

# **COOKING WITH PLANTS IN ANCIENT EUROPE AND BEYOND**

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# **COOKING WITH PLANTS IN ANCIENT EUROPE AND BEYOND**

*Interdisciplinary approaches to  
the archaeology of plant foods*

SOULTANA MARIA VALAMOTI, ANASTASIA DIMOULA AND MARIA NTINOU (EDS)

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# Early Chalcolithic plant economy at Aktopraklık Höyük in northwest Anatolia: preliminary findings

Ceren Kabukcu, Eleni Asouti, Emma Percival,  
Ellen Grice, Necmi Karul

## Abstract

This chapter presents preliminary archaeobotanical evidence from the Early Chalcolithic occupation at the site of Aktopraklık Höyük in northwest Anatolia, near the south Marmara coast. Samples collected in 2016-17 and processed during the 2017-2019 field seasons, using a rigorous recovery strategy, have yielded a rich and diverse archaeobotanical assemblage, containing ubiquitous and abundant crop remains as well as charred fruit, seeds and nutshell from indoor floor deposits and outdoor courtyard and communal areas. Our preliminary results also indicate spatial variation between indoor and outdoor areas with regard to crop processing and food preparation and consumption activities.

*Keywords: Chalcolithic, archaeobotany, Anatolia*

## 6.1 Introduction

### 6.1.1 The study area

Aktopraklık Höyük is located in northwest Anatolia, approximately 25 km from the Marmara Sea on the eastern terraces of Lake Ulubat. Ongoing excavations at the site since 2002 have uncovered three distinct areas of occupation (A-C) spanning the Late Neolithic and Early Chalcolithic (ca 6400-5600 cal BC) (Karul 2017; Karul and Avcı 2011). While sampling for archaeobotanical remains had been carried out from the initial stages of excavation, reporting on this material, including samples from both Neolithic and Chalcolithic deposits, has been limited. The study of the anthracological remains (Schroedter and Nelle 2015) indicated the presence of mixed deciduous woodland in close proximity to the site including hazel, plums/cherries, oak, etc. The samples available for the present study were recovered during the 2015-2017 excavation seasons, which targeted Early Chalcolithic occupation layers dug in Area B (dated to ca 5900-5750 cal BC) including a series of buildings arranged in a semi-circular plan surrounded by a large ditch/channel structure (see Fig. 6.1). The buildings of Area B encircle a large, external/communal area at the centre of the settlement. Ovens and hearths are found inside buildings, with larger ovens also occurring in external spaces.

While there is an abundance of published archaeobotanical studies from other regions of Anatolia (e.g. central and southeast Anatolia; see Bogaard et al 2017, 2021; Kabukcu

