is the hardest part to preserve, while the glume and glume bases have higher likelihood of fossilizing and are often recovered among archaeological material. The grains, of course, have the highest chance to become preserved. A good way of assessing the degree of bias and the likelihood of chaff becoming preserved is by observing the distortion of the preserved grains (Boardman and Jones 1990). Among my material grains were preserved intact in most cases, and very low fragmentation and surface distortion is evidenced. Apart from this, one sample containing a relatively large number of durable forks indicates that the carbonization process was optimal for the preservation of such parts. As Gustafsson (2000) concluded in his experimental study, all cereal grains char equally, with bread wheat having slightly lower chances to preserve. Nevertheless, the recovered bread wheat kernels among the Arslantepe material are equally well preserved, which means the temperature of burning was not high enough to cause such bias. Given all these facts it is assertive to conclude that the VI B2 plant assemblage does not suffer from a preservation bias and, thus, a similar assemblage of grains was deposited as it was recovered.

The lack of straw and chaff and clean samples containing almost 100% of crop grains are a result of human actions in the past. The chaff and straw have an economic value in many cultures and are often used for the tempering of clay in pottery and daub production, for fodder, or as fuel (Van der Veen 2016) which is not excluded at Arslantepe, but no evidence for the chaff and straw being kept exists. The case of storing only clean crops is the same for many previously studied contexts at the site from the VI B2 and other periods as well (Masi, Sadori, Susanna, Vignola, unpublished data). For example the house XXXVIII in the center of the village contained a lot of fork and ear finds in two rooms where processing probably took place, but in the storage room of the house only clean samples were recovered (Piccione et al. 2015). Another VI B2 house, with the room A170 containing a lot of chaff remains, seems like a house where the processing as well as storing and consuming took place. Indeed, the households had their storages, stables and domestic installations and were apparently economically independent. But the rest of the storage rooms and domestic areas contained only minor amounts of chaff residues (Masi, Sadori, Susanna, Vignola, unpublished data). Clean cereal remains present at the site and in independent storages next to the M120 wall indicate that they were threshed and weaned somewhere else, very thoroughly before the storing. After the crop processing and cleaning, the grains were probably taken to dry, perhaps on the roofs of the houses, and then stored in these rooms. An important thing to mention is that only a part of the village from this phase was excavated and the mound has not been fully studied yet, due to the destruction of parts of the VI B2 village by the constructions from subsequent periods. Therefore, the place where crop processing for the analyzed samples took place might have been somewhere else but was not documented. It was, nevertheless, done on a large scale for all the harvest, not on a daily basis before the cooking and consumption. This practice was evidenced in previous phases of occupation at Arslantepe and presents a continuation of routine procedures in the VI B2 period (Frangipane: personal communication). This observation is in accordance to the claim that in this period Arslantepe is inhabited by the local faming populations who lived in the surrounding area in the Chalcolithic times, as evidenced by the material culture. It shows that they continue their agricultural practices even though the social system has changed greatly with the collapse of the centralized elite power from the Late Chalcolithic 5. On the other hand, as presented by Vignola et al. (2017) in the study of carbon and nitrogen stable isotopes from cereal grains, the practices concerning the growth and manuring of the crops have changed. In the period with centralized power the high-level irrigation was evidenced in which case the crops grown on poorer soil can give good yields. After the collapse of the Late Chalcolithic 5 society, the barley grains show less water availability, which indicates that it was grown on poorer soil than the *Triticum* species and not irrigated, in which case it still succeeds, since it is more drought resistant. This change might be a consequence of the influx of new Transcaucasian populations, but also of the lack of centralized large-scale production and of environmental constraints as well.

Interpretation of the studied plant remains can be usefully made based on their archaeological context (Figures 34 and 35). Such work is empowered by the preservation of archaeobotanical material in one event when the whole village burned and sealed them *in situ*. As mentioned in the paragraph about materials and methods, the seeds and fruits were often recovered from layers sealed by the collapsed roof material. Therefore, we can conclude that a lot of samples were placed on the floor of the rooms before the fire occurred and, since they were mostly grouped and collected as a sample *in situ*, probably placed in jars or sacks. Some of them are clearly coming from structures constructed for the purposes of crop storing, like *siloi*. It is also clear that families used the roofs of the houses, which might have been some kind of attic area or just a covered open space, for keeping the harvested crops. This is evidenced by the fact that a substantial amount of seeds comes from layers above the roof material as well (Figure 30). Many of these seeds also ended up in the streets after the collapse of the house. For these reasons it is probable that the VI B2 village burned somewhere after the harvest of the cereal crops and they were put on the attic area in order to likely dry them prior to storing in jars, sacks or *siloi.* In the streets I analyzed the finds were



