15. The plant remains

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Introduction[1]

Limited sampling for plant remains was carried out during the excavations at Tille Höyük (see *Tille 3.1*: chapter 3, p. 45). Samples (some large) of charred seeds were routinely collected by the excavation team from the burnt buildings found in the Late Iron Age Levels VIIIa and VIIIb and Hellenistic Levels I and II. Aside from burnt areas, a small number of samples were collected from Late Bronze Age and Middle Iron Age pits. Overall, samples deriving from 19 distinct deposits were studied. Of these, 12 are from the extensive destruction deposit of the Late Iron Age (Neo-Assyrian) burnt level, Level VIIIa (Table 15.1). Sample 7, of foxtail millet, was identified at an early stage as being of exceptional interest and has already been published.[2] The Late Bronze Age and Hellenistic samples, few in number, are included in this report for the sake of completeness (Table 15.2).

Most of the deposits are of stored crops. Both the relatively small number of samples, and their pure, unmixed nature make it difficult to reconstruct the full range or the relative proportions of crops grown at the site. Comparison with the plant remains of other sites has helped fill out the picture. However, the greatest importance of these plant remains lies in what they can tell us about crop storage practices at the site, and in the presence of some uncommon finds (whole grapes, grass pea, foxtail millet).

Archaeobotanical methodology

Analyses of the samples are given in full in Tables 15.1 and 15.2 and, for crops only, in summary form in Table 15.3.

Sample numbering
Samples were allocated a five-part identification number during excavation: site code and year (e.g., TH83), grid (e.g., 7459), unit (e.g., 161), material code (sample type, 22 or 23 for the botanical samples), and batch number (e.g., 003) from a consecutive series running within each trench (see *Tille 3.1*, chapter 4, pp. 56–7 for further details of numbering).

In some cases more than one sample was collected from a given seed deposit. In these cases I generally chose to sort just one sample from each group, on the assumption (based on quick scanning of the other samples) that one sample would be representative of the whole deposit. For example, three samples of millet were collected; all were part of the same archaeological context and have similar contents, so just one was sorted. The extra, unsorted samples have not been quantified and do not feature in this report.

In the case of some samples, it was not clear until after analysis that they derived from the same deposit. In these cases (samples 5, 11, 13, 19), the results from the individual samples are presented in Tables 15.1 and 15.2 but are amalgamated in the summary Table 15.3. Sample 3 is a special case, as three separate batches of soil were collected from a pit and were analysed to explore variation within. In practice, all three batches are very similar, and results have been amalgamated in the summary table.

Sub-sample size
Eleven of the 19 samples could be sorted in total within a reasonable time. The remaining samples were either very large, or contained many small weed seeds, and thus could not be sorted in full. In the case of the stored product samples there were two main aims: firstly, to ensure that enough of the main crop (or crops, if a mixture was present) was obtained so as to be sure of its identity and allow reliable quantification; secondly, to allow sufficient of the weed flora to be recovered. As this type of stored crop sample is often rich in crop seeds and poor in weed seeds a two-tier sampling technique was often appropriate, in which a fraction is sorted for seeds of the dominant crop, and the entire sample (or much of it) is sorted for weed seeds and the less abundant crop seeds. This procedure was followed for samples 1, 8 and 10. In contrast, in sample 3, all of the large fraction and just a quarter of the small fraction were sorted, as the smaller, weed seed-containing, fraction was very rich. In samples 7 and 9 both crops and weed seeds were sorted from the same fraction (with the exception of a few large items).

Flax is a special case; only in sample 10 were the flax seeds loose and thus amenable to ordinary sorting; here 12.5% of the sample was sorted. The other samples consisted of glued-together lumps of flax seed. Short of pulverising these and hoping to extract weed seeds

1 This report was written in 1993 and lightly revised in 2006 to take account of subsequent literature. I am grateful to Jane Goddard for the seed drawings and Tuğrul Çakar for the photographs, and to Stuart Blaylock, Simone Riehl and Delwen Samuel for careful comments on the text.

2 Nesbitt, Summers 1988.

intact, there was little choice but simply to sort the debris at the bottom of the sample bag, consisting of fragmented flax seed and weed seeds that had rubbed off the lumps after excavation. In the case of sample 12 a good suite of weed seeds were recovered, but only a small amount of loose material could be sorted from sample 11. In practice, however, the results do show a very consistent weed flora in all the flax samples.

Data are shown in corrected form in Tables 15.1–15.3; where only part of a sample was sorted, I have multiplied up the figures to 100%.

Quantification

The two main cereals in the samples, free-threshing wheat and two-row hulled barley, have been scored in detail, distinguishing between whole and fragmented grain. The only exception is sample 3, where the grain fragments are too small for sorting; however, most of these fragments seem to be barley. In the case of all the other crop and weed seeds, fragmented grains have been converted to whole-grain equivalents and amalgamated with whole-seed scores. Where large amounts of fragmented material needed to be quantified, I have weighed it and calculated the equivalent whole grains, using thousand-grain weights obtained from whole seeds in the same samples.

Level of identification

Of the total 14,661 weed seeds counted, 17% have not been identified. The unidentified seeds are concentrated in six samples; insufficient time was available to identify these.[3]

Archaeology and taphonomy of the samples

In this section the archaeological context and the archaeobotanical composition of the samples is compared. This analysis is based on ethnographic observation of traditional practice[4] and comparison with practice at other sites.

Late Bronze Age: Samples 1–2

These were collected from separate Late Bronze Age pits excavated in a 10 x 10 m sounding through the Late Bronze Age burnt level.[5] Both pits lie about 2m below the major Late Bronze Age burnt level. Level 6, to which sample 1 belongs, was poorly preserved, with many pits and scanty remains of walls.[6] Sample 2 belongs either to Level 6, or Level 5, which contained poorly preserved rectilinear structures.[7] Both samples probably date to sometime in the 13th century BC.[8]

Both pit samples consist of almost pure deposits, of wheat and bitter vetch respectively, and were clearly visible in section as dense charred deposits. They are atypical of pit deposits, which usually derive from refuse disposal and are very mixed (see sample 3). Equally, the excavation notes make it clear these deposits did not derive from *in situ* burning, for example, of crops stored in pits. These samples are therefore interpreted as redeposited burnt stores, perhaps from a localised area of burning that did not extend into the area of the sounding.

No seed samples were found in the very extensive burnt level that terminates the Late Bronze Age at Tille. Large quantities of burnt timber were found, but the fire may have been too intense to enable survival of charred seeds.