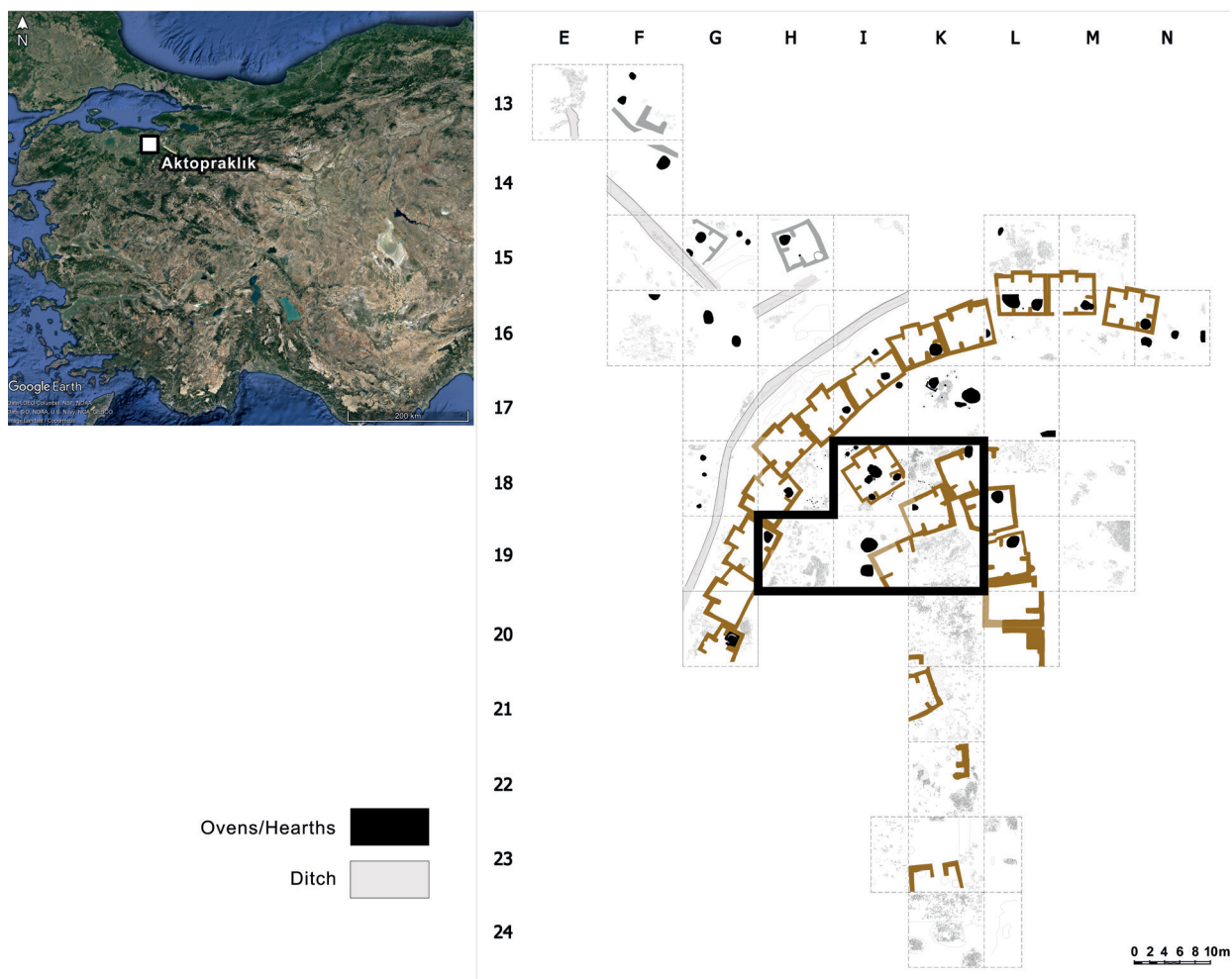


Fig. 6.1 Location of the site and map of Area B (highlighted in thick black line are the excavation squares sampled for archaeobotanical remains in 2016-17).

et al 2021, and references therein) to date published reports on crop economies and plant use from Neolithic and Chalcolithic sites in western and northern Anatolia have been limited. In this paper we present preliminary findings on the Aktopraklık materials and outline future directions of research based on these early results.

### 6.1.2 Previous archaeobotanical and archaeobiological research at Aktopraklık

Previous analyses on wood charcoal remains and carpological finds from Aktopraklık reported in Schroedter and Nelle (2015) have suggested the exploitation of a diverse woodland catchment in the environs of the site. The examined samples, spanning all phases of occupation from the Late Neolithic to the Chalcolithic, indicate the existence of a diverse vegetation cover including *Pistacia*, *Rhamnus/Phillyrea*, *Prunus* spp., *Maloideae*, *Fraxinus*, *Pinus*, *Cupressaceae*, etc. The dominant fuel wood species were deciduous and evergreen *Quercus*

and *Carpinus*, indicating the local presence of mixed oak-hornbeam woodland. The presence of *Corylus* wood and nutshell in Neolithic and Chalcolithic samples points to the early use of this taxon as a source of gathered food in northwest Anatolia.

