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ORIGINAL ARTICLE

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The origins of cultivation of *Cicer arietinum* L. and *Vicia faba* L.: early finds from Tell el-Kerkh, north-west Syria, late 10th millennium B.P.

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Abstract *Cicer arietinum* L. (chickpea) and *Vicia faba* L. (faba bean, broad bean or horse bean) were found in late 10th millennium B.P. levels at Tell el-Kerkh, in north-west Syria. They are the earliest well preserved archaeobotanical finds of these two species. Over a hundred *C. arietinum* specimens were recovered which showed a wide morphological diversity varying from *C. arietinum* ssp. *reticulatum* to the more rounded shape as seen in cultivated varieties. For *Vicia faba*, 29 complete and 119 half seeds, as well as many fragments were recovered. Tell el-Kerkh is one of the few early PPNB Near Eastern sites situated in the Mediterranean zone which could have been the habitat of the unknown wild progenitor of the faba bean. The wild progenitor of chickpea, *C. a. reticulatum*, is found in a limited area of southeast Turkey, at a considerable distance from Tell el-Kerkh. These finds suggest that the use and domestication of these pulses is perhaps earlier than was previously supposed.

Keywords *Cicer arietinum* · *Vicia faba* · Domestication · Neolithic · Near East

Introduction

Three possible criteria can be used to identify pulse domestication. 1) The non-dehiscent pods, although these do not survive archaeologically, 2) changes in seed size, which are difficult to interpret and 3) changes in the morphology of the testa which only very occasionally survives. Because of these difficulties little is known about the early stages of pulse domestication (see Butler 1998). Indeed domestication of pulses could predate cereals (Kislev and Bar-Yosef 1988), which were domesticated by the early pre-pottery Neolithic B (PPNB) (Nesbitt 2002; Willcox 2002). Even for the most common pulses which originated in southwest Asia such as *Lens culinaris* Medik. (lentil), *Pisum sativum* L. (pea), *Vicia ervilia* L. (bitter vetch) and *Lathyrus sativus* L. (grass pea) there is very little evidence of how, when and where they were domesticated despite the fact that they often occur at high frequencies during the 10th and 9th millennia. Even less is known about chickpeas and faba beans which are much rarer. Changes in the testa, which becomes smooth with domestication, is the most reliable characteristic (Butler 1998) but despite the suggestion of domestication during the middle PPNB (Zohary and Hopf 2000, p 106) there is little hard archaeobotanical data. In two cases large quantities of pulses were recovered from storage structures, for example 7.4 kg of lentils and 2850 seeds of faba beans from Yiftah'el in Israel, dated to the middle PPNB (Garfinkel et al. 1988; Kislev 1985). 500 chickpeas were found at the pottery Neolithic site of Höyücek in Turkey (Nesbitt 2002).

The present study will examine new finds of *Cicer arietinum* and *Vicia faba* from the late 10th millennium B.P. site of Tell el-Kerkh in north-west Syria (Fig. 1). The site is located in a Mediterranean zone only 50 km from the coast and 260 km from the area of distribution of the wild progenitor of *C. arietinum*. The wild progenitor of *V. faba* is not known. The domestication of these two species is poorly understood because there are very few reliable identifications from early agriculture sites. These new finds should increase our knowledge of where and when early farmers brought them into cultivation.

Site description

Tell el-Kerkh is situated in the Rouj basin, on the northern edge of the Ghab valley in north-west Syria (Fig. 1,

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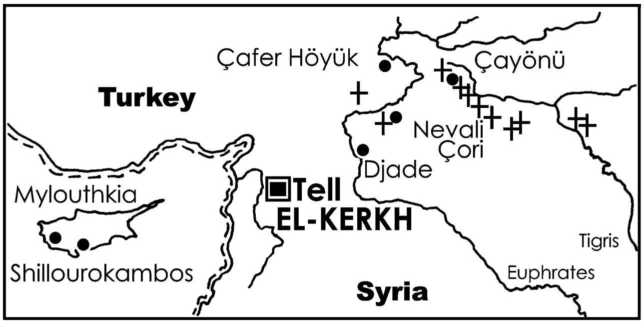


Fig. 1 Location of Tell el-Kerkh and distribution of *Cicer arietinum* ssp. *reticulatum* (modern wild chickpea). Crosses indicate known collection points of wild chickpea

Iwasaki and Tsuneki 2003). This fertile alluvial basin is surrounded by limestone and basalt hills. Annual precipitation of this area is 500–600 mm. The vegetation is typically Mediterranean but is highly degraded due to cultivation and overgrazing.

