Subsistence economy in Central Anatolia during the Neolithic: the archaeobotanical evidence

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Some central issues concerning the emergence of agriculture in Anatolia

The systematic retrieval and study of charred plant remains from several early sites in Southwest Asia[1] have demonstrated the diversity of the Neolithic subsistence strategies, with accumulating evidence on the existence of complex processes of agricultural uptake and considerable regional variation in subsistence practices (cf. Miller 1991; Willcox 1999; Colledge 2001). In this context, much research has focused on the emergence of sedentary communities with complex systems of social organisation and symbolic expression, which pre-date the appearance of fully-fledged agricultural economies (cf. Cauvin 2000). In the southern and central Levant, Southeast Anatolia and Northeast Iraq, this process (beginning during the Pre-Pottery Neolithic A) saw its expression in the appearance of sedentary settlements, few of which (Jericho, Iraq ed-Dubb and Aswad I) have given definite evidence for at least some exploitation of cereal domesticates (Van Zeist and Bakker-Heeres 1982; Hopf 1983; Watkins *et al.* 1991; Kozłowski 1989; Rosenberg *et al.* 1995; Hole 1996; Colledge 2001). For the most part these early settlements had developed 'foraging economies', relying mainly on the gathering and hunting of a wide variety of wild plants and animals, with only minor contributions from cultivated crops (Harris 1998).[2]

It was within this research background that a strong inclination has developed to identify first in Southeastern Anatolia and subsequently in Central Anatolia too, a pattern of subsistence practices based on the preponderance of gathered plant foods as opposed to cultivation. Thus, for the period corresponding to the early PPNB (otherwise considered as a period of agricultural expansion) it has been argued that the Grill-Building subphase at Çayönü demonstrates exactly this, with a local process of neolithisation emerging from an essentially hunting and gathering background at the end of the 9th millennium cal BC (see Özdoğan 1995, 1997a, 1997b). The large quantities of wild pulses recovered from Çayönü have been used to support this interpretation. Furthermore, the apparent importance of pulses at Cafer Höyük (where morphologically domesticated cereals did exist) was also taken to exemplify an idiosyncratic trait of the Early Anatolian Neolithic, whereby agriculture played a secondary role compared to plant

[1] Central Anatolia (in particular the excavations at Canhasan by David French and his team) was indeed the place where the retrieval of charred plant remains by means of mechanical flotation (French 1971) was implemented for the first time worldwide, thus revolutionising our understanding of past societies not only in terms of architectural development or artefacts, but also in their full environmental and economic context.

[2] For a comprehensive review of the archaeobotanical record see Garrard 1999; Colledge 2001.

gathering, even where it was practiced. The same line of argument lies behind the consideration of Aşıklı Höyük as a society of sedentary hunter-gatherers that managed to persist for 1000 years apparently without an overt reliance on cultivation (Esin and Harmankaya 1999). There have also been suggestions that plant domesticates played a minor role at Çatalhöyük, although the little evidence published so far points firmly in the opposite direction (Özdoğan 1995, 1997a, 1997b; but see Helbaek 1964; Asouti *et al.* 1999; Fairbairn *et al.*, in press).

Such an approach calls for some reconsideration of the archaeobotanical evidence. To begin with, the lack of morphological evidence for pulse domestication does not necessarily signify that they were not actually cultivated.[3] Indeed, even in sites as late as Erbaba in the Beyşehir area we do not find pulses with the full morphological characteristics of domesticate forms (Van Zeist and Buitenhuis 1983).[4] At the same time, unlike cereals, collecting and processing of wild pulses for food consumption can prove very unproductive in terms of their food value: wild legumes do not form dense stands, and large quantities of seeds cannot therefore be easily collected (Ladizinsky 1989).[5] Given the substantial pulse concentrations found in Çayönü and later sites such as Cafer Höyük and Gritille, it is indeed extremely unlikely that the bulk of pulses were actually collected from the wild (Van Zeist 1972; Van Zeist and De Roller 1991-1992; De Moulins 1993, 1997; Miller, in press).