The preliminary results of zooarchaeological analyses at Aktopraklık indicate the importance of domesticated animals in the subsistence economy, notably caprines (sheep and goat) and cattle alongside a reliance on hunted mammals such as fallow deer (Budd et al 2013, 2018).  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  isotopic determinations on human remains from the site had previously suggested a potentially greater reliance on animal products as sources of dietary protein compared to crops (Budd et al 2013, 2018). However, the authors noted that the consumption of crops grown in manured fields could have also contributed to the isotopic signatures of human remains. At that time, evidence for crop use such as cereal and pulse seeds, chaff and wild/weedy taxa had not been recovered (Schroedter and

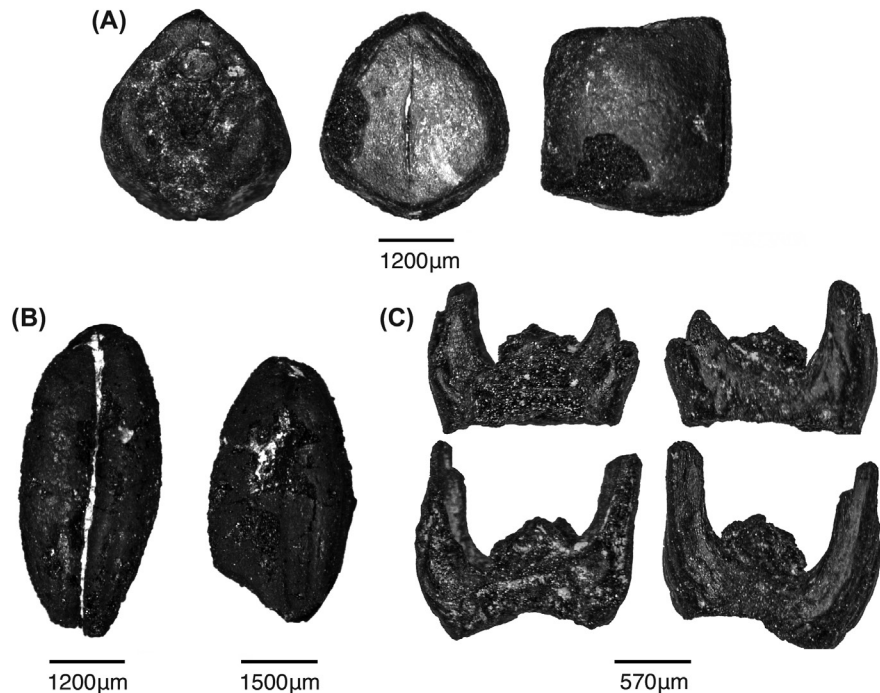


Fig. 6.2 Selected archaeobotanical finds from Aktopraklık. a *Lathyrus*; b *T. monococcum* grain; c *T. monococcum* spikelet forks.

Nelle 2015). This probably reflects the sampling strategy adopted by Schroedter and Nelle (2015) which focused primarily on non-domestic, external areas and outdoor pits, avoiding building spaces and features such as hearths and ovens, in order to maximise the utility of the sampled deposits for palaeoenvironmental reconstruction (see also Kabukcu and Chabal 2021). One of the key objectives of the current archaeobotanical project at Aktopraklık has been to increase the scale, intensity and spatial coverage of archaeobotanical sampling, by systematically collecting sediment samples  $\geq 40$  l from a broad range of archaeological contexts and features. Samples are routinely processed by machine-assisted flotation using a 3-tank high-capacity recycling water system. The light flot fractions (containing charred plant remains and light shells) were captured with a chiffon mesh, labelled and hung to dry slowly in the shade. The heavy residue fractions (containing mostly lithic and bone debris, pottery fragments, microfauna and very small artefacts) were retained in a 500  $\mu$ m nylon mesh that was securely pegged to the walls of the flot tank. Once dried, flot fractions were passed through a stack of geological test sieves (meshes 4mm, 2mm, 1mm, 500 $\mu$ m and 250 $\mu$ m). The  $>4$ - $>1$ mm fractions were sorted in their entirety under a Leica S8APO stereozoom microscope (magnifications  $\times 10$ - $\times 80$ ). The remaining fractions were subsampled with a riffle box. The application of this processing protocol resulted in a significant improvement of charred plant recovery rates and the overall density of archaeobotanical remains (particularly for fractions  $< 500\mu$ m). Furthermore, the

introduction of a highly efficient sediment washing system has greatly improved recovery rates from the marl-rich clayey soils characteristic of the site.