Materials and methods

Excavations at Tell el-Kerkh were started in 1997 (Tsuneki et al. 2004). A total of 1066.5 litres of deposit were collected from square D6 at Tell Ain el-Kerkh where early PPNB occupation levels were excavated (Arimura 2002). Five radiocarbon dates were obtained from charcoal fragments which gave dates of between 9350 and 9165 uncal. B.P. (Table 1).

Of the 1067 litres of sediment collected from the site, 438 litres were sorted by hand for charred seeds to prevent the risk of damage by water flotation. The remaining 629 were treated by flotation using the standard technique, although some seeds were picked out by hand. In total 138 *C. arietinum* and 437 *V. faba* finds were identified. The majority of the pulses (82% of *C. arietinum* and 87% of *V. faba*) were recovered from levels associated with a hearth where 290 l of sediment were recovered. The hearth consisted of placed stones surrounded by an ashy deposit which contained the pulses. Large quantities of *Crataegus* remains were found in the same deposit.

Measurements were carried out using a digital image analyzing program and were made according to the criteria used by Zeist and Roller (1991, 1992) for *C. arietinum* and by Kislev (1985) for *V. faba*. All drawings were made by K. Tanno.

Results

Cicer arietinum (chickpea)

Finds of *Cicer arietinum* consisted of 11 complete seeds, 65 half seeds and 62 fragments (Table 2). All but two of the complete seeds lacked the radicule (beak) and one retained a small fragment of testa. The seed morphology of the ancient chickpeas was compared to three wild species (Ladizinsky and Adler 1976a), *C. arietinum* ssp. *reticulatum* (14 accessions), *C. echinospermum* (9) and *C. bijugum* (14), and to modern cultivars of *C. arietinum* ssp. *arietinum*. Measurements are given in Tables 3 and 5. Reference material was obtained from the US Department of Agriculture (ARS, WRPIS).

Table 1 ^{14}C dates from Tell el-Kerkh (calibrations: OxCal ver. 3.10)

Lab. code	Uncal B.P.	Cal B.C. (1σ)	Dated material
GrA-22277	9350±90	8750–8470	Wood charcoal
Ly-2555(O×A)	9250±40	8560–8350	Wood charcoal
GrA-22276	9240±50	8550–8340	Wood charcoal
Ly-12086	9205±60	8530–8310	Wood charcoal
Ly-2556(O×A)	9165±40	8430–8290	Wood charcoal

Table 2 Number of seeds found at Tell el-Kerkh

	Number
Cicer arietinum	
Whole	11
Half	65
Fragment	62
Total	138
Vicia faba	
Whole	29
Half	119
Fragment	289
Total	437