Therefore, far from arguing that Çayönü forms a *par excellence* case of sedentary hunter-gatherer society, we could instead view the same evidence as indicative of a local trajectory relating to agricultural production. Furthermore, drawing from the archaeobotanical record, the suggestion has been put forward recently that, during the PPNB, a distinct pattern of plant exploitation is discernible in Southeastern Anatolia characterised by the predominance of pulse crops and a marked preference for the use of wood instead of dung as fuel (Miller, in press). This has moreover been contrasted with sites in the more arid regions of the Syrian steppe (e.g., Abu Hureyra 2) where more drought-resistant crops such as barley became more widespread and the indications for the use of dung as fuel are more prominent.[6]

3 For a summary of the views on this issue see Miller 1991. The main morphological change in domesticated pulses is the development of a non-shattering seed pod, very rarely preserved in archaeological charred specimens. Furthermore, changes in size (i.e., to larger forms) as a result of domestication occur very gradually in pulses, resulting in a difficulty to classify intermediate forms.

4 By contrast, the presence of morphologically domestic pulses in Çatalhöyük has been ascertained through finds of stores of large, well-formed seeds. Storage contexts are all important in this respect since mixed refuse deposits deriving from all kinds of ashy debris, burnt dung, etc., may well include in abundance smaller forms, which in turn are likely to represent crop processing by-products used as fodder and/or fuel.

5 The same author has observed for example that it requires approximately 10,000 wild lentil plants (*Lens orientalis*, producing on average ten seeds per plant) to obtain 1kg of clean seed.

6 Miller, in press. The absence of barley cultivation in early Çayönü has also been stressed by Van Zeist (1988). Potential indicators for the use of dung fuel in Abu Hureyra 2 include the presence and abundance of 'weed' seeds (notably small-seeded legumes and grasses) which accounted on average for over 85 % of the samples (De Moulins 2000). That such a 'tradition' (possibly instigated by environmental differences between Southeast Anatolia and the Syrian steppe) of plant management based on pulses could have had a long history in Southeastern Anatolia is further suggested by the archaeobotanical findings from the early site of Hallan Çemi with the absence of wild cereal grains (Rosenberg *et al.* 1995). In Çayönü, pulse and cereal domesticates are present from the early levels, including one-seeded einkorn (*T. monococcum*) and emmer (*T. dicoccum*). The presence of one-seeded domesticated einkorn indicates that this cultivar was introduced in Çayönü, since its wild progenitor (*T. boeoticum* ssp. *aegilopoides*) does not occur naturally in the area (Van Zeist 1972). Furthermore, wild cereals *were not* intensively harvested by the inhabitants of Çayönü, judging by their low presence and abundance compared to domesticates (*ibid.*; Van Zeist and De Roller 1991-1992). Thus Van Zeist and De Roller conclude that plant cultivation (with a strong emphasis on pulse crops) was practiced in Çayönü from its very beginning. It should also be noted here that wild cereal types may continue to propagate under cultivation due to spontaneous sowing and furthermore most likely occurred in early stages as 'weeds' alongside cultivated cereals (Willcox 1999). Based on the presently available evidence, one should therefore leave open the possibility that plant domesticates were introduced/adopted and adjusted to pre-existing subsistence routines by settled non-agrarian communities, although at a date much earlier than the Grill Building subphase of Çayönü. Only further sampling of the round house levels at Çayönü and the full analysis of the archaeobotanical remains from early sites such as Göbekli Tepe and Nevalı Çori would help in clarifying this issue.

Plant domesticates and subsistence strategies in Early Neolithic Central Anatolia

Whether or not cereal and pulse domesticates are present in Early Neolithic Central Anatolian sites appears to be mainly a reflection of sampling policies and (to a lesser extent) preservation conditions (see Table 1). The more extensively sampled sites such as Çatalhöyük and Canhasan III[7] have given the most representative assemblages in this respect, whilst Aşıklı and Musular (with less favourable preservation conditions) present only a slightly different picture (Van Zeist and De Roller 1995; Mihriban Özbaşaran, pers. comm.).[8] Suberde was not sampled at all and the effect of this in species presence is most evident: the sole evidence of plant remains amounts to three clay impressions (see Bordaz 1977). It is interesting to note that the same phenomenon applies to the representation of fruit species (see Table 2) which serves to illustrate the point as concerns likely sampling and preservation biases.[9]