## 6.2 Preliminary archaeobotanical results

### 6.2.1 Archaeobotanical finds

To date  $> 2000$  litres of sediment (corresponding to  $\sim 50$  flotation samples) have been processed deriving from domestic floor contexts from 2 excavated buildings and outdoor spaces dug in the central part of Area B (see Fig. 6.1). While full sorting and quantification of the charred wood and non-wood macrofossils are ongoing, the first results of our analysis confirm the ubiquitous presence of a diverse crop suite including glume wheats (*Triticum monococcum*, *T. turgidum* subsp. *dicoccum*, *T. timopheevi* ("new" glume wheat/NGW) (Figs 6.2-6.3), free-threshing wheat (*T. aestivum* / *durum*), and naked and hulled barley (*Hordeum vulgare* var. *nudum*, *H. vulgare*). Verified pulse crops so far include *Lens*, *Vicia ervilia* and *Lathyrus sativus*. In addition, nut and fruit remains such as *Pistacia* and *Ficus carica* are ubiquitous (Fig. 6.4). Cereal chaff remains are also very abundant and ubiquitous, including hundreds of charred awn fragments, which further testify to the effectiveness and precision of the new sampling and flotation recovery methods adopted at Aktopraklık.

A preliminary comparison of crop and wild fruit and nut presence between Aktopraklık and other Neolithic and Chalcolithic sites in Anatolia (Table 6.1) demonstrates the unique nature of the Aktopraklık crop



Fig. 6.3 *T. timopheevi* ("New" glume wheat/NGW) spikelet fork from Aktopraklık.

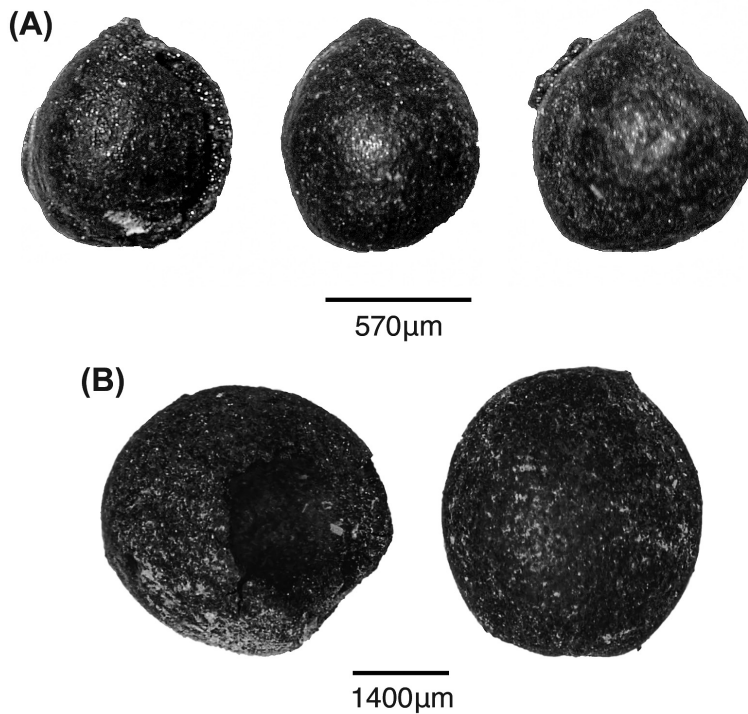


Fig. 6.4 Selected archaeobotanical finds from Aktopraklık. a *Ficus carica*; b *Pistacia*.