[Figure 30- A thick layer of charred carpological material recovered from above the wooden beams which are interpreted as the roof remains]

not so abundant; however the finds from the street A152 are in correlation with the finds from the rooms surrounding it (A153 and A167) (Figure 7). These rooms do not have the quantitative data available, but only qualitative and unpublished ones. They both contained *Triticum dicoccon*, *Triticum aestivum/durum* and *Hordeum vulgare.* The only sample not coming from the very floor of the room A153 contained *Triticum aestivum/durum* and *Hordeum vulgare* which is the reason these taxa might be more abundant in the samples from A152. Nevertheless, it is hard to make such assumptions when no quantitative data is available.

The room A472 surely contained a lot of carpological material on the roof since most of the samples are coming from the archaeological layers connected to the upper floor. These 17 analyzed samples (all apart from 684 and 687 samples) show a diversity of taxa including mixed crops of cereals and pulses (the edible seeds of legume plants) (Table 4). They mostly contained einkorn, followed by emmer and barley, but also had abundant finds of peas, vetches and chickpeas. All taxa are dispersed on the whole area of the room, but with some spatial groupings. Given the fact that in storage pots or *siloi* of other rooms as well as the kitchen floors, there is no big mixing of the taxa, but were, on the contrary, always kept apart, it is likely that in this house they were placed in organic sacks or baskets that could not survive charring. Nevertheless, there is not enough evidence to rule out the possibility of them all being kept mixed. Most of data from the analyses carried out on the ground floor are unfortunately unavailable and therefore a concise comparison of taxa composition between the ground floor and the upper floor was not possible. Nevertheless, the two samples of my study (684 and 687) coming from the floor of the house, and six samples previously analyzed, show a much greater relative abundance of legumes. With both floors containing such a vast amount of crops, this room undoubtedly served as a storing or crop processing space. Since it also contained a basin-type structure, a fireplace and a bench, it wasn't used solely for storing, but also for daily activities. Indeed the finds of several rose and hawthorn fruits on the bottom floor indicate an immediate use of the plant, since they are not likely to be stored but can be consumed fresh or used for making jams or juices. They were recovered only from the area around the bench in the northeast corner (Q1, Figure 8) and might have ended up here as being consumed on the spot. In my opinion, this gives more an impression of a food preparation and consumption area, with the upper floor being used for storing. A crude copper found on the floor speaks about the connection of this room to metallurgic activities. Since the ore smelting is rather unhealthy, and there is evidence for the metallurgic areas elsewhere in the village, this process was most probably not taking place inside the room. This multipurpose room might have been connected to other ones, and in that way a part of a house, but, since it has an entrance on the north side it also could be a building for itself.

A999, with its pure barley finds and a structure with a clear function as a *silos* can undoubtedly be called a storage room. It is not a part of a house but space used only for keeping the dried crop yields, namely barley. No indication of daily activities, such as food preparation, is evidenced since there are no domestic installations. Barley is commonly used for beer production, and for bread making as well (Renfrew 1973, Zohary and Hopf 2000). It is often considered the least palatable cereal, especially if hulled (like all the specimens in this study) due to the presence of bracts such as *lemma* and *palaea*, whose removal is a very tedious work. Therefore, oftentimes it was grown for the consumption of animals, as fodder, which is nowadays the main purpose of this crop (Zohary and Hopf 2000). However, at

Arslantepe, this crop was probably used for human consumption, especially if we take into account the kitchen with evidence for barley preparation. The likelihood for this room to have contained livestock feed is, in my opinion, not very high, by the logic that animals can be fed with crops which are not thoroughly cleaned, and even with straw alone. The material coming from the silos of A999 is exceptionally clean and appears to be remnants of cereals ready for human food preparation.