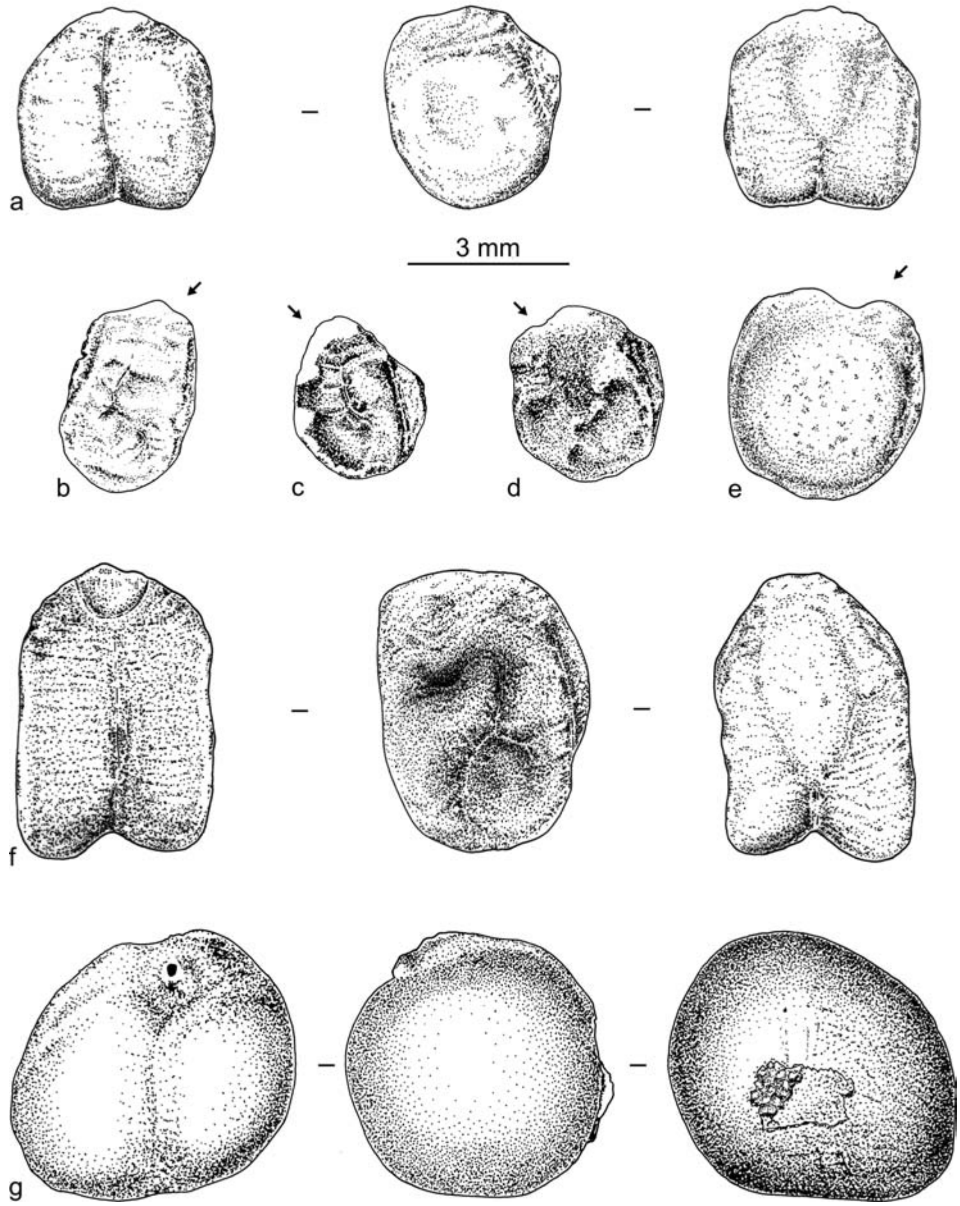
Figure 2a shows a typical seed from Tell el-Kerkh, small in size compared to modern material. Of the 11 seeds which were measured we obtained the following averages: 3.52 mm length, 3.29 mm breadth, 3.18 mm thickness (Table 3). Most specimens were round in shape but a few were more angular.

Figure 2b–e are lateral views demonstrating variation in shape. The seed in Fig. 2b is well developed in the length axis, while the one in Fig. 2c is more developed in the thickness axis. Both seeds show wrinkling on the surface of the cotyledons and are angular in shape, which are two characters found in *C. a. reticulatum*. In Fig. 2d the surface of the seed is concave but about half of all seeds were well rounded in the lateral view as illustrated in Fig. 2e and resemble small modern cultivars.

One large specimen shown in Fig. 2f closely resembles *C. a. reticulatum* (wild chickpea). It has angular square edges to the cotyledons and deep wrinkling on the cotyledon surface. It is larger than most other specimens and has a characteristic slender breadth compared with its thickness (5.38×3.69×3.84 mm).

Figure 2g is a large intact seed (4.80×5.10×4.89 mm) which has a round, plump shape; although slightly deformed, its form resembles that of cultivated *C. a. arietinum*. This seed also has a small fragment of testa which is thicker than those found in modern domesticated varieties, and partly retains the original rough surface found in *C. a. reticulatum*. The shape is rounded and plump (Fig. 2g), resembling more modern cultivated varieties than *C. a.*

Fig. 2 *Cicer arietinum* from early PPNB levels at Tell Ain el-Kerkh. **a** shows the most common type**, b–e** are lateral views to show morphological variation from more wild forms to more domestic forms arranged from left to right. The wrinkling which is often seen in *C. a. reticulatum* can be seen in **b, c** and **f. f** shows a large, ssp. *reticulatum*-type seed. **g** shows a large rounded seed with its beak and a fragment of testa. Arrows indicate presumed position of beaks



reticulatum. Thus in this specimen we have characteristics common to both wild and cultivated varieties.