assemblage. Notably, NGW has thus far not been reported from other sites in northwest Anatolia, such as Ilıpınar and Barcın, dated to the Neolithic and Chalcolithic periods (Cappers 2008; Balcı et al 2019). NGW has been previously reported from Neolithic layers excavated at Yenikapı (Ulaş 2021; Ulaş and Fiorentino 2021). NGW is an important component of crop assemblages reported from central Anatolian Neolithic and Chalcolithic sites (e.g. the Çatalhöyük East and West mounds: Bogaard et al 2017, 2021; Stroud 2016). We should note here that NGW could have also existed at other Neolithic sites such as Höyücek and Hacılar the archaeobotanical studies of which predate its identification) and from Yumuktepe on the southern Anatolian coast (Fiorentino et al 2014).

Furthermore, while *Pistacia* is found at Aktopraklık (both as wood charcoal and nutshell), this taxon is absent

from Ilıpınar and Barcın. This regional disparity in the use of *Pistacia* also stands in contrast to the pattern observed in Neolithic and Chalcolithic occupations in central and southwest Anatolia (Table 6.1). In fact, *Pistacia* and almond are some of the most ubiquitous wild fruit/nut taxa used across Anatolia, a tradition which continues from earlier periods (Ergün et al 2018). The presence of both NGW and *Pistacia* at Aktopraklık (if not attributed to preservation and recovery factors) may thus point to a greater affinity and/or continuity with regard to plant use and culinary choices with occupations further afield in central and southern Anatolia.

Period	Region	Site	Einkorn	Emmer	New glume wheat	Free-threshing wheat	Hulled barley	Naked barley
N	NW	Yenikapı	x	x	x	x	x	x
N	NW	Pendik Höyük		x(?)			x	
N/C	NW	Ilıpınar	x	x		x	x	x
N/C	NW	Barçın Höyük	x	x		x	x	
N/C	NW	Aktopraklık	x	x	x	x	x	x
N	C	Çatalhöyük East	x	x	x	x	x	x
C	C	Çatalhöyük West	x	x	x	x	x	x
N	C	Erbaba	x	x		x	x	x
N	SW	Höyücek		x		x	x	x
N	SW	Hacılar	x	x		x	x	
N/C	S-Med	Yumuktepe	x	x	x	x	x	x

Site	Lentil	Bitter vetch	Grass pea	Chick pea	Pea	Flax	Terebinth/Pistacia	Almond	Fig	Hazel
Yenikapı	x	x	x	x	x	x			x	
Pendik Höyük			x		x	x				
Ilıpınar	x	x	x	x	x	x			x	x
Barçın Höyük	x	x		x	x	x				x
Aktopraklık	x	x	x			x	x		x	x
Çatalhöyük East	x	x	x	x	x	x	x	x	x	
Çatalhöyük West	x	x	x	x	x		x	x	x	
Erbaba	x	x	x		x					
Höyücek	x	x	?	x	x		x			
Hacılar	x	x	x	x	x		x	x		
Yumuktepe	x	x		x	x	x	x	x	x	

Table 6.1 Presence of main crop and wild fruit/nut taxa across selected Neolithic and Chalcolithic sites in Anatolia. Period: N= Neolithic, C=Chalcolithic. Region: NW=northwest, C=central, SW=southwest, S-Med= south, Mediterranean coast. Yenikapı and Pendik: Ulaş 2021; Ilıpınar: Cappers 2008; Barçın höyük: Balcı et al 2018 ; Çatalhöyük East: Bogaard et al 2017; Çatalhöyük West: Stroud 2016; Erbaba: van Zeist and Buitenhuis 1983; Höyücek: Martinoli and Nesbitt 2003; Hacılar: Helbaek 1970; Yumuktepe: Fiorentino et al 2014.