	Aşıklı	Musular	Canhasan III	Suberde	Çatalhöyük	Erbaba
Cereals						
Triticum monococcum (eincorn wheat)	*		*		*	*
Triticum dicoccum (emmer wheat)	*	*	*		*	*
Triticum durum (free-threshing durum wheat)	*				*	
Triticum aestivum (free-threshing bread wheat)		*	*		*	
Triticum durum/aestivum						*
Triticum (clay impressions)				*		
Hordeum distichum (two-rowed hulled barley)	*		*			*
Hordeum vulgare var. *nudum* (naked barley)	*	*	*		*	*
Hordeum (clay impressions)				*		
Pulses						
Vicia (bitter vetch)	*		*		*	*
Lens (lentil)	*	*	*		*	*
Pisum (pea)	*		*		*	*
Cicer (chickpea)		*			*	*
Lathyrus (grasspea)		*				*
Lathyrus (clay impressions)				*		
Cicer (chickpea)						

Table 1 Presence of the major cereal and pulse domesticates in Neolithic sites of Central Anatolia (for full references to the individual site reports see text)

7 In both Çatalhöyük and Canhasan III mechanical flotation for the retrieval of charred plant remains has been applied (French *et al.* 1972; Hastorf and Near 1997).

8 For a preliminary list of the plant taxa retrieved from Musular see Özbaşaran 2000.

9 The complete lack of fruit species at Erbaba, however, merits special attention. It is possible that it reflects the absence from the environs of Erbaba of those dryland fruit-producing species (e.g., *Pistacia, Celtis, Amygdalus*) 'traditionally' exploited by Neolithic villages located in the Anatolian plateau.

	Aşıklı	Musular	Canhasan III	Suberde	Çatalhöyük	Erbaba
Fruits and nuts						
Celtis (hackberry)	*	*	*		*	
Pistacia (terebinth)	*	*			*	
Pistacia (clay impressions)				*		
Amygdalus (almond)	*	*			*	
Crataegus (hawthorn)			*			
Prunus (cherry)			*		*	
Vitis (wild grape)			*			
Rhus coriaria (sumac)					*	
Juglans (walnut)			*			
Ficus (fig)					*	
Quercus (acorn)					*	
Juniperus (juniper)					*	

Table 2 Presence of fruit and nut species collected from the wild in Neolithic sites of Central Anatolia (for full references to the individual site reports see text)

Nevertheless, it is still possible to discern some divergent local trajectories in evidence for subsistence practices. We shall use as reference points the sites of Aşıklı and Çatalhöyük, as more representative of the regions of Cappadocia and Konya respectively. In Aşıklı, cereals and pulses appear to have been of almost equal importance as cultivated crops (Fig. 1). The archaeobotanists who analysed the material have concluded that bitter vetch was cultivated, alongside lentil and pea (Van Zeist and De Roller 1995). From the pulses, most important appears to have been bitter vetch, which is widely considered (together with chickpea) to be a SE Anatolian domesticate anyway, in contrast to all the major cereal crops that were (on the basis of the currently available archaeobotanical evidence and genetic studies) introduced to both Southeastern and Central Anatolia from the Levant.[10] Further evidence for the important role of cereals in daily life is provided by the fact that processing activities (including threshing) were taking place on site (Van Zeist and De Roller 1995). The weed flora also indicates that the inhabitants of Aşıklı probably practiced rainfed cultivation on raised surfaces next to the Melendiz River and/or hillsides and dry areas in the valley, close to the settlement (*ibid.*).[11] To summarise, the archaeobotanical record does indicate a fairly sedentary lifestyle based on the

10 The argument for the first domestication of bitter vetch (*Vicia ervilia*) at Çayönü is based on the fact that it appears there for the first time in large concentrations, which suggests its status as a domesticate; large concentrations of bitter vetch have been found in several other Anatolian sites (including Canhasan III, Çatalhöyük, Erbaba and recently Aşıklı too) which suggests a long tradition for the exploitation of this cultivar in Anatolia (Van Zeist 1988; Van Zeist and De Roller 1995). By contrast, the earliest evidence for the domestication of emmer, einkorn and barley comes from sites in the Levant (for useful summaries of the evidence see Garrard 1999; Willcox 1999; Zohary and Hopf 2000; Colledge 2001). Zohary and Hopf (2000) consider the possibility that peas and chickpeas were brought under cultivation in Anatolia; lentils however appear to be closely associated with the onset of cereal cultivation. The genetics argument for a single-event domestication of the founder crops is developed in detail by Zohary (1996, 1999).