Vicia faba (faba bean)

29 whole specimens, 119 halves and 289 fragments were identified (see Table 2). Of the 29 whole seeds, 25 were directly collected by hand from the sediment while 4 were recovered by water flotation. This suggests that flotation may adversely affect specimens of the species.

Measurements of *V. faba* show that it is small compared to present-day cultivars (Table 3). Most of the specimens are wedge-shaped but some are more oval. The testa only rarely survives in the archaeological material and therefore the hilum scars are also missing. However the position of the hilum scar can be estimated because it leaves an impression (Fig. 3a–b). One specimen which has remains of the testa also has a small fraction of hilum scar (Fig. 3c). In most case the radicles are also missing, having been broken. This occurs even in modern material if the testa is

Table 3 Average size and range of *C. arietinum* and *V. faba* seeds from Tell el-Kerkh

	Average	S.E	Min	Max
Cicer arietinum (*n*=11)				
Length	3,54	0,28	2,3	5,4
Breadth	3,29	0,21	2,1	5,1
Thickness	3,15	0,22	2,2	4,9
Vicia faba (*n*=13)				
Length	6,05	0,17	4,8	7,0
Breadth	4,80	0,13	4,1	5,4
Thickness	4,26	0,13	3,5	5,3

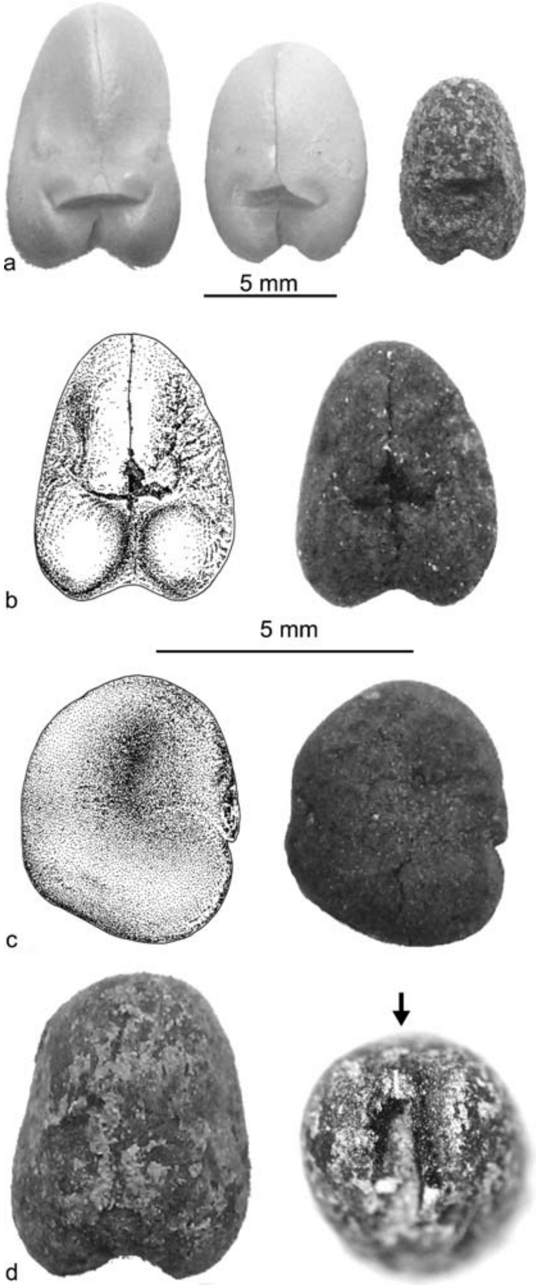


Fig. 3 *Vicia faba* from E-PPNB levels at Tell el-Kerkh. **a**, left two modern domestic seeds without radicle and testa, right a charred ancient seed. The two modern seeds were small-type varieties (from left: PI415049 from Sudan, PI270055 from Pakistan). The charred seed shown in **a** is an oval-shaped type. **b** and **c,** drawings and photos of a wedge-shape seed from Tell el-Kerkh. **d** left seed complete with testa covering radicle. **d** right is a basal view showing part of the hilum scar indicated by the arrow. The seeds have a wedge-shaped form which is thicker at the hilum end. **b–d** are at the same scale

removed, as seen in Fig. 3a, but its position can be seen by the depression. In Fig. 3a, far right, where the testa survives it covers the radicle and in this case there is no depression. The few surviving fragments of testa of *V. faba* from Tell el-Kerkh are similar to those of modern domestic seeds but we do not know if there was a big difference between wild and domestic varieties.