In the second building phase of VI B2 period, the room A1018 serves as a storage to a certain extent. Most probably there were two sacks containing carpological specimens, one of them, containing pure barley placed close to the entrance and another one, containing the vetches, with a few lentils and peas, in the opposite side of the room. Some of these seeds were classified as *Lathyrus*, possibly *Lathyrus cicera*. This is a wild vetch encountered on some Early and Middle Bronze Age sites, and according to Renfrew (1973) it is collected from the wild or grown to be used as fodder. This sample might be here for that reason, especially because it contained only three pea seeds which seem to have an important role in the human consumption of Arslantepe. On the other hand, the small amount of he sample would speak differently. The rest of the material comes from an earlier phase, perhaps the first building phase of the VI B2 village, and was mostly contained in the E1 *silos*, which became a bench, or a platform, in the later phase. The specimens outside this structure were found in the wall and floor material around it, and are considered to originate from the same time. Since this structure was a *silos* in the first building phase, it is clear that the same area maintained its function as a storing space in the latter phase when the wall gate was closed and the room A1018 built. It gives a possibility to think that the spaces on the inner side of the wall were used as storage in the first phase of VI B2 period, when the monumental wall had its defensive function as well.

[Figure 31-The biscuits recovered at Arslantepe]

The room on the outer side of the monumental wall, built in the second phase of the VI B2 village (A1186) was interpreted as a kitchen by the archaeologists. Since in the room only barley seeds were found in big amounts it is clear that it was used for human consumption. As mentioned before, there was a hole with a mortar for grinding, which served for coarse flour or flakes production. They could be later made into porridge, or mixed with other flours to make bread or some kind of biscuits, like the ones discovered on the site (Figure 31). The very well-known practice commonly associated with barley is the production of beer. For the brewing of alcoholic beverages whole cereals are soaked in water until they sprout, afterwards are ground and left to ferment by spontaneous yeast addition from the air (Hornsey 2003). It is evidenced by the pottery analyses, as well as in the ancient written documents from the Mesopotamian cities even before the Bronze Age (Renfrew 1973). It can also serve to produce non-alcoholic beverages by just boiling barley in hot water (Hornsey 2003). Many barley seeds from this room were agglutinated upon retrieval, which means that they were wet when charred (Figure 32). This seems like a possible find of beer production or of soaking barley caryopses for some other reasons as a step in preparation.

[Figure 32- Several caryopses of barley glued together upon retrieval. They come from sample 2729 from the A1186 kitchen]

The roofed area on the inner side of the monumental wall (A1187), built in the niche of it, was from the start considered to be a storage space due to a number of big storing pots, like *pithoi*. This was confirmed by carpological analyses from a pot and from a floor sample. The clean crops of only caryopses of the floor sample are in correlation with the rest of the samples in the village, but the pot X22 contained a lot of cereal forks which are among not so common finds of rachis remains. Apart from this sample, chaff remains were found only in small amounts, up to a few counts, apart from samples from three rooms (A170, A707 and A710; Piccione et al. 2015) where the cleaning of the samples by fine sieving probably took place prior to food preparation. In the pot mixed emmer and einkorn were probably in the process of production, since again we have a lot of agglutinated caryopses and some emmer still paired together (Figure 33). This might be due to the same reason as the above mentioned barley grains, being charred in the moment of soaking or left to ferment, since it is found outside the areas used for cooking. The floor sample which contained an estimation of 3,080 *T. aestivum/durum* caryopses makes up the largest sample of this taxon in the site. It was mixed with hulled cereals einkorn and emmer, with einkorn being the dominant species. It is an interesting find because the *T. aestivum/durum* grains demand different processing than the *T. monococcum and T. dicoccon* ones before consumption. The *T. aestivum/durum* is a free-threshing cereal because it does not retain the spikelet small bracts (*palaea* and *lemma*) after the threshing, unlike the *T. monococcum* and *T. dicoccon*. The latter are hulled cereals and must go through a process of de-husking before preparation, therefore they were probably separately processed and then mixed together in order to be prepared. As can be seen in Figures 11 and 12, much more than one pot were recovered in the room. Since only one contained caryopses, most likely this space was used for storing liquids which might have been wine, but as the crop finds indicate, could also be beer. Apart from one find of grape seed among my samples (from A472), 12 more were found on the site in this period so far, demonstrating that the vine grape was well-known to Arslantepe dwellers, but not widely used.