11 The analysis of wild taxa has revealed the presence of a mixture of dryland and wetland plants including mainly *Buglossoides arvensis, Taeniatherum caput-medusae, Cynodon dactylon, Carex, Eleocharis* and *Scirpus*, accompanied by various grasses and legumes, all present in low numbers. As one of the possible reasons for the overall low abundance of weed seeds has been suggested the likely effect of harvesting practices such as uprooting (Van Zeist and De Roller 1995).

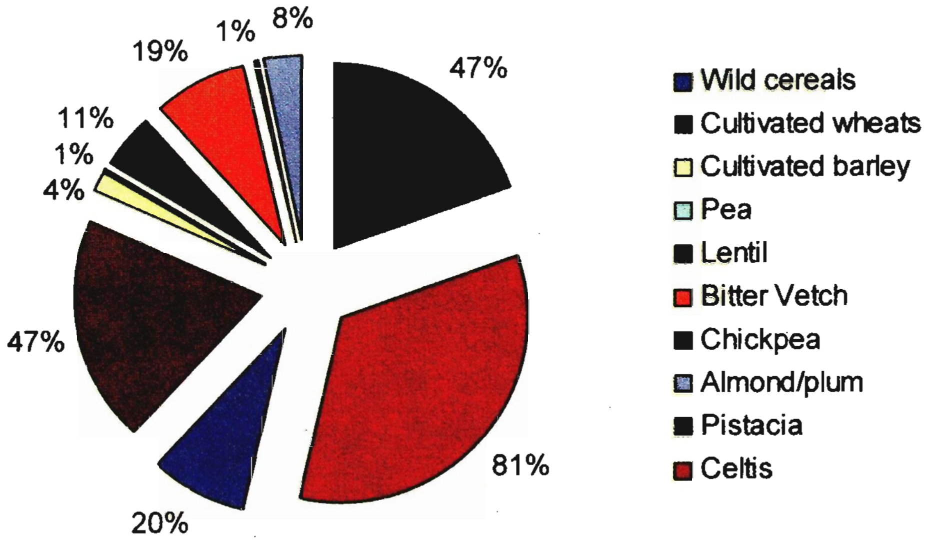

Fig. 1 Relative presence of major edible plant taxa (i.e., excluding possible 'weed' species) from Aşıklı. Percentage presence scores have been calculated based on the data published by Van Zeist and De Roller 1995 (total no. of samples: 144)

exploitation of locally available resources, primarily cultivated cereal and pulse crops. The regular presence of fruits such as *Pistacia* and *Celtis* throughout the sampled contexts may in part reflect the location of woodland stands close to the site, which were seasonally harvested. The lack of extensive data on fuel exploitation notwithstanding, there is still some evidence that Aşıklı (being in the upland zone) probably relied on the collection of pistachio and hackberry wood, supplemented by riverine species and oak, all locally available (Woldring and Cappers 2001).[12] To date, no evidence has been produced for the widespread use of dung as fuel.[13]

For *Celtis* in particular, its over-representation in the assemblages can be explained by the fact that hackberry fruit stones are virtually indestructible and require no charring to be preserved in contrast to seed and chaff remains that in dryland sites must be charred, mineralised or desiccated to survive. Some large concentrations of *Celtis* in Aşıklı have indicated that hackberry was indeed intensively exploited. However, they are not directly comparable to the abundance values of charred cereal and pulse remains. A more realistic approach should involve comparing only charred nutshell and cereal/pulse grain as representatives of wild and domestic plant foods respectively, assuming that nuts and grains/pulses are good candidates for storable foods from each group (Jones 2000).[14] Such a comparison using the published information from Aşıklı

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12 E. Asouti has also examined soil micromorphological thin sections from Aşıklı that indicated the presence of a similar species range.

13 The low presence and abundance of wild seed taxa could be an indication that dung fuel was not used extensively. Some evidence for the burning of dung fuel has arisen from the analysis of micromorphological thin sections (W. Matthews, pers. comm.) It has to be stressed however that, in the absence of supportive evidence from quantifiable botanical macro-remains, such results cannot be used on their own as evidence for the extent to which dung fuel was used in the past. Only further archaeobotanical research could suggest something definitive.

14 The same author however cautions against comparisons that disregard context-related variation in the archaeobotanical record, since cereal remains are much less likely to be adequately represented in non-storage contexts compared to nutshell. Nutshell in particular stands a better chance of being preserved through its exposure to fire as waste and/or fuel-kindling than do prime foodstuffs such as cereals and pulses (see also Legge 1989).