Middle Iron Age, Level VII: Samples 3–4

Level VII was very poor structurally, with heavily eroded structures, and many pits; much of the mound was unoccupied at this time and perhaps in use as a crop storage/processing area (above, chapter 6).

Both samples derive from pits. Sample 3 comprises three flotation samples from the lower part of pit 481 (see sections in Fig. 5.2, 54; Fig. 5.4, 62). The excavator noted dark green to brown, very sticky soil, interpreted as a cesspit. The samples did not contain any uncharred plant remains, such as grape pips, typical of human excreta. However, no uncharred seeds or fruits were found at Tille, suggesting that they had decayed. Although the charred plant remains do not derive from cesspit use, they are highly diverse and probably derive from use of the pit for refuse disposal. The three flotation samples are scored separately in Table 15.2, but are treated as one deposit in summary Table 15.3 in view of their homogeneous composition.

Sample 4 is less straightforward. It comprises 280 charred grapes, mostly whole, and is thus similar in composition to sample 13, of whole grapes, found in the Neo-Assyrian burnt level (Level VIIIa, below). However, sample 4 is in a distinct, earlier stratigraphic level, and is 40m distant from the position of the other samples. Unlike the other grape sample, it also contains many small weed seeds. The excavator noted that:

3 Nomenclature for cereals follows van Zeist 1984, for other crops and for botanical names of wild plants, the *Flora of Turkey*. Measurements follow van Zeist 1968–1970 for cereals and Kroll 1979 for pulses.

4 Hillman 1981; *idem* 1984.

5 Summers 1993a.

6 *Ibid.*: fig. 14.9 (plan); fig. 15b, no. 33 (section).

7 *Ibid.*: fig. 14.16 (plan); fig. 15b, no. 31 (section).

8 *Ibid.*: 30.

> ... after excavation a ring of organic (carbonised grapes) showed in [the] pit edge. In plan this extends only a couple of inches beyond the pit as excavated and thus appears to be part of [the] fill. [...] either itself some kind of lining or was in an earlier concentric pit. [... (dated following day)] Totally removed as sample. Must be considered a part of 213 pit. (Trevor Carbin, Field Notebook)

Could the charring have occurred *in situ*, perhaps in connection with the making of *pekmez*, concentrated grape juice, involving the crushing of grapes and boiling of the juice? However, it is difficult to reconstruct a plausible process by which so many whole grapes could have become charred during the boiling of grape juice. Or could the grapes represent redeposited material from another burnt level? The weed seeds present in this sample must derive from the soil matrix surrounding the charred grapes, and might or might not derive from the same charring event. Overall, this remains a puzzling deposit. The state of the charred grapes is discussed below, in relation to sample 13.

Late Iron Age (Neo-Assyrian), Level VIIIa: Samples 5–16

These seed samples were from the substantial destruction deposit of the Neo-Assyrian burnt level, centred in the north-west area of the site. They were found as *in situ* deposits intermingled with the remains of buildings. The distribution of the samples from the Neo-Assyrian burnt level mirrors that of pots (see Fig. 7.19), both being concentrated in Rooms 17–30, which were the focus of the destruction fire.

The samples derive from four types of archaeological context:

Floor: Three samples, 5, 6 and 7, were found directly on the floors, and must therefore have been inside the building before the destruction fire occurred.

Roof: Only one sample, 13, was definitely on top of a roof at the time of the destruction fire.

Debris: Most samples were collected from collapsed roofing material, often disturbed in salvage or reconstruction efforts soon after the fire. It is likely that most of this material was originally stored on roof tops, but this cannot be proven from the excavation records for these units.

Pit: Sample 12 is from a pit. The composition of the pottery in the pit suggests that it held redeposited material from the destruction fire.

Samples 5 & 6, Barley

Samples 5 and 6 are both from the floor of Room 23. Sample 5 is made up of near pure barley, with a little wheat admixture, and a few weed seeds. Although collected as two samples from adjoining trenches (and thus scored separately in Table 15.1), it evidently forms one deposit. This deposit of pure, whole grain was very likely part of a grain store, burnt in the destruction of this level by fire.

Sample 6 was collected nearby to sample 5, but is very different in character. It contains an unusually high proportion of barley as fragments (rather than whole grains), and a very high proportion of weed seeds: 39.5%. This could represent fine sievings, in which barley grain has been sieved in a small-gauged sieve to remove fragmented grain and small weed seeds, such as the wild grasses which form a large part of this sample. Such a weedy sample – containing large numbers of poisonous darnel (*Lolium temulentum*) seeds – could not represent a store ready for consumption. It might have been awaiting disposal, or been kept as animal feed.

Sample 7, Foxtail millet

Sample 7 was collected from a burnt deposit from the floor of Room 25. It is a near pure deposit of this crop.

Samples 8–9, Bitter vetch

Samples 8 and 9 come from adjacent rooms (23 and 22 respectively). Sample 8 is of pure bitter vetch; sample 9 contains a mixture of bitter vetch and pea. Both crops are pulses, and both ethnographic and archaeological evidence shows that pulses were often grown (deliberately or otherwise) in mixtures.[9] However, it is impossible to say whether sample 9 derives from a mixed harvest, or whether it derives from mixing of pure deposits of bitter vetch and pea, neither of which survived (even in part) as pure deposits. If samples 8 and 9 are both derived from rooftop storage, then sample 8 could be the source of the bitter vetch in sample 9.

Samples 10–12, Flax

Three of the flax samples are relatively pure storage samples. Sample 10 contains some bitter vetch. In view of the disparity in plant habit and seed size, this mixture is unlikely to result from harvesting of a single crop. Instead, mixing of two different crop stores may have occurred during burning. This sample does indeed come from the same room (23) as one of the bitter vetch samples.

Sample 11 was collected from Room 30 as two samples (Table 15.1), but is treated as one deposit in view of the shared archaeological context and similar composition of the samples. Sample 12 is from a pit containing redeposited debris in Room 26. Its contents – a burnt store of flax – are typical of the burnt level samples, rather than of the mixed samples usually recovered from archaeological refuse pits.