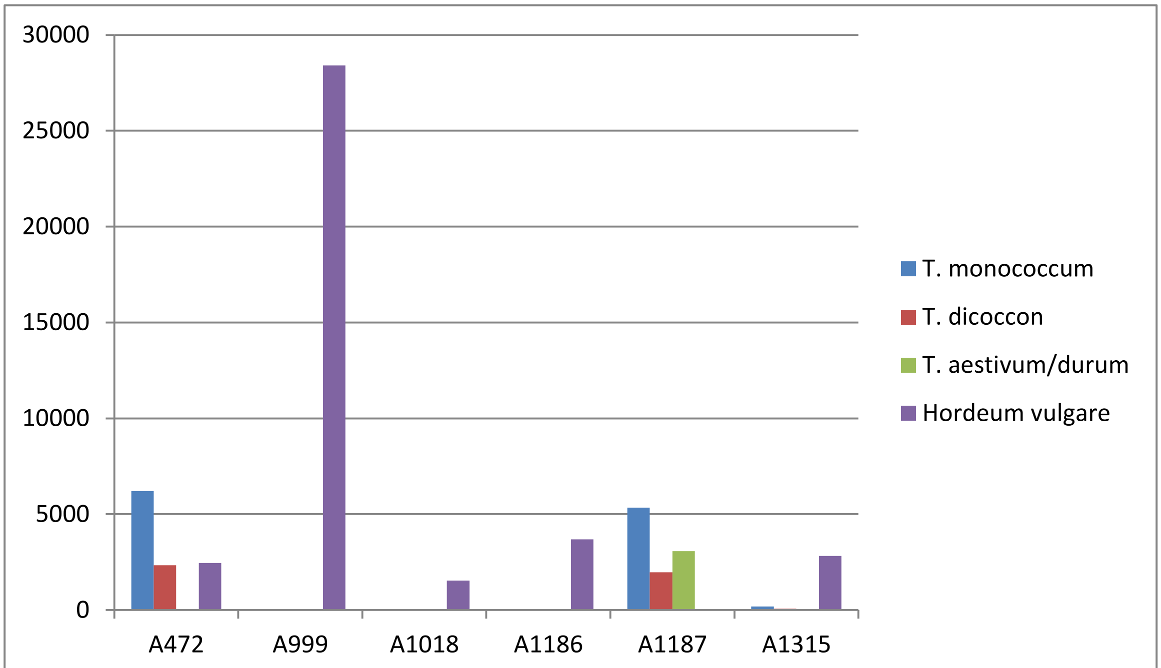
As the A1315 context is not fully clear, it is hard to interpret the results. They come from a small passageway which was partially walled in the second phase of the VI B2 period, when the wall lost its primary defensive function. This little passage could have been used as an arrow slit in the first phase, but as the wall was losing its function it could gradually start being used as a shelf or a storing place connected to the room A1182. The samples contain mostly barley with an addition of emmer and einkorn and were recovered among pottery shreds. They were not recovered in a great amount typical for big storing spaces but could have contained grains which about to be further prepared. The preparation was to be done with mainly barley, but an addition of *Triticum* species could be intentional due to their high percentage of gluten which could improve the properties of dishes or pastries about to be made (Renfrew 1973).

In the central part of the investigated village, where complexes of rooms make up a house, it is clear to whom the storing space belonged, like the previously mentioned XXXVIII house with the storage area A736 (Piccione et al. 2015). On the contrary, the four storage spaces (A999, A1018, A1187 and A1315) on the inner side of the wall M120 do not make up a part of a complex of buildings, but stand alone. The open space in front of them contains no structures and no plant material either. Nevertheless, they were actively being used and had an important place in everyday activities of someone who lived in the village at that time, since they contained very clean crop samples ready to be cooked, as well as, most probably, stored liquids and cereals in the process of food preparation. So, who did they belong to? Was it the people who inhabited the unearthed houses outside the walled area who just used the walls structure to build new storage rooms in this phase, or was it belonging to someone who lived inside the walled part of the village? As explained in the introductory paragraph, in the previous period (VI B1) a fence was defending the upper part of the mound, which became the big wall in the VI B2 period. At this time a single hut, considered to belong to a chief or a higher status person was constructed here. A continuation in the purpose of the upper part of the village is most probable and, in that case, these staples in VI B2 might have belonged to a higher status person or a group. Even when the purpose of the wall changed with the addition of rooms on both sides and the walling of the gate, we cannot