All three sampled sites located in the Marmara region (Aktopraklık, Barçın, Ilıpınar) have provided early evidence of the use of *Corylus* (hazel) starting from the late Neolithic and continuing into the early Chalcolithic. This probably reflects an environmental gradient, as hazel is a taxon characteristic of more humid temperate environments. Another interesting commonality of crop use with Barçın and Ilıpınar is the presence of abundant remains of flax (*Linum usitatissimum*) at all three sites (Cappers 2008; Balcı et al 2019). Flax is ubiquitous at Aktopraklık; it is hoped that further work will provide greater insights into the antiquity of its use at the site and its potential uses.

A significant divergence between the northwest and central Anatolian Neolithic and Chalcolithic occupations is the absence of dung remains from Aktopraklık, Barçın and Ilıpınar. The reliance on this fuel type is very well documented in central Anatolian sites (Bogaard et al 2017, 2021; Stroud 2016; Ergün et al 2018). Thus far we have not found charred or mineralised dung remains at Aktopraklık (despite the confirmed presence of caprines from its earliest phases). Future archaeobotanical analyses, coupled

with planned micromorphology work, will clarify whether dung was among the fuel sources exploited by the site inhabitants.

### 6.2.2 Emerging evidence of crop use and processing activities

While full sorting, identification and quantification of the Aktopraklık archaeobotanical samples are ongoing, some preliminary observations on the nature of crop use and food preparation activities at the site are feasible. As expected, the composition of the samples originating from domestic floor deposits indicates final stages of crop cleaning prior to consumption. These samples contain overall fewer botanical remains compared to outdoor contexts including small quantities of glume wheat chaff with low inputs of wild/weedy taxa (e.g. *Galium*, Brassicaceae and small-seeded Fabaceae). Some also contain charred plant aggregates, of similar structure and morphology as previously described by Valamoti (2002) and Valamoti et al (2019). Plant aggregates appear either more homogenous (likely involving finer grinding of seeds) or they contain a mixture of fine to medium particle sizes (Fig. 6.5).