9 Butler 1992.

Year		1986	1986	1986	1986	1986	1986	1986	1986
Grid		7559	7659	7559	7558	7559	7660	7559	7659
Unit		419	418	418	499	419	26	419	387
Material code		22	23	22	22	22	22	22	22
Batch number		021	008	019	006	024	001	030	004
Volume floated (litres)		2	0.7	1.5	-	-	-	-	-
% sorted (crops/weeds)		100	100	100	2.66	25/100	25	12.5/100	3.3
Stratigraphic level		VIIIa	VIIIa	VIIIa	VIIIa	VIIIa	VIIIa	VIIIa	VIIIa
Period		Neo-Assyrian	Neo-Assyrian.	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian
Context details		Floor	Floor	Floor	Floor	Debris	Debris	Debris	Debris
Room number		23	23	23	25	23	22	23	30
Sample number		**5**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Dominant crop		Barley	Barley	Barley	Millet	Bitter vetch	Bitter vetch	Flax	Flax
WHEAT									
Free-threshing wheat	grain	-	-	-	-	-	4	-	-
Free-threshing wheat	grain fragment	-	-	-	-	-	-	-	-
Free-threshing wheat	internode	-	-	-	-	-	-	-	-
Einkorn	grain	1	-	-	-	-	-	-	-
Glume wheat (1-grained type)	grain	2	2	35	-	-	-	-	-
Einkorn/emmer	spikelet fork	-	-	-	-	-	-	-	-
Indeterminate species	grain	-	-	10	-	8	-	-	-
BARLEY									
Straight	grain	296	123	47	-	-	8	-	-
Indeterminate	grain	125	50	9	-	-	-	1	-
Twisted	grain	18	2	-	-	-	-	-	-
Indeterminate	grain fragments	260	64	711	1	-	-	-	-
2-row	internode	-	1	-	-	-	-	-	-
6-row	internode	-	-	-	-	-	-	-	-
Indeterminate	internode	-	-	-	-	-	-	-	-
WHEAT/BARLEY									
Indeterminate	grain fragments	-	-	-	-	-	-	-	-
Sub-basal	internode	-	-	-	-	-	-	-	-
Culm-ear	node	-	-	-	-	-	-	-	-
Culm	node	-	-	1	-	-	-	-	-
Basal culm	node	-	-	-	-	-	-	-	-
MILLET									
Foxtail millet	grains	-	12	-	264,938	-	4	-	-
PULSES									
Chickpea	seed	-	-	-	-	-	4	-	-
Bitter vetch	seed	1	30	1	-	2116	6764	229	-
Horsebean	seed	-	-	-	-	4	-	-	-
Lentil	seed	-	-	-	-	-	4	2	-
Grass pea	seed	-	-	-	-	-	4	-	-
Pea	seed	-	-	-	-	-	868	-	-
OTHER CROPS									
Grape	whole fruit	-	-	-	-	-	-	-	-
Grape	pip	-	1	-	-	-	-	-	-
Grape	pedicel	-	-	-	1	-	-	-	-
Flax	seed	-	-	-	-	16	-	2973	82,097
WILD PLANTS									
Sea club-Rush	nutlet	-	-	-	-	-	-	-	-
Gold of pleasure	seed	-	-	-	-	2	-	1	90
Syrian scabious	seed	-	-	30	-	-	-	-	-
Scorpion-vetch	seed	-	-	-	-	-	-	-	-
Bedstraw	seed	11	3	6	-	24	28	1	-
Vetch/vetchling	seed	-	-	-	-	128	-	4	-
Medick	seed	-	-	-	-	-	4	-	-
Medick	fruit	-	-	-	-	-	4	-	-
Terebinth nut	nutshell	-	-	-	-	-	-	-	-
Campion	seed	-	-	-	-	-	-	18	-
Cow basil	seed	28	1	2	-	1	-	3	30
Unidentified	seed	4	5	76	-	6	52	7	90
WILD GRASSES									
Goatgrass	seed	-	-	2	-	-	-	-	-
Goatgrass	spikelet fork	-	-	-	-	-	-	-	-
Ryegrass	seed	-	-	112	-	9	12	21	-
Darnel	seed	59	15	228	-	-	8	-	-
Canary grass	seed	-	-	-	38	-	-	-	-
Bristle grass	seed	-	-	-	7227	-	-	1	-
cf. Bristle grass	seed	-	-	-	903	-	-	-	-
Wild einkorn (1-grained type)	seed	-	-	17	-	-	-	-	-
Wild einkorn/wild emmer	seed	-	-	46	-	-	-	-	-
Unidentified	seed	-	-	12	-	1	4	-	-
Total items		805	309	1345	273,108	2315	7772	3261	82,307
Total crop seeds		703	284	813	264,940	2144	7660	3205	82,097
Total crop chaff		0	1	1	0	0	0	0	0
Total weed seeds		102	24	531	8168	171	112	56	210
% weed seeds		12.7	7.8	39.5	3.0	7.4	1.4	1.7	0.3
% crop seeds & chaff		87.3	92.2	60.5	97.0	92.6	98.6	98.3	99.7

Table 15.1. Scoresheet for plant remains from the Neo-Assyrian burnt destruction level at Tille Höyük.