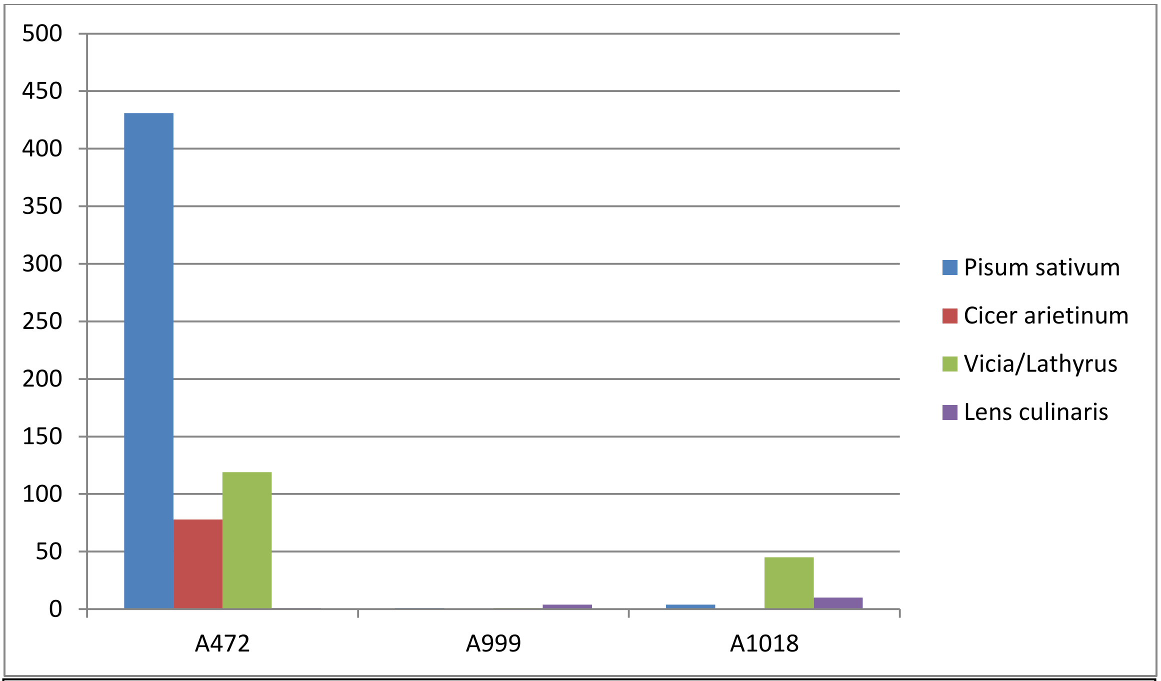
[Figure 33- Three pairs of *Triticum dicoccon* kernels still holding together. They come from the 2726, pot sample, from the A1187 room] securely confirm that it completely lost its defensive function, which means the second building phase of VI B2 might similarly have chiefs living in the upper part of the village with their storage areas incorporated in the wall. On the other hand, these rooms built on the monumental wall might have emerged here just to use the space and construction of the wall when the defensive function was becoming marginal and in that way belong to the people of the unearthed village. These are the possibilities which cannot be further discussed, since the archaeobotanical data is not sufficient to answer who the staples belonged to and what was the purpose of the inner part of the village. What can be concluded is that this area was apparently being used for storing before the second building phase of the VI B2 period, since the *silos* of A1018 belonged to the first building phase. The storing purpose of this area was definitely intensified in the second building phase when the rooms discussed here were built.

Interpretations can be made not only based on the relative quantities of plant remains in each archeological context, but also on their spatial distribution. In the storage areas different cereal crops are found separated, i.e. barley is kept separated from emmer and einkorn, which means that they were for sure always grown and processed, and possibly consumed, apart (Figure 34). This confirms that in the cases where many seeds are found mixed, they were probably originally stored separately, but the storing sacks or baskets didn't survive the charring and consequently we recover many taxa mixed together. According to Zohary and Hopf (2000) einkorn is commonly grown with other types of wheat in the same field, but sometimes it is sown separately. A mixture of einkorn and emmer, referred to as maslin, such as in the Arslantepe samples, can oftentimes be found on prehistoric sites of the Near East (Zohary and Hopf 2000). This is not the case with pulses in this period at Arslantepe. They are usually found as groups of species mixed together. Most commonly a combined group is formed of peas and chickpeas, but among my samples *Vicia/Lathyrus* is also abundant (Figure 35). It is evident that the cultivation of legumes played a vital role at Arslantepe for the consumption of their protein-rich seeds, which makes them a great accompaniment to a cereal-based diet. They can be prepared fresh or dried for storage (Renfrew 1973). There is no direct evidence on how pulses were consumed, but we can assume that it was made into a soup or a stew which is documented in Roman times and in the ethnological studies. The study on the types of vessels would be of help in determining how they were prepared. Pulses can also be made into flour which might have been used for the production of bread, possibly mixed with the cereal flour (Renfrew 1973). Special care needed to be taken with the vetches preparation because they contain elements which make it bitter and toxic for human consumption. Soaking in water prior to cooking helps in their elimination. Nowadays, the vetches are used mainly for animal consumption or as human food among poor people (Zohary and Hopf 2000). We cannot say if in prehistory vetches were considered less appealing food as well, but since they are recovered mixed with very palatable and edible peas and chickpeas they were very likely to be consumed by humans also.