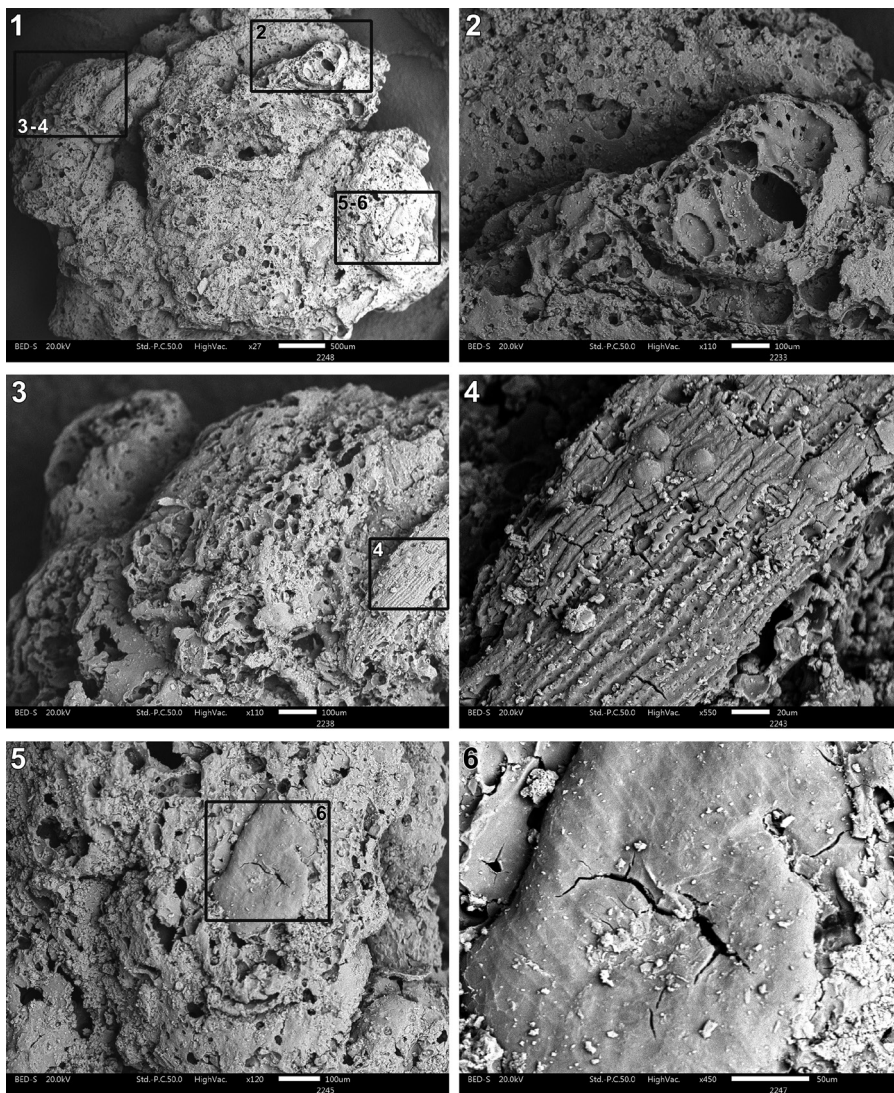


Fig. 6.5 SEM micrographs of charred plant aggregate fragment from Aktopraklık (square from 18I). 1 Overview of the fragment; 2 Close-up showing variable porosity in the matrix; 3-4 Close-up showing cereal husk inclusion and multicells; 5-6 Close-up showing transverse cell layers.

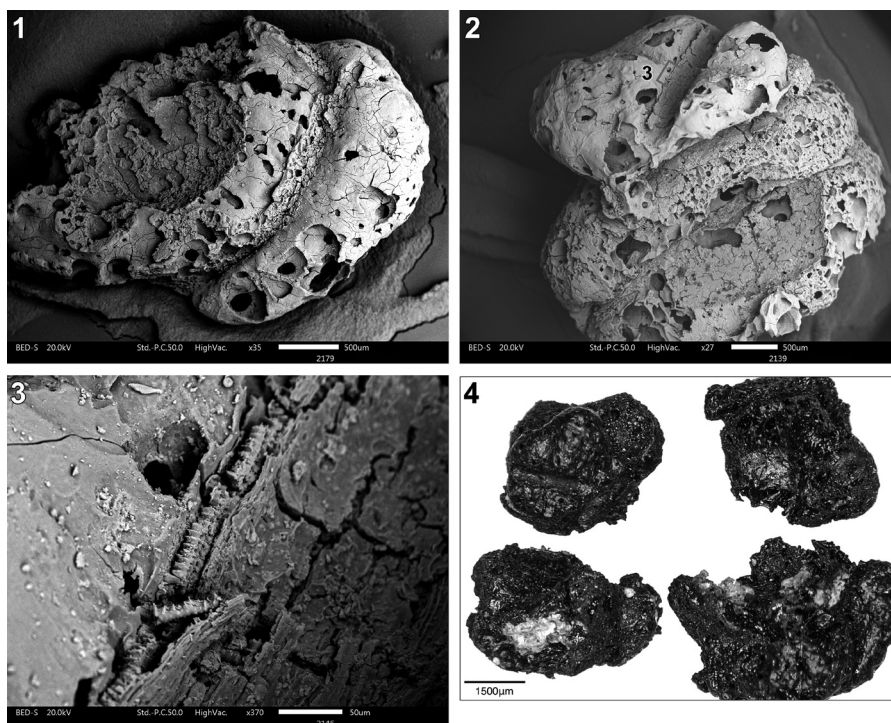
By contrast, the samples originating from outdoor areas have yielded high concentrations of glume wheat chaff, free-threshing wheat and barley rachises, and high concentrations of cereal awn fragments as well as several wild/weedy taxa. Thus far, the charred aggregates recovered from outdoor contexts are distinctly different from those found in domestic contexts. They are characterised by large size inclusions of cereal grain and may represent cooked/boiled cracked/coarse ground grain food debris. Additionally, some charred aggregates from these samples also display distortion associated with high temperature burning and/or high moisture content impacting the state of preservation and their analytical potential (Valamoti et al 2019, 2021).