Discussion

Cicer arietinum

The chickpeas from Tell el-Kerkh appear to present high morphological variation. Some are proportionately long, narrow and angular with a well-developed hump, and resemble the wild progenitor *C. a. reticulatum* (Fig. 4). But many specimens are rounded in shape showing more resemblance to domestic varieties. Taking the whole range of shapes of chickpea from Tell el-Kerkh into account, it appears that we have an intermediate stage between *C. a. reticulatum* and the modern cultivated chickpea.

The present-day distribution of the wild progenitor, *C. a. reticulatum*, is limited to southeast Turkey (Ladizinsky and Adler 1976b; Berger et al. 2003). The nearest wild plants are 260 km from Tell el-Kerkh (Fig. 1). Within this area of distribution the wild progenitor remains a very rare species and does not form thick stands and so would be difficult to harvest. This leads us to the conclusion that chickpea from Tell el-Kerkh could have been introduced. However, wild chickpea, *C. a. reticulatum*, is a relatively new species reported in 1975 (Ladizinski 1975) and its known distribution as we have seen is very limited, indeed there are only 18 original accessions (Berger et al. 2003). According to Berger et al. (2003), *C. a. reticulatum* grows on limestone hills between 600 m and 1500 m a.s.l. with low winter temperatures and in areas with between 350–830 mm of precipitation during the growing season. These conditions are found over a much wider area, which leads us to suspect that the present-day distribution is in fact a relic of a former more widespread distribution which could even have extended much further west. Recent DNA-AFLP analysis (Sudupak et al. 2004) suggests that the most westerly accession of *C. a. reticulatum* [ILWC247 (=PI527934)] and therefore the nearest to Tell el-Kerkh was the one more closely related to *C. a. arietinum* than other accessions.

Some specialists suggest that *C. echinospermum* could also have contributed to the domestic varieties (Tayyar and Waines 1996; Singh and Ocampo 1997). *C. echinospermum* differs from *C. a. reticulatum* in the surface of the testa and its general shape is less angular (Fig. 4). Three well preserved examples from Tell el-Kerkh appear closer to *C. a. reticulatum* than *C. echinospermum* because they are more angular in shape. Another species, *C. bijugum*, which is genetically not so close, was also considered because it is known to occur in north-west Syria (Berger et al. 2003) and its rounded seeds resemble the cultivated chickpea except for a concave dorsal side, but this was not observed in the samples from Tell el-Kerkh. Typical *C. a. arietinum*, the domestic variety, may be characterized by rounded seeds and indeed some of the archaeobotanical material was very rounded (Fig. 2f). But in reality these three species are difficult to separate on the basis of their shape because of phenotypic variability and the effects of charring. Given the material from Tell el-Kerkh and taking into account the three wild taxa and one domestic taxon, we have identified them as *C. a. arietinum* and/or *C. a. reticulatum* (Fig. 2f–g). This