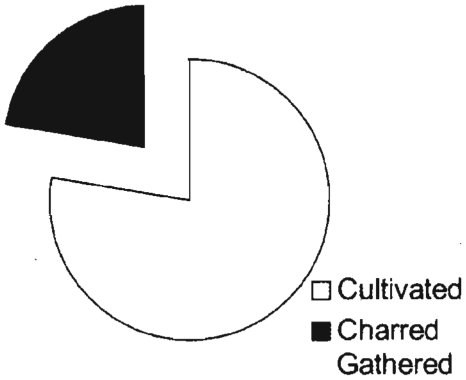

Fig. 2a Aşıklı: comparison using charred abundance

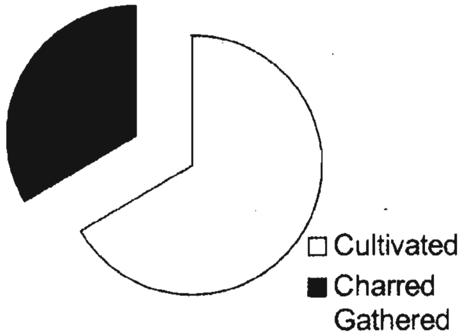

Fig. 2b Aşıklı: comparison using calorific conversions of charred abundance

Fig. 2 Comparison of cultivated (cereals and pulses) and gathered (nuts and fruits) plant resources preserved by the same means (i.e., charring) based on (2a) charred plant remain abundance and (2b) calorific conversion from Aşıklı Höyük (abundance values were calculated from the data published by Van Zeist and De Roller 1995)

shows the predominance of cultivars, in terms of both abundance and the relative calorific value of each class of material (Fig. 2).[15]

In Çatalhöyük,[16] emmer wheat (*T. dicoccum*) and bread wheat (*T. aestivum*) are dominant, with smaller quantities of einkorn and barley. These dominate the flotation samples and the storage contexts in similar proportions.[17] Legumes at Çatalhöyük overall are less archaeologically visible than in Aşıklı but still form an important element of the charred plant assemblage. Bitter vetch and lentil are again the most common pulses, with pea and chickpea less so. Charred remains of *Celtis*, *Pistacia*, Prunoideae (wild plums) and *Amygdalus* (almond) were also present throughout the sampled sequence (see also Figs. 3, 4).

Most of the wild plant seeds (mainly small-seeded legumes, reeds and wild grasses) and the cereal chaff from the flotation samples appear to be largely derived from material fed to animals and were probably charred through the burning of dung fuel.[18] Dung fuel was present throughout the excavated sequence. Its clear predominance however is manifested in the earliest levels and is further matched by low densities of wood charcoal (mainly of riverine species) from the same levels. In the later levels this phenomenon is reversed, with much higher densities of charcoal

15 The calorific conversion is a relative one based on the conversion of charred remains to an equivalent grain size and then calculating the calorific values of each plant type based on their modern equivalents. The results presented here simply rely on the total abundance for each type of plant material, thus lacking any consideration of context-related variation (very little contextual information for the archaeobotanical assemblages has been published so far) but they are useful nonetheless for prompting discussion and also offer a more balanced perspective than presence and abundance values do.

16 Information on the plant remains has been compiled from Helbaek 1964; Asouti *et al.* 1999. A major synthesis of the first results of the renewed archaeobotanical investigations will appear shortly in print (Fairbairn *et al.*, in press).

17 That cereals were important in Çatalhöyük is also evident in the fact that cereal chaff and straw were extensively used in mud-brick and pottery manufacture. By contrast, wild resources such as reeds (*Scirpus*) and grasses were the primary raw material for basketry and mat-weaving (Fairbairn *et al.*, in press).

18 The occurrence of many typical weed taxa and cereal chaff in the dung assemblages testifies to the integrated character of agropastoral production in Çatalhöyük (Fairbairn *et al.*, in press).