### 6.3 Future directions of archaeobotanical research at Aktopraklık

The picture emerging from the first systematic archaeobotanical investigations conducted at Aktopraklık confirm that

cereal, pulse and oil crop cultivation formed an important component of the site economy and subsistence practices during the Early Chalcolithic period. Although no samples are as yet available for analysis from Neolithic strata at the site, there is no doubt that agricultural production held a prominent position in Neolithic subsistence production as well. Our field sampling programme and improved archaeobotanical recovery methods also demonstrate the importance of retrieving sufficiently large sediment samples processed by large-scale, machine-assisted flotation for obtaining a representative picture of the diversity and spatial variation of prehistoric plant use. With regard to spatial variation, the first results of our work suggest that crop processing was a communal activity, indicated by the abundant finds of chaff and awn remains in outdoor areas. By contrast, the limited range of fully studied domestic indoor contexts appear to contain the final stages of crop cleaning prior to cooking. Indoor contexts studied from 19H contain a greater quantity of glume bases and spikelet

Fig. 6.6 SEM micrographs and stereomicroscope images of charred plant aggregates from Aktopraklık (square 20K) show the presence of a mixture of fused cereal grain in cracked/coarse ground form. 1 Specimen with eroded aleurone layer; 2 Specimen with fused grains, one of which likely cracked; 3 Close-up of 2 showing the ventral furrow; 4 Stereomicroscope images of charred plant aggregates from the same samples showing variable states of preservation, some likely due to high temperature burning and/or high moisture content.



forks when compared to cereal grain, with low quantities of small weed/wild seeds (Percival 2019). The proportions of cereal chaff, grain and wild/weedy seeds observed in the preliminary investigations of indoor contexts suggests the storage of glume wheats as semi-clean ears, and that the archaeobotanical composition of indoor floor deposits represent the cleaning waste derived from the hand-cleaning of glume wheats prior to cooking (cf. Hillman 1984). These initial observations agree with glume wheat storage and cleaning/cooking practices reported at other Neolithic sites in Anatolia (Bogaard et al 2017, 2021). Further spatial analysis and evaluation of sample composition at Aktopraklık will permit a more comprehensive evaluation of crop processing routines at the site, and whether large-scale communal crop processing was widely practiced across the excavated sectors of the site. In addition, ongoing SEM analyses of the charred plant aggregates found in almost all contexts sampled at Aktopraklık will provide further insights into possible spatial variation in the types of plant foods prepared and consumed in outdoor and indoor contexts including different ingredients, preparation routines and recipes. The presence of several large ovens in outdoor/communal areas is suggestive of communal cooking and/or food consumption events. Alongside the evidence for differential crop processing signatures, this evidence might indicate specific cultural practices (e.g. culinary customs) associated with crop production and consumption at the site.

Another significant aspect of the first results of renewed archaeobotanical work at Aktopraklık is the now fully confirmed evidence for the cultivation of a diverse cereal

and legume crop assemblage alongside flax. This evidence is in agreement with the emerging archaeobotanical record from northwest Anatolia. Previous work carried out at Late Neolithic and Early Chalcolithic Ilıpınar and Barcın Höyük point to the use of a similar range of crops, alongside fruit and nuts collected from the wild. While we still do not have data from the Neolithic phases at Aktopraklık, on currently available evidence it appears that NGW was present at the site from at least the Early Chalcolithic period. Overall, the NW Anatolian archaeobotanical record (even if incomplete) points to the possible existence of similar crop and wild plant preferences, and woodland catchments through the Neolithic and Early Chalcolithic periods. Ongoing archaeobotanical and anthracological analyses at Aktopraklık will be supplemented by a comprehensive crop  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  isotope analysis programme, in order to address cultivation practices (e.g. water availability, manuring) and the contribution of crops to the local subsistence economy.

### Acknowledgements

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