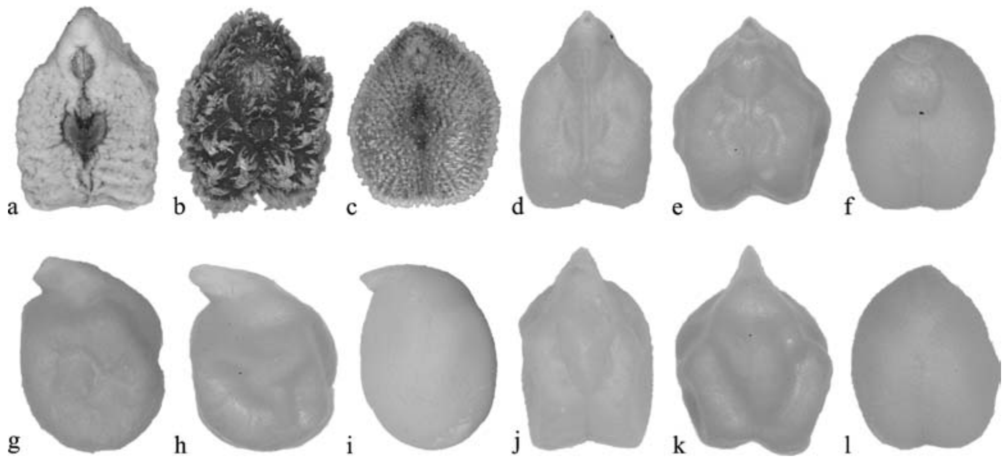


Fig. 4 *Cicer arietinum* ssp. *reticulatum* (wild chickpeas) (**a**, **d**, **g** and **j**), *C. echinospermum* (**b**, **e**, **h** and **k**) and *C. bijugum* (**c**, **f**, **i** and **l**). **a–c**, whole seeds. **d–f**, front views. **g–i**, lateral views. **j–l**, dorsal views. Typical *C. a. reticulatum* has an angular square edge (**a** and **d**) with a developed dorsal side (**g** and **j**) and wrinkling on the cotyledon surface (**g**). Typical *C. echinospermum* has irregular wrinkling on the cotyledon surface (**h**), but as a whole it has an intermediate shape between *C. a. reticulatum* and *C. a. arietinum* (domestic chickpea), which is why it is difficult to identify. Typical *C. bijugum* has a round shape with a depressed dorsal side (**i** and **l**)

being the case, the evidence supports the hypothesis that *C. a. reticulatum* is the wild progenitor of the cultivated chickpea, *C. a. arietinum* (Ladizinski and Adler 1976a; Ohri and Pal 1991; Tayyar and Waines 1996; Robertson et al. 1997; Iruela et al. 2002; Nguyen et al. 2004; Sudupak et al. 2004).

Chickpea remains which are contemporary with Tell el-Kerkh are to be found on several sites in the Near East (Table 4). A single specimen was reported from Çayönü (Zeist and Roller 1991, 1992). This seed, found from the "basal pit" phase, was dated to between c. 9320-9175 B.P. (Özdoğan 1999). Two and a half seeds were recovered from the "channel building" phase dated to ca. 9100-9000 B.P. Evidence from Jericho (Hopf 1983) is poor, with two doubtful identifications probably dated to the PPNB (see Nesbitt 2004). At Nevali Çori (Pasternak 1998), an early PPNB site, there was a single seed identified as *Cicer*/*Lathyrus cicera*. At Dja'de three specimens of *Cicer* sp. were identified (Willcox, in prep.). Thus, the finds from Tell el-Kerkh provide the best evidence for the use of chickpea during this period.

Table 4 Archaeobotanical records for *C. arietinum* and *V. faba* in the early Neolithic periods

Site	Identification	Number	uncal B.P.	Reference
Cicer arietinum				
Tell el-Kerkh	*Cicer arietinum*	138	9350–9165	This paper
Çayönü (basal pits)	*Cicer sp.*	1	9320–9175	van Zeist and de Roller (1991, 1992)
Jericho	*Cicer arietinum*	? ("frgts?")	9320–9230	Hopf (1983)
Nevali Çori	cf. *Cicer sp.*	1	9250	Pasternak (1998)
Çayönü (channelled building)	*Cicer* sp.	2.5	9100–9000	van Zeist and de Roller (1991, 1992)
Aşıklı Höyük	cf. *Cicer* sp.	1	8900–8500	van Zeist and de Roller (1995)
Ain Ghazal	*Cicer* cf. arietinum	3	8620–8070	Rollefson et al. (1985)
Çayönü (cell building)	*Cicer* sp.	7.5	8600–8300	van Zeist and de Roller (1991, 1992)
Ghoraife	*Cicer* cf. arietinum	3	8400–8150	van Zeist and Bakker-Heeres (1982)
Jericho (trench D phase"?")	*Cicer* arietinum	2	(PPNB)	Hopf (1983)
Wadi Jirat 7 (trench B)	cf. *Cicer* sp.	1	8810–8390	Colledge (1994, p.82)
Çatalhöyük	*Cicer* cf. *arietinum*	88	8240–7760	Fairbairn et al. (2002)
Çatalhöyük	*Cicer* sp.	4	8240–7760	Fairbairn et al. (2002)
Abu Hureyra 2 (trench E, phase 6)	*Cicer arietinum*	8	8020±100	Moulins (1997 p.129), de Moulins (2000 p.414)
Ramad	*Cicer* sp.	27.5	7900	van Zeist and Bakker-Heeres (1982)
Vicia faba				
Iraq ed-Dubb	*Vicia* cf. *faba*	5	11145–9950	Colledge (1994)
Tell el-Kerkh	*Vicia faba*	437	9350–9165	This paper
Nevali Çori	*Vicia faba*	15	9250	Pasternak (1998)
Abu Hureyra 2 (trench B, phase 2)	*Vicia cf. faba*	1	8500±120	Moulins (2000)
Çafer Höyük	*Vicia* cf. *faba*	2	8950–8480	Moulins (1997)
Yiftah'el	*Vicia faba*	2750	8800	Kislev (1985)
Jericho (trench F, phase 29–30	*Vicia narbonensis*	30+frgts	8900–8670	Hopf (1983)