In this study, only the plant remains concerning the food remains are being discussed, but the agriculturalist people inhabiting Arslantepe in the Early Bronze Age I consumed meat and very probably milk products. This is attested by the archaeozoological analyses: the most domestic animal bones belong to cattle, but caprine ones are also recorded (Piccione et al. 2015).



[Figure 34- A graph depicting the amount of cereals studied in this work. The number of the investigated rooms is given on the x-axis, and the amount in estimated numbers on the y-axis]



[Figure 35- A graph depicting the amount of pulses studied in this work. The number of the investigated rooms is given on the x-axis, and the estimated amount of seeds on the y-axis]

6. CONCLUSIONS

A vast amount of plant materials preserved from a prehistoric site, like it happened at Arslantepe during the VI B2 period, represents a unique case among the archaeobotanical studies. The carbonization of the plant remains on a broad area in a single event made it possible to interpret them on a large scale, and to speak about the crop production and food preparation activities of the whole village instead of events from a single house or a single hearth. This gave the opportunity to investigate the crop processing, storing and dietary practices of Arslantepe inhabitants in the Early Bronze Age Ib.

In this period cultural and political changes were occurring at the site. There is an apparent changeover in the social system. The sudden cut with the previous elite ruling led to a not centralized society. This is evidenced especially in the agricultural practices by the agronomic conditions for crop growth. Nevertheless, some traditions are still being practiced, like the storing of very clean crops. The large amounts of stored seeds indicate that the cleaning of crops was done on a large-scale for the whole harvest before the storing, meaning that the day-to-day habits of food preparation stayed the same with few needs for the last cleaning before the meal cooking. It is likely that the same rural people, who were previously involved in the centralized system, are now inhabiting the site and the individual households seem to have economic independence even though the subsistence strategies have not radically changed. This is reflected in them having their own storages and stables.

The plant diet of the Early Bronze Age Ib inhabitants of Arslantepe is typical of a traditional agriculture-based model. The main crop production is that of cereals of which barley is the predominant one, but a great deal goes to einkorn and emmer; naked wheat is also common. People produced coarse flour in the kitchens where bread or biscuits were baked in big circular ovens, as well as, possibly, cereal meal porridges made on open hearths. There are clues indicating beer production, which could have been stored in large pots. Apart from cereals, pulses make an important share among food resources and a big protein input next to meat and milk products of cows and caprines. The most popular ones are peas and chickpeas, but wild vetch species are also grown or perhaps collected from the wild. In the plain of Malatya, Arslantepe inhabitants had access to other juicy fruits such as various types of edible berries, of which hard parts were fortunately preserved and identified at the site. The identified species are blackberry, elderberry and roses. A share of the yield was meant for the livestock feeding, as well as seeds collected from the wild. Like in every agriculturalist community leftovers from crop processing and human feeding often belong to animals, and it can be assumed that at Arslantepe it was no different.

At this point it is impossible to undoubtedly define what the purpose of the storage rooms on the inner side of the big fortification wall was, and if there did maybe someone of higher status inhabit the defended area. Whatsoever, the change in the function of a defensive wall surrounding a village is commonly interpreted as a change in the turbulence of the area, when there is no more need for such an obstruction. At the end of the VI B2 period, the Arslantepe inhabitants suffered a bitter fate when their home was devastated with all the annual crop yields carefully cleaned and stored for the months to follow. This happened, perhaps, due to the very assumption that the defensive function of the wall was no more needed, while the story we unravel five millennia later speaks differently. Due to the full exploitation of current results and evidence, my investigation goes no further. Future studies with modern technologies, following the multidisciplinary approach that many specialists already grasped, will undoubtedly delve even deeper into the everyday life of Arslantepe dwellers and their unfortunate fate, and in that way continue to canvass the story of the Bronze Age Near Eastern societies.

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