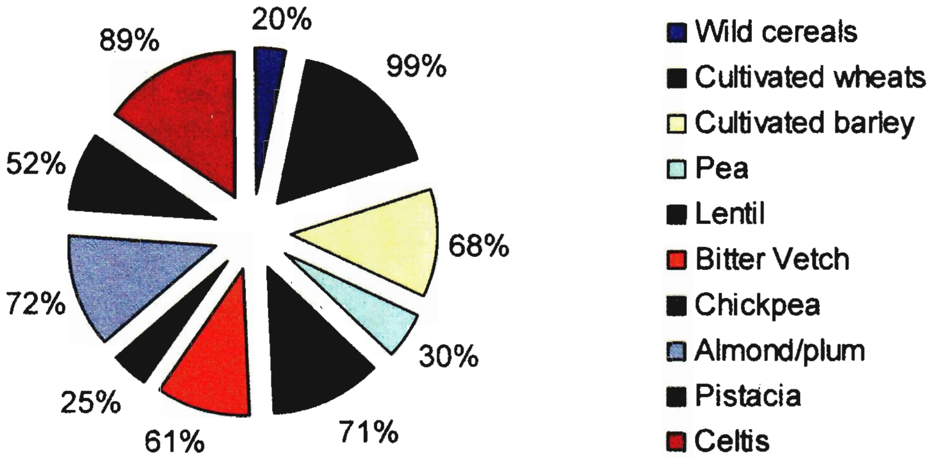

Fig. 3 Relative presence of major edible plant taxa (i.e., excluding possible 'weed' species) from Çatalhöyük. Percentage presence scores have been calculated based on the data made available by the renewed archaeobotanical research in Çatalhöyük (Fairbairn *et al.*, in press; total no of samples: 334)

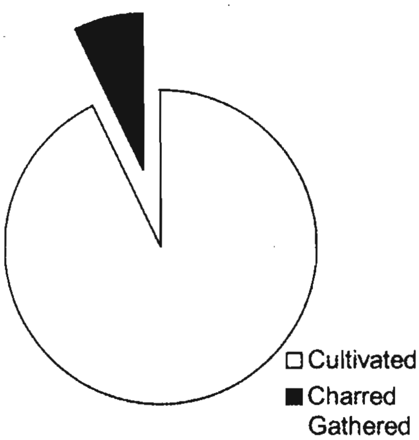

Fig. 4a Çatalhöyük: Comparison using charred abundance

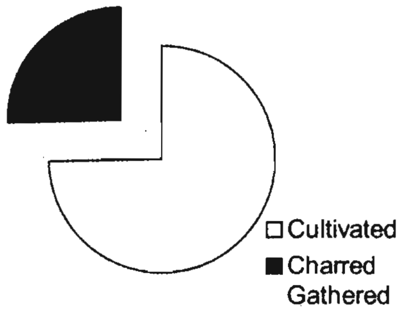

Fig. 4b Çatalhöyük: Comparison using calorific conversion of charred abundance

Fig. 4 Comparison of cultivated (cereals and pulses) and gathered (nuts and fruits) plant resources preserved by the same means (i.e., charring) based on (4a) charred plant remain abundance and (4b) calorific conversion from Çatalhöyük (abundance values were calculated from data to be published soon; Fairbairn *et al.*, in press)

and overall lower archaeological visibility of dung fuel compared to the early assemblages (Fairbairn *et al.*, in press; Asouti and Fairbairn, forthcoming). At the same time, a much wider array of tree and shrub species make their appearance most of which are associated with oak woodland vegetation (Asouti and Hather 2001).

Overall, apart from fuel, there is little evidence to suggest that there were marked changes in plant-based subsistence at Çatalhöyük over time. The archaeobotanical record shows a remarkable continuity in crop usage and presence throughout the period sampled. However, this picture of continuity and stability in agricultural practices comes together with evidence suggesting that reliable crop cultivation is unlikely to have taken place in the immediate environs of Çatalhöyük, at least not in terms of optimal production (i.e., risk buffering in the medium and/or long term). Geomorphological investigations have indicated that the site was founded on a low-lying alluvial delta/floodplain, lacking substantial raised dry surfaces (Roberts *et al.* 1996, 1999; Roberts and Boyer 1999). The soils of the area were saturated for much of the year and the spring floods (either annual or at longer intervals) would have inundated large areas of the alluvial basin for prolonged periods, thus destroying any cereal crops that had not been planted on raised locations. On environmental grounds, the most optimal source for crops appear to be the Neogene terraces and the low hills flanking the Konya Plain, some 10-12km to the south of Çatalhöyük.[19]

The geomorphological evidence together with the results of charcoal analysis (indicating the regular collection of firewood from wet riparian forests, oak woodland and woodland steppe alike) (Asouti and Hather 2001; Fairbairn *et al.*, in press) suggest that the Neolithic community of Çatalhöyük routinely exploited on a seasonal basis widely dispersed territories (including the marshes, the floodplain, the hills and the steppe) for pasture, food, fodder and fuel, a pattern of resource use which could have been well-suited to the extreme environmental gradients and resource instability characterising the semi-arid Konya Plain. In this sense Çatalhöyük appears to be different from Aşıklı, although much of this difference could be explained as a result of the contrasting environments of the Konya Plain and the Cappadocian highlands respectively.