Table 5 Size of archaeobotanical records compared with some wild relatives. The measurements of *C. a. reticulatum* and *C. echinospermum* are based on modern accessions including testa

Site	Number of measurements	Size (length × breadth × thickness)	Comment
Cicer arietinum			
Tell el-Kerkh	11	av. 3.52×3.29×3.18	
Ain Ghazal	3	3.8–5.0	"diameter"
Ghoraife	3	3.2×3.4×3.0, 3.3×3.2×3.0, 2.6×2.6×2.5	
Jericho	1	4.30	only one dimension given
Ramad	18	av. 4.3×4.1×3.8	
Cayonu	4	3.8×3.6×3.2, 5.4×4.1×3.2, 4.4×4.2×3.5, 3.5×3.4×2.9	mixture of EPPNB-PPNC
C. a. reticulatum	251	7.48×4.96×5.27	11 accessions
C. echinospermum	90	7.32×5.19×5.50	3 accessions
Vicia faba			
Tell el-Kerkh	13	av. 6.05×4.80×4.26	
Yiftah'el	not indicated	av. 5.50×4.73×4.04	

The seeds from Tell el-Kerkh were small (average 3.52×3.29×3.18 mm length×breadth×thickness) compared with wild chickpea today, but they compare well with other finds from the Near East. Measurements from other sites are given in Table 5. In order to compare size we measured modern uncarbonised seeds provided by the USDA (ARS, WRPIS) seed bank station. Measurements of 251 modern *C. a. reticulatum* seeds from 11 accessions gave averages of 7.48×4.96×5.27 mm with standard deviations 0.82–0.62–0.59 (length, breadth and thickness, respectively). However if the beak is excluded as in the archaeological remains, the length is 5.77 mm instead of 7.48 mm. *C. echinospernum* gave similar results, 7.32×5.19×5.50 mm (90 seeds from 3 accessions). The length would have been 5.63 mm if the beak was removed. While *C. a. reticulatum* could have crossed with domestic varieties in the recent past to give bigger seeds, this would not have been the case for *C. echinospernum*. Taking into account the size of modern wild chickpeas and the shrinkage due to charring, the ancient seeds do not appear to have undergone an increase in size.

One of the main differences between wild and domestic chickpeas is that wild chickpeas germinate in the autumn, while cultivars are spring sown. The wild progenitor, *C. a. reticulatum*, does not require vernalization although low temperatures may help its growth (Abbo et al. 2002). An advantage of spring planting is that it has an adverse affect on *Ascochyta* blight, a disease which seriously affects chickpea crops, so the change to spring planting may have been for this reason (Abbo et al. 2003a) propose that this change took place in the Bronze Age, but given the new data this change may have occurred earlier. Fairbairn et al. (2002) suggest that environmental conditions at PPNB/PN Çatalhöyük in south-central Anatolia made autumn sowing unlikely and they suggest that pulses such as *V. ervilia* were sown in the spring and early summer. The change from autumn to spring varieties would have been accompanied by a series of genetic changes or bottlenecks. DNA data using various methods (RFLP, Udupa et al. 1993; RAPD and ISSR, Iruela et al. 2002; AFLP, Sudupak et al. 2004) suggest that this change may have been early. These studies revealed very low genetic diversity of cultivated chickpea compared with the wild progenitor, and this reduction in diversity must have predated chickpea dispersal west into Europe and east into central and southern Asia. It is now known that this dispersal occurred in the fifth or sixth millennium B.C. The high variation in both morphology and size seen in the Tell el-Kerkh seeds could be interpreted as high genetic variability, in which case these populations either predate or were at least in the initial stages of domestication.