1986	1986	1987	1987	1986	1986	1986		Year
7659	7659	7459	7559	7558	7559	7658		Grid
396	416	161	462	488	416	551		Unit
22	22	22	22	22	22	22		Material code
005	008	003	032	004	022	007		Batch number
-	-	-	-	18	1	5		Volume floated (litres)
18.5	14.7	100	100	100	100	100		% sorted (crops/weeds)
VIIIa	VIIIa	VIIIa	VIIIa	VIIIa	VIIIa	VIIIa		Stratigraphic level
Neo-Assyrian	Neo-Assyrian.	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian	Neo-Assyrian		Period
Debris	Pit	Roof	Roof	Debris	Debris	Debris		Context details
30	26	20	20	25	24	27		Room number
11	**12**	**13**	**13**	**14**	**15**	**16**		**Sample number**
Flax	Flax	Grape	Grape	Mixed	Mixed	Mixed		Dominant crop
								WHEAT
-	-	-	-	-	3	-	grain	*Triticum durum/aestivum*
-	-	-	-	-	-	-	grain fragment	*Triticum durum/aestivum*
-	-	-	-	1	-	-	internode	*Triticum durum/aestivum*
-	-	-	-	-	-	-	grain	*Triticum monococcum*
-	-	-	-	-	2	-	grain	*cf. T. monococcum/dicoccum*
-	-	-	-	7	-	-	spikelet fork	*T. monococcum/dicoccum*
-	-	-	-	-	-	-	grain	*Triticum*
								BARLEY
-	-	-	-	6	7	-	grain	*Hordeum distichum/vulgare*
-	-	-	-	21	4	1	grain	*Hordeum distichum/vulgare*
-	-	-	-	-	-	-	grain	*Hordeum distichum/vulgare*
-	-	-	-	-	40	1	grain fragments	*Hordeum distichum/vulgare*
-	-	-	-	-	-	-	internode	*Hordeum distichum*
-	-	-	-	4	-	-	internode	*Hordeum vulgare*
-	-	-	-	5	-	-	internode	*Hordeum*
								WHEAT/BARLEY
-	-	-	-	-	-	-	grain fragments	*Triticum/Hordeum*
-	-	-	-	1	1	-	internode	*Triticum/Hordeum*
-	-	-	-	1	-	-	node	*Triticum/Hordeum*
-	-	-	-	3	-	-	node	*Triticum/Hordeum*
-	-	-	-	3	-	-	node	*Triticum/Hordeum*
								MILLET
11	7	-	-	20	1	1	grains	*Setaria italica*
								PULSES
-	-	-	-	-	-	1	seed	*Cicer arietinum*
-	-	-	-	8	-	1	seed	*Vicia ervilia*
-	-	-	-	-	-	-	seed	*Vicia faba*
-	-	-	-	-	-	1	seed	*Lens culinaris*
-	-	-	-	-	-	-	seed	*Lathyrus sativus*
-	-	-	-	-	-	-	seed	*Pisum sativum*
								OTHER CROPS
-	-	53	298	7	-	-	whole fruit	*Vitis vinifera*
-	-	59	135	137	-	7	pip	*Vitis vinifera*
-	-	40	111	13	1	-	pedicel	*Vitis vinifera*
9810	15,827	-	-	-	-	1	seed	*Linum usitatissimum*
								WILD PLANTS
-	-	-	-	136	-	-	nutlet	*Bolboschoenus maritimus*
5	54	-	-	-	-	-	seed	*Camelina sativa*
-	-	-	-	-	2	-	seed	*Cephalaria syriaca*
-	-	-	-	25	-	1	seed	*Coronilla*
-	-	-	-	-	2	-	seed	*Galium*
-	-	-	-	12	-	-	seed	*Lathyrus/Vicia*
-	-	-	-	182	1	3	seed	*Medicago*
-	-	-	-	5	-	-	fruit	*Medicago*
-	-	-	-	1	-	-	nutshell	*Pistacia*
16	346	-	-	9	-	-	seed	*Silene*
16	598	-	-	-	2	1	seed	*Vaccaria*
-	-	-	-	1100	16	175	seed	Unidentified
								WILD GRASSES
-	-	-	-	-	4	-	seed	*Aegilops*
-	-	-	-	14	1	-	spikelet fork	*Aegilops*
-	163	-	-	27	6	7	seed	*Lolium*
-	54	-	-	17	11	4	seed	*Lolium temulentum*
-	-	-	-	-	-	-	seed	*Phalaris*
-	-	-	-	-	-	-	seed	*Setaria verticillata/viridis*
-	-	-	-	-	-	-	seed	cf. *S. verticillata/viridis*
-	-	-	-	-	-	-	seed	*Triticum boeoticum* (1-grained)
-	-	-	-	-	3	-	seed	*T. boeoticum* (2-grained)
-	34	-	-	13	22	1	seed	Unidentified
9858	17,083	152	544	1778	129	206		
9821	15,834	152	544	212	58	14		
0	0	0	0	25	1	0		
37	1249	0	0	1541	70	192		
0.4	7.3	0.0	0.0	86.7	54.3	93.2		
99.6	92.7	100	100	13.3	45.7	6.8		

Year		1990	1990	1987	1987	1987
Grid		7460	7460	7559	7559	7559
Unit		270	264	491	491	491
Material code		22	22	22	22	22
Batch number		007	008	035	036	037
Volume floated (litres)		3	2	3	3	3
% sorted (crops/weeds)		3.1/100	100	100	100	100/25
Stratigraphic level				VII	VII	VII
Period		Late Bronze Age	Late Bronze Age	Middle Iron Age	Middle Iron Age	Middle Iron Age
Context details		Pit	Pit	Pit	Pit	Pit
Room number						
Sample number		**1**	**2**	**3**	**3**	**3**
Dominant crop		Wheat	Bitter vetch	Mixed	Mixed	Mixed
WHEAT						
Free-threshing wheat	grain	5696	2	7	18	28
Free-threshing wheat	grain fragment	4068	-	-	-	-
Free-threshing wheat	internode	-	-	-	-	-
Einkorn	grain	-	-	-	-	-
Glume wheat (1-grained type)	grain	-	-	2	2	4
Einkorn/emmer	spikelet fork	-	-	1	-	-
Indeterminate species	grain	-	-	7	-	-
BARLEY						
Straight	grain	1	7	5	18	22
Indeterminate	grain	5	3	13	8	14
Twisted	grain	-	-	-	-	-
Indeterminate	grain fragments	-	10	36	-	-
2-row	internode	-	-	-	-	-
6-row	internode	-	-	-	-	-
Indeterminate	internode	-	-	-	3	4
WHEAT/BARLEY						
Indeterminate	grain fragments	-	-	38	620	400
Sub-basal	internode	-	-	-	-	-
Culm-ear	node	-	-	-	-	-
Culm	node	-	-	-	-	-
Basal culm	node	-	-	-	-	-
MILLET						
Foxtail millet	grains	-	-	-	-	4
PULSES						
Chickpea	seed	-	-	-	-	1
Bitter vetch	seed	3	2085	1	-	-
Horsebean	seed	-	-	-	-	-
Lentil	seed	-	-	-	-	-
Grass pea	seed	-	8	-	-	-
Pea	seed	-	-	-	-	-
OTHER CROPS						
Grape	whole fruit	-	-	-	3	-
Grape	pip	-	-	8	33	50
Grape	pedicel	-	-	3	4	4
Flax	seed	-	-	1	-	15
WILD PLANTS						
Sea club-Rush	nutlet	-	-	-	-	-
Gold of pleasure	seed	-	-	2	-	-
Syrian scabious	seed	64	-	77	15	80
Scorpion-vetch	seed	-	-	-	-	-
Bedstraw	seed	5	4	34	128	148
Vetch/vetchling	seed	-	-	1	-	-
Medick	seed	-	-	-	1	-
Medick	fruit	-	-	-	-	-
Terebinth nut	nutshell	-	-	-	-	-
Campion	seed	-	-	-	-	-
Cow basil	seed	-	-	18	4	28
Unidentified	seed	160	-	-	107	-
WILD GRASSES						
Goatgrass	seed	-	-	-	7	2
Goatgrass	spikelet fork	-	-	-	-	-
Ryegrass	seed	64	-	11	5	40
Darnel	seed	-	-	54	80	68
Canary grass	seed	-	-	-	-	-
Bristle grass	seed	-	-	-	-	-
cf. Bristle grass	seed	-	-	-	-	-
Wild einkorn (1-grained type)	seed	-	-	-	-	-
Wild einkorn/wild emmer (2-grained)	seed	-	-	2	-	-
Unidentified	seed	32	-	6	11	392
Total items		10,098	2119	327	1067	1304
Total crop seeds		9773	2115	121	706	542
Total crop chaff		0	0	1	3	4
Total weed seeds		325	4	205	358	758
% weed seeds		3.2	0.2	62.7	33.6	58.1
% crop seeds and chaff		96.8	99.8	37.3	66.4	41.9

Table 15.2. Scoresheet for plant remains from Tille Höyük (excluding the Neo-Assyrian burnt destruction level).

1988	1983	1983	1984	1984		Year
7859	7858	7858	7659	7659		Grid
213	326	330	246	261		Unit
22	22	22	22	22		Material code
001	001	002	001	002		Batch number
1.5	-	-	-	-		Volume floated (litres)
100	100	25	100	100		% sorted (crops/weeds)
VII	VIIIa					Stratigraphic level
Middle Iron Age	Hellenistic I	Hellenistic I	Hellenistic I	Hellenistic II		Period
Pit	Floor	Pithos	Floor	Floor		Context details
						Room number
4	**17**	**18**	**19**	**19**		**Sample number**
Grape	Chickpea	Grass pea	Chickpea	Chickpea		Dominant crop
						WHEAT
-	-	-	-	-	grain	*Triticum durum/aestivum*
-	-	-	-	-	grain fragment	*Triticum durum/aestivum*
-	-	-	-	-	internode	*Triticum durum/aestivum*
-	-	-	-	-	grain	*Triticum monococcum*
-	-	-	-	-	grain	*cf. T. monococcum/dicoccum*
-	-	-	-	-	spikelet fork	*T. monococcum/dicoccum*
-	-	-	1	-	grain	*Triticum*
						BARLEY
2	-	-	-	-	grain	*Hordeum distichum/vulgare*
3	-	-	-	-	grain	*Hordeum distichum/vulgare*
-	-	-	-	-	grain	*Hordeum distichum/vulgare*
-	-	-	-	-	grain fragments	*Hordeum distichum/vulgare*
-	-	-	-	-	internode	*Hordeum distichum*
-	-	-	-	-	internode	*Hordeum vulgare*
1	-	-	-	-	internode	*Hordeum*
						WHEAT/BARLEY
-	-	-	-	-	grain fragments	*Triticum/Hordeum*
-	-	-	-	-	internode	*Triticum/Hordeum*
-	-	-	-	-	node	*Triticum/Hordeum*
-	-	-	-	-	node	*Triticum/Hordeum*
-	-	-	-	-	node	*Triticum/Hordeum*
						MILLET
-	-	-	-	-	grains	*Setaria italica*
						PULSES
-	230	-	789	478	seed	*Cicer arietinumVicia ervilia*
-	-	24	-	1	seed	*Vicia ervilia*
-	-	-	-	-	seed	*Vicia faba*
-	-	-	-	-	seed	*Lens culinaris*
-	-	22,156	-	-	seed	*Lathyrus sativus*
-	-	7632	-	-	seed	*Pisum sativum*
						OTHER CROPS
280	-	-	-	-	whole fruit	*Vitis vinifera*
2	-	-	-	-	pip	*Vitis vinifera*
1	-	-	-	-	pedicel	*Vitis vinifera*
-	-	-	-	-	seed	*Linum usitatissimum*
						WILD PLANTS
-	-	-	-	-	nutlet	*Bolboschoenus maritimus*
-	-	-	-	-	seed	*Camelina sativa*
-	-	-	-	-	seed	*Cephalaria syriaca*
-	-	-	-	-	seed	*Coronilla*
-	2	284	-	-	seed	*Galium*
-	-	108	-	-	seed	*Lathyrus/Vicia*
-	-	-	-	-	seed	*Medicago*
-	-	-	-	-	fruit	*Medicago*
-	-	-	-	-	nutshell	*Pistacia*
-	-	-	-	-	seed	*Silene*
-	-	-	-	-	seed	*Vaccaria*
156	-	-	-	-	seed	Unidentified
						WILD GRASSES
-	-	-	-	-	seed	*Aegilops*
-	-	-	-	-	spikelet fork	*Aegilops*
30	-	-	-	-	seed	*Lolium*
3	-	-	-	-	seed	*Lolium temulentum*
-	-	-	-	-	seed	*Phalaris*
-	-	-	-	-	seed	*Setaria verticillata/viridis*
-	-	-	-	-	seed	cf. *S. verticillata/viridis*
-	-	-	-	-	seed	*Triticum boeoticum* (1-grained)
2	-	-	-	-	seed	*T. boeoticum* (2-grained)
-	-	-	-	-	seed	Unidentified
480	232	30,204	790	479		
288	230	29,812	790	479		
1	0	0	0	0		
191	2	392	0	0		
39.8	0.9	1.3	0.0	0.0		
60.2	99.1	98.7	100	100		

Number	Sample reference	Room	Context type	Free-threshing wheat	Glume wheat	Two-row hulled barley	Foxtail millet	Chickpea	Bitter vetch	Horse bean	Lentil	Grass pea	Pea	Grape	Flax	% main crop	number of crop taxa	Total plant remains
Late Bronze Age (c. 1200 BC)																		
1	7460-270-22-007		Pit	**9764**	-	+	-	-	+	-	-	-	-	-	-	96.7	3	10,098
2	7460-264-22-008		Pit	+	-	+	-	-	**2085**	-	-	+	-	-	-	96.7	4	2119
Level VII - Middle Iron Age (C8th BC)																		
3	7559-491-22-035, 036, 037		Pit	+	+	+	+	+	+	-	-	-	-	+	+	Mixed	8	2702
4	7859-213-22-001		Pit	-	-	+	-	-	-	-	-	-	-	**283**	-	59.0	2	480
Level VIII - Neo Assyrian (C7th BC)																		
5	7559-419-22-021 7659-418-23-008	23	Floor	-	+	**939**	+	-	+	-	-	-	-	+	-	84.3	5	1114
6	7559-418-22-019	23	Floor	-	+	**767**	-	-	+	-	-	-	-	-	-	57.0	3	1345
7	7558-499-22-006	25	Floor	-	-	+	**264,938**	-	-	-	-	-	-	+	-	97.0	3	273,108
8	7559-419-22-024	23	Debris	-	-	-	-	-	**2116**	+	-	-	-	-	+	91.4	3	2315
9	7660-026-22-001	22	Debris	+	-	+	+	+	**6764**	-	+	+	**868**	-	-	87.0	8	7772
10	7559-419-22-030	23	Debris	-	-	+	-	-	+	-	+	-	-	-	**2973**	91.2	4	3261
11	7659-387-22-004 7659-396-22-005	30	Debris	-	-	-	+	-	-	-	-	-	-	-	**91,907**	99.7	2	92,165
12	7659-416-22-008	26	Pit	-	-	-	+	-	-	-	-	-	-	-	**15,827**	92.6	2	17,083
13	7459-161-22-003 7559-462-22-032	20	Roof	-	-	-	-	-	-	-	-	-	-	**696**	-	100.0	1	696
14	7558-488-22-004	25	Debris	+	+	+	+	-	+	-	-	-	-	+	-	Mixed	6	1778
15	7559-416-22-022	24	Debris	+	+	+	+	-	-	-	-	-	-	+	-	Mixed	5	129
16	7658-551-22-007	27	Debris	-	-	+	+	+	+	-	+	-	-	+	+	Mixed	7	206
Hellenistic I (late C4th-3rd BC)																		
17	7858-326-22-001		Floor	-	-	-	-	**230**	-	-	-	-	-	-	-	99.1		232
18	7858-330-22-002		Pithos	-	-	-	-	-	+	-	-	**22,156**	**7632**	-	-	98.6		30,204
Hellenistic II (late C3rd-2nd BC)																		
19	7659-246-22-001 7659-261-22-002		Floor	-	-	-	-	**1267**	+	-	-	-	-	-	-	99.8		1269

Table 15.3. Summary scoresheet for plant remains from Tille Höyük. Numbers of seeds are given for main sample components only.

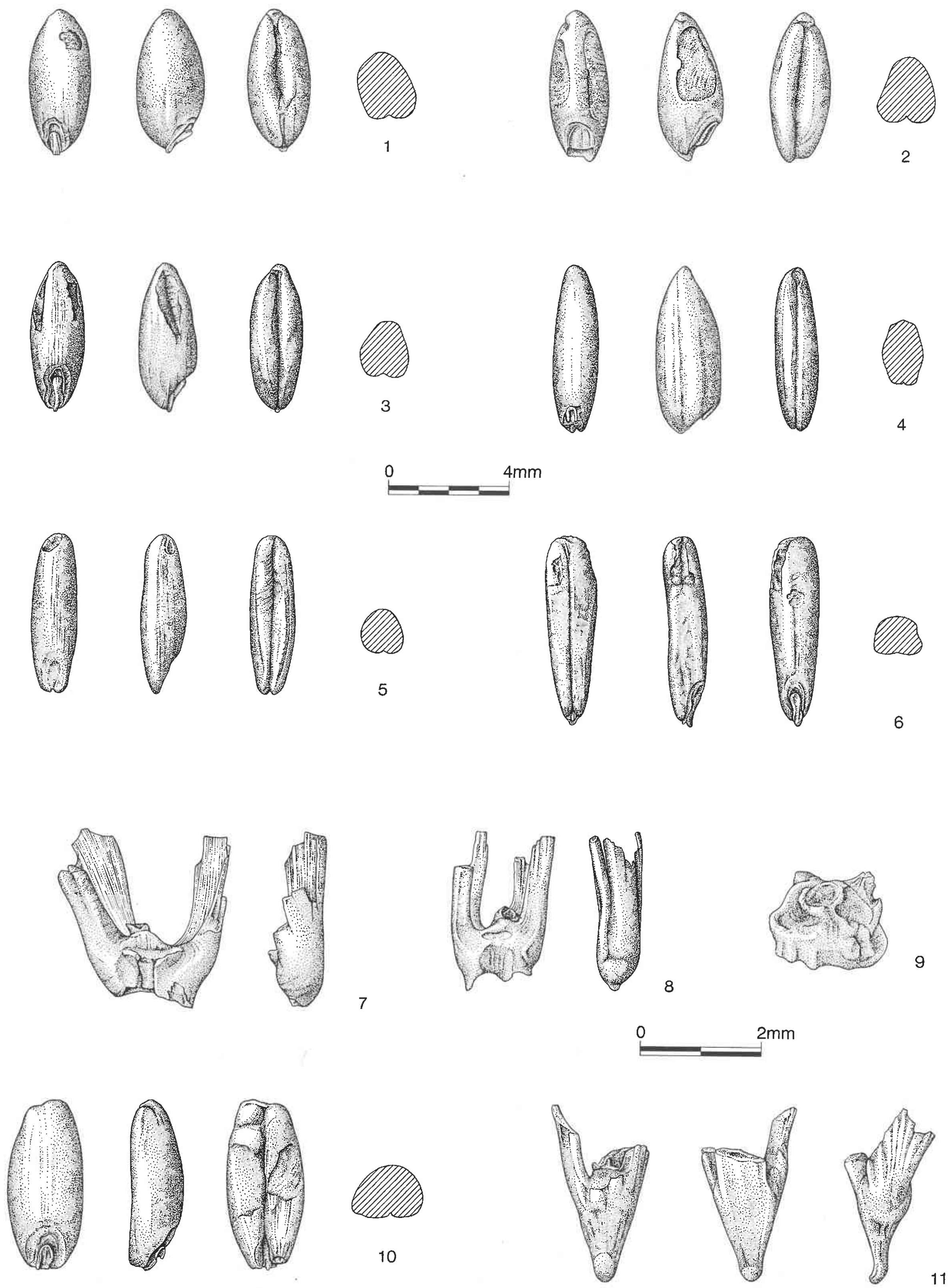

*Fig. 15.1. Charred seeds from Tille Höyük, 1: 1. Domesticated glume wheat grain (one-grained type) (sample 3); 2. Domesticated einkorn grain (sample 5); 3–4. Wild einkorn grains – one-grained type (sample 6); 5–6. Wild einkorn grains – two-grained type (sample 6); 7–8. Spikelet forks of einkorn or emmer wheat (sample 7); 9. Upper portion of rachis segment of bread wheat (sample 14); 10–11. Grain and spikelet fork of goat grass (*Aegilops*) (sample 15; 14).*

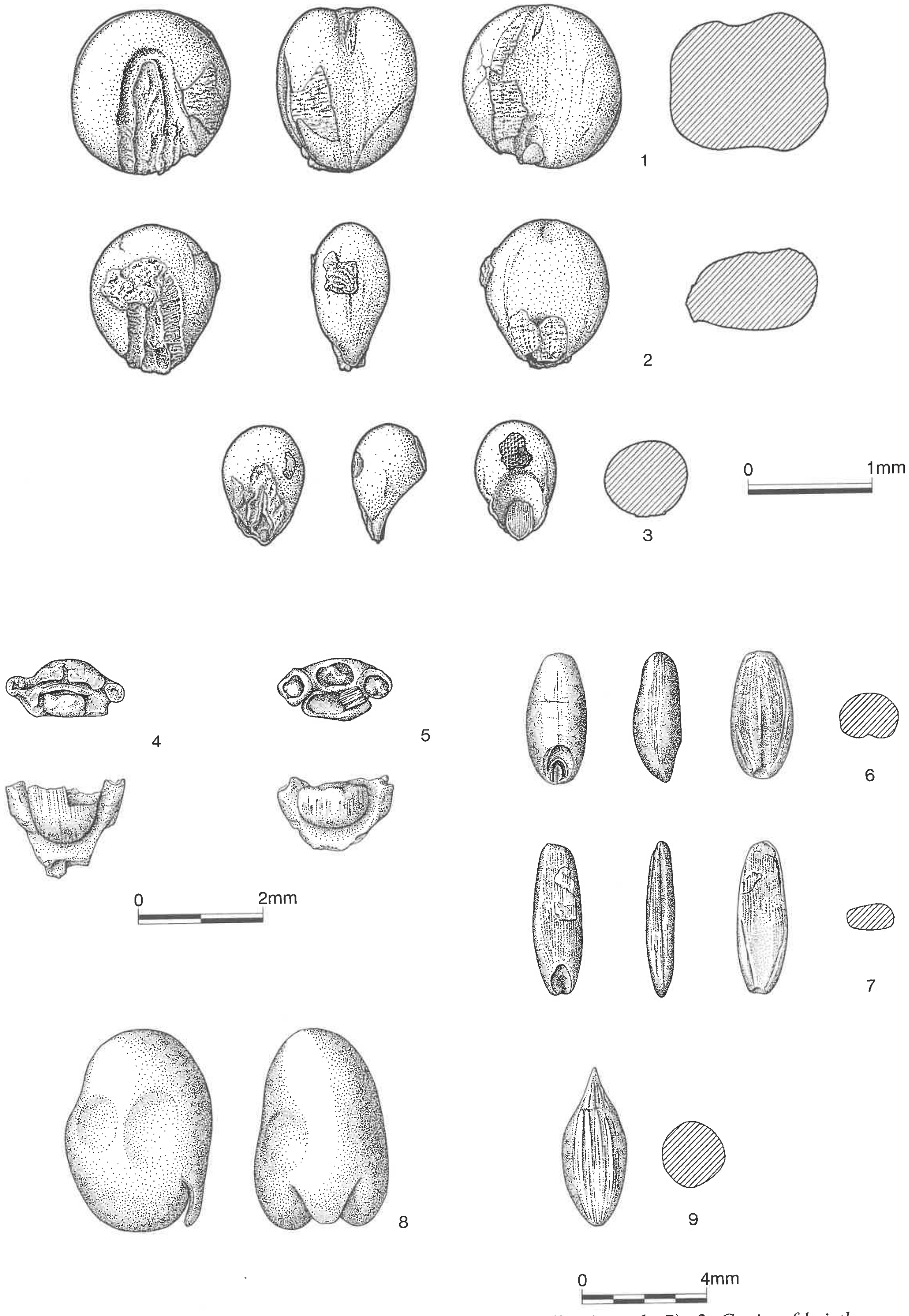

*Fig. 15.2. Charred seeds from Tille Höyük, 2: 1. Grain of foxtail millet (sample 7); 2. Grain of bristle grass (*Setaria verticillata/viridis*) (sample 7); 3. Small-seeded form of bristle grass (sample 7); 4. Rachis segment of two-row barley (sample 5); 5. Rachis segment of six-row barley (sample 14); 6. Grain of darnel (*Lolium temulentum*) (sample 6); 7. Grain of ryegrass (*Lolium sp.*) (sample 6); 8. Horsebean seed (sample 8); 9. Seed of Syrian scabious (*Cephalaria syriaca*) (sample 6).*

Sample 13, Grapes
This large deposit of whole, charred grapes is almost certainly from a collapsed roof deposit, in Room 20. The grapes in trench 7459 are described in Trevor Carbin's excavation notes as lying on top of burnt timbers – in other words, on top of the roof structure. In 7559, the trench to the east, the excavation notes give more detail:

> [...] what was left of the roof of the Iron Age structure destroyed by fire. 462 is a layer of burnt/carbonised straw deposited in a fairly mixed/uneven fashion over the area and must represent what was left of the straw/mud roof. Mixed in with the straw are carbonised complete grapes. Presumably stored on the roof at the time of the fire and lost with the collapse. (Field description for unit 7559/462, by Martin Hicks)

A separate note and sketch record that the grapes were concentrated in an area approx. 1m east–west, by 200–300mm north–south along the southern edge of the trench. During examination of this sample I found numerous remains of burnt wood and reeds (*Phragmites australis*), supporting the excavator's proposed rooftop origin of this deposit. The 'burnt/carbonised straw' reported by the excavator is evidently the remains of reeds; the wood resembled timber fragments (rather than grapevine wood).

Were these charred grapes fresh when charred? The question is of interest because the burning of fresh grapes would imply that the fire occurred in September–October, soon after the grape harvest. The grapes from square 7559 are mostly fully swollen and unwrinkled; the grapes from the adjoining square 7459 (part of the same archaeological deposit) are in varied condition. Eighteen grapes were wrinkled, eight unwrinkled. In the Middle Iron Age sample 4, 46 fruits were wrinkled, seven smooth. In the latter two cases there was a wide range of variation from fully dried raisins, to somewhat wrinkled grapes retaining their original shape, to unwrinkled smooth-surfaced grapes.

Experimental work has shown that charring causes raisins to swell, eventually closely resembling fresh grapes.[10] It has been suggested that the presence of charred sugar on the exterior of the grape skin might show that a charred fruit had previously been dried;[11] there was no opportunity to examine the Tille grapes for this using a scanning electron microscope. The mixed state of the fruits could indicate varied response to charring, or grapes in varied states of drying.

10 Cartwright 2003; Mangafa *et al.* 2001.
11 Cartwright 2003.

The best evidence for the pre-charring state of the grapes is their location in the settlement, on a roof. Raisins are not stored on roofs in areas such as South-East Turkey which have wet winters – and animal predators. Instead, roofs are used for drying fruit. In view of the excavators' confidence that these samples originated on top of a roof, the most likely interpretation of the two burnt level samples of grapes is that they represent grapes that were being dried, on a roof, in the autumn.

Samples 14–16, Mixed
These samples consist of redeposited burnt debris from the destruction fire (in Rooms 25, 24, and 27 respectively). However, the composition of the samples is not typical of burnt crop stores, but is rather a close match for mixed refuse, such as that found in pit 7559/481 (sample 3). It is unclear whether these samples derive from pit contents, redeposited after the destruction fire, or were stored, as discussed below, and were charred during the fire event.

All three samples are dominated by weed seeds and are very similar in composition to sample 3. They contain a diverse range of crop seeds (ranging from 7 to 46% of the sample), small amounts of chaff and many small weed seeds. In terms of the standard traditional crop-processing sequences described by Gordon Hillman, these assemblages are a poor match for any of their products or by-products.[12] The mixture in these samples could represent hand sorting of impurities from cleaned crops just before consumption. An alternative origin could be a combination of small seeds, especially those of segetal weeds such as darnel and bedstraw, deriving from fine sieving by-products, and larger seeds and straw remains (accounting for the culm nodes) from coarse sieving. Such by-products of crop cleaning (or, possibly, floor sweepings) could have been stored for use as tinder or animal feed, or could have been derived from the burning of dung.

Hellenistic Level I: Samples 17–18
Hellenistic Level I dated to the late fourth–third centuries BC and contained an area of buildings that had been destroyed by fire. Sample 17 comes from a room full of pots in this burnt level and is a pure deposit of chickpea; sample 18 comes from a pithos against the south wall of the room, and contains a mixture of peas and grass pea. This mixture of similarly sized pulses probably results from mixed cultivation, particularly as the contents of a pithos are not susceptible to mixing during burning or excavation.

12 Hillman 1981; *idem* 1984.

	Pure samples (n=10)	*Mixed samples (n=4)*	
	Ubiquity%	Proportion%	Ubiquity%
Grape	36	45.1	100
Barley	55	35.4	100
Free-threshing wheat	9	9.5	75
Foxtail millet	45	4.3	100
Einkorn	18	3.0	75
Bitter vetch	45	1.7	75
Flax	36	0.5	50
Chickpea	9	0.3	50
Lentil	18	0.2	25
Pea	9	0.0	0
Horsebean	9	0.0	0
Grass pea	9	0.0	0

Table 15.4. Relative importance of crops at Tille Höyük, judged according to proportion and ubiquity in mixed samples. The crops are divided into four subjective groups, ranging from dominant (top) to minor (bottom).

Hellenistic Level II: Sample 19
Hellenistic Level II dated to the late third–second centuries BC. This pure sample of chickpeas was found on a floor in a localised area of burning.

Relative importance of the crop species

The Late Bronze Age and Hellenistic samples are too few to allow quantification of crop importance. However, a total of 14 samples are available from the Middle and Late Iron Age (Levels VII and VIII), covering a relatively narrow time-frame of about 100 years in the eighth and seventh centuries BC. Of these samples, ten are relatively pure samples of crop seeds – evidence of use of an individual species, but obviously not representative of the full range of crops stored in the large Neo-Assyrian burnt level. Fortunately we have the four mixed samples (3, 14, 15, 16) for comparison. Each mixed deposit holds five to seven crop species (as compared to one to four in most of the stored crops). As the discussion of their taphonomy above suggests, they obviously result from a mixture of different sources, rather than representing just the cleaned seeds of one crop from, perhaps, a few fields.

There is an encouraging correspondence between the list of the crop taxa in the mixed samples and those recovered as stores. Of the 11 crops identified in the stores (excluding einkorn as of uncertain crop status) all except grass pea, pea and horsebean are represented. The overall similarity between the stores and the refuse samples suggests that our list of crops is essentially complete.

Relative abundance is more difficult to judge. Table 15.4 compares the ubiquity of crops in pure and mixed samples – ubiquity being the percentage of samples in which a crop occurs. The table also presents the proportion of crops in the mixed samples. The figures for einkorn include the grains scored as 'glume wheat (one-grained type)'. Proportions have not been calculated for the pure samples as these would be somewhat arbitrary in view of the incomplete quantification of the destruction level samples. This table should be interpreted with caution in view of the small number of mixed samples.

Subjective assessment of the three sets of figures suggests that barley is the most important cereal, and bitter vetch the most important pulse. Free-threshing wheat, foxtail millet, flax, chickpea and lentil are likely to have been important crops.

We know that grass pea and pea were grown as crops, because they occur in large, pure deposits, but their ubiquity is low. Although no pure stores were found, einkorn is present in three of the four mixed samples. Grapes are common, but this might be because of the higher likelihood that grape pips will come into contact with fire (if discarded during consumption), and survive charring if in contact with fire.

The plant species: identification, history and uses

Measurements are given for a range of crop seeds in Tables 15.5 and 15.6.

Free-threshing wheats
Macaroni wheat *Triticum durum*
Bread wheat *Triticum aestivum*
Most of the wheat grains in the Tille samples have the rounded flanks and cross section of the free-threshing ('naked') wheats (Fig. 15.3). Their measurements are comparable to those of charred grains from other Near Eastern sites, with a length typically under 5mm. Although the one large sample (1) of free-threshing wheat is Late Bronze Age, occasional grains are present in the Neo-Assyrian samples.

Free-threshing wheats can be divided into two groups on the basis of chromosome numbers, the tetraploid group, today mainly represented in the Near East by *T. durum*, and the hexaploid group, mainly represented by *T. aestivum*. The grains of Turkish landraces of both groups are indistinguishable morphologically; only rachis remains can separate the two groups. At Tille we have only one rachis segment surviving, definitely of hexaploid (*aestivum*) type (Fig. 15