19 The question of the location of arable fields at Çatalhöyük has been the subject of intense debate within the project. The weed flora contains both wetland and dryland species, but since many of them were probably incorporated in the archaeobotanical record via dung burning it is likely that they do not represent an accurate reflection of cropping practices *per se* (although the occurrence of many dryland weed seeds co-varies with that of cereal crops; Fairbairn *et al.*, in press). Recent phytolith studies have also provided some indications for the occurrence of dryland cereal crops (Arlène Rosen, pers. comm.). In objection to this interpretation, it has been pointed out that the site is in a similar situation to settlements occupying the Mesopotamian lowlands, where successful cropping occurred in association with the annual floods (cf. Charles 1988; Potts 1997). The environment at Çatalhöyük however is qualitatively different. The site lies in the middle of the Çarşamba fan, which is deposited in a non-outlet basin (the Pleistocene Konya palaeolake) and is characterised by permanent high water levels. Alluvial sediments accumulated gradually on the flat marl lake floor and there is an absence of evidence for the development of levées and extensive dry raised surfaces. Fine-grained sediments gradually prograded towards the centre of the basin to the north, where they settled in the form of heavy clays. At the same time, the whole area slopes from SW to NE, resulting in a higher water table in the northern part of the plain. Overall, save modern drainage works, drainage in the south and west of the Çumra area (i.e., closer to the foothills) is much better than in the east and north (where Çatalhöyük is located) thus leading to the formation of extensive marshes and backswamps. Presently the Neogene terraces south of Çumra are classified as the best agricultural soils for rainfed cultivation in the plain (Driessen and De Meester 1969; Roberts *et al.* 1999).

Still, one cannot claim that the floodplain was not used at all for cropping. It is entirely possible that certain pulse crops were spring-sown on freshly exposed patches of alluvium after spring floods had retreated (Fairbairn *et al.*, in press). From an archaeobotanical point of view, only the analysis of the crop stores retrieved in large numbers by Hans Helbaek in the 1960s will furnish some positive indications on the issue of field location (through the examination of the associated weed floras). However, if cereals were indeed grown in the immediate environs of Çatalhöyük, the way of cropping seriously challenges currently established assumptions about Neolithic cereal cultivation. It would imply one or all of the following:

* Spring-sown cereal varieties had developed; this would have been much earlier than we know at the moment (see Oates and Oates 1977). Winter-sown cereals need more stable, drier conditions and (while they could have survived the occasional prolonged flood) they could not persist in soils that were wet through much of the autumn, winter and spring. Permanent high water levels prevent germination (Hook 1984:268) and lead to cessation of growth and/or death through hypoxia or anoxia in non-adapted plants such as the cereal crops (Trought and Drew 1981; papers in Kozłowski 1984).
* Some form of flood control existed, at least locally (i.e., in the form of drainage ditches or embankments none of which is evidenced in Çatalhöyük); this again would be much earlier than we have evidence from elsewhere in Southwest Asia (cf. Oates and Oates 1977).
* Cropping was dispersed and very mobile; this would also be a high risk strategy and prone to low yields or even total crop failure in the event of particularly wet winters or pronounced spring floods.

The origins of agriculture in Central Anatolia

As to the origins of cereal and pulse cultivation introduced in Central Anatolia during the Early Neolithic the preceding discussion has hopefully demonstrated that agriculture is likely to have arrived in the region from the southeast. The crop assemblages of Aşıklı and, to a lesser extent, Çatalhöyük (characterised by the greater importance of pulses) indicate clear links with the Southeast Anatolian Neolithic complex.[20] Further than this, Çatalhöyük provides an example of how the construction of permanent dwellings and the use of plant domesticates probably did not go hand in hand with reduced seasonal mobility and considerations about the availability of prime agricultural land, as it appears to be the case with Aşıklı. An explanation of this phenomenon should therefore also address the question of the origins of the community of Çatalhöyük. Three possibilities are open to discussion:

1. The site was settled by agriculturalist-colonisers

If this is correct then our assumptions about site selection by groups we view as primarily agriculturalists have to be re-addressed. The optimal agricultural location would be at the southern edge of the Çarşamba floodplain on the Neogene terraces and the low-sloping hills. The geomorphological evidence shows that Çatalhöyük was in all likelihood far from this. Another possibility is that the site was initially settled and farmed and then, being overwhelmed by flooding, saw the transference of farming to the hills. This hypothesis suffers because the soils underlying the alluvium are highly calcareous (hence unsuitable for arable exploitation)[21] and the radiometric dates for the onset of alluviation pre-date our earliest settlement dates.[22]

2. Acceptance and use of crops/new technologies by a population already using the area and fitted into a pre-existing resource round

In this case the non-optimal farming location can be explained as being the traditional ancestral home, people being bound to it by familiarity, belief and history. The planting of crops was adjusted into an established cultural landscape, for centuries part of tribal or kin territories used for hunting and other resource extraction. Pınarbaşı A shows that mobile hunting groups occupying seasonal campsites were present in the area, inhabiting wetland locales before Çatalhöyük was established, although it has furnished no evidence for the exploitation of plant resources apart from firewood gathering (Watkins 1996; Asouti, forthcoming; Mark Nesbitt, pers. comm.).

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20 This is not to deny differences that have been observed in other aspects of daily life and material culture between Southeast Anatolia and the Early Central Anatolian sequence, as for example in architecture, artistic expression and lithic industries (see various contributions this volume). The range of crops utilised at Aşıklı and Çatalhöyük is typical of that used in the Neolithic across Central Anatolia and the presence of emmer, einkorn, bitter vetch, chickpea and lentil presents obvious links to Southeast Anatolia and the Levant. One difference is the occurrence of naked six-row barley which is present at most sites in the region (see also Table 1) as well as Hacılar (Helbaek 1970) and Ilıpınar (Van Zeist and Waterbolk-van Rooijen 1995) but is notably absent from contemporary sites in the southeast (see tables in Garrard 1999). Barley crops are known to perform better than wheats in harsher conditions (Zohary and Hopf 2000) such as increased aridity/salinity and short growing seasons. So this preference may reflect differences in environmental conditions between Central Anatolia and the southeast, although we should not discount cultural explanations including likely culinary preferences or barley's traditional use as a fodder crop (Zohary and Hopf 2000).

21 Calcareous marls cannot support crops unless broken up by terracing or deep ploughing, due to poor root penetration. The same holds for heavy clays.

22 c. 7480 cal BC for the onset of the earliest excavated phases and 7550 cal BC for the start of the alluvial deposition (Cessford 2001; Roberts *et al.* 1999).

3. A combination of the above

This appears to be the most likely scenario. First, as noted before it is possible to discern in the patterns of plant resource exploitation a 'tradition' of mobility and diversification, which would accord with our evidence for occupation prior to Çatalhöyük. Pınarbaşı has given the strongest indications for such a pattern of mobility in the Konya Plain during the Neolithic which furthermore persisted into later periods, whilst the results of surface surveys in the Konya Plain itself have produced the first tangible evidence for a long tradition of settlement on wetland environments in this area (Baird, this volume). We have argued for the existence of comparable patterns in Çatalhöyük with the great dispersion of resources and their predicted seasonal exploitation. In this sense, there might be some support for ideas envisaging the dissolution of early conservative societies such as Aşıklı, followed by their dispersion and re-assembly elsewhere (Gérard, this volume). However, it is also possible to argue for the presence of a 'foreign' element too, bringing into this area pre-existing notions of exploitable resources from elsewhere. Thus, the preference for dung fuel over firewood which is so marked in the early levels of Çatalhöyük (otherwise difficult to interpret on purely environmental and/or functional grounds) (Asouti and Fairbairn, forthcoming; Fairbairn *et al.*, in press) might reflect the attitude of a 'frontier group' with entrenched beliefs about fuel use, and is much reminiscent of patterns of fuel exploitation familiar from the northern Levant (Miller, in press). Such an inclusive interpretation could benefit from further investigations and comparisons with other classes of archaeological evidence. However, a data-informed understanding of the processes involved will be achieved only when a) The core of Çatalhöyük is excavated and comprehensively sampled, and b) Other early sites that exist in this area are investigated in a comparable way (i.e., with full archaeobotanical and palaeoenvironmental analyses).

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