Vicia faba

Until now, finds of early Neolithic *Vicia faba* have been very rare and identifications are uncertain (Table 4). This rarity of faba bean finds may be due to their fragility. We noted that only 4 out of 29 were recovered by flotation and some were broken in transportation. The earliest archaeobotanical record for this taxon comes from Iraq ed Dubb in Jordan where cf. *V. faba* was identified (Colledge 1994, 2001). However there is some doubt because the five identifications were only identified as "cf." and there is some risk of contamination from Iron Age levels. A more secure identification comes from 15 seeds, most of which were broken, from early PPNB Nevali Cori (Pasternak 1998). Middle PPNB finds come from Abu Hureyra, (1 identification) and Çafer Höyük (2 identifications) of cf. *V. faba* (Moulins 1997). At other sites seeds were poorly preserved and lacked the hilum scar so they could not be separated from species such as *V. narbonensis* or *V. galilaea* (Zohary and Hopf 2000). At PPNB Jericho, 30 seeds were identified as *V. narbonensis* because of their spherical to oval shape and the position of the hilum, and they also included some "*Vicia faba* types" (Hopf 1983). One seed was identified from early PPNB Dja'de (Willcox, in prep.). Taking the evidence as a whole, only two sites have secure identifications, Yiftah'el and Tell el-Kerkh.

The most outstanding finds of *V. faba* come from late PPNB Yiftah'el, Israel, where 2750 seeds were recovered (Kislev 1985). They were found in a storage structure (2600 seeds) and also from an adjacent dwelling (150 seeds) dated to 8800 B.P. (Garfinkel et al. 1988). The finds from Yiftah'el had a flat and wedge-shaped form which was thicker at the hilum end. This distinguishes them from the *V. narbonensis* complex (Bennett and Maxted 1997) which have round shaped seeds. The finds from Yiftah'el's were identified as var. *minuta* (Alef.) Mansf. (= var. *minor* (Harz.) Beck) because of their small size (5.5×4.7×4.0 mm) (Kislev 1985). The *V. faba* from Tell el-Kerkh resembles that of Yiftah'el in that it has the same small, flat and wedge-shaped form. According to the criteria used in the Yiftah'el samples, the *V. faba* from Tell el-Kerkh also belongs to var. *minuta*. Even today's populations with small wedge-shaped seeds are to be found in southwest Asia and Africa, but large-sized varieties (var. *major*) are rapidly replacing them. The archaeobotanical evidence for the appearance of the large-sized seed variety, *V. faba* var. *major* is poor; according to Maxted (1995) this variety did not appear until about A.D. 1000.

The main problem when considering the origin of *V. faba* is the lack of data (as mentioned above, see also Table 4). The wild progenitor of *V. faba* has not been identified, indeed it may be extinct. The finds from Tell el-Kerkh, which are wedge-shaped, probably resemble the wild ancestor and like the cultivar, which has an erect, stout stem and reduced tendrils, it probably preferred damp, heavy soils. These soil requirements fit the alluvial plains of the Mediterranean zone such as are found in the el-Rouj basin and the Ghab valley in Syria. If this was the habitat of the wild ancestor it is not surprising that it has disappeared because these areas have been particularly degraded through human impact. Indeed the seven wild *Vicia* species found in this area of the Levant are threatened with extinction (Maxted 1995).

Cicer arietinum and *Vicia faba* in the early Neolithic period

The rarity of *V. faba* in the early Neolithic may be more apparent than real due to the fragility of the charred grains which we observed during sampling. In the case of *C. arietinum*, the grains are less fragile but their large size may make them more susceptible to fracturing than the small pulses such as lentils and bitter vetch. Also because the fragments of these two taxa are difficult to identify they are often recorded as *Pisum* or *Vicia* or even large Fabaceae types. The finds of *C. arietinum* had characteristics common to both wild and domestic varieties and may have been in the process of domestication. The finds of *V. faba* probably closely resemble the wild progenitor.

Finally, these new results demonstrate that *C. arietinum* and *Vicia faba* were probably more commonly used in the late 10th millennium than we previously thought. While *C. arietinum* is considered to be one of the eight founder crops which include *Triticum monococcum*, *T. turgidum* ssp. *dicoccum*, *Hordeum vulgare*, *Lens culinaris*, *Pisum sativum*, *Linum usitatissimum* and *V. ervilia* (Zohary 1996), this list does not include *Vicia faba*. Perhaps now it is time to enlarge the list to nine species by including *V. faba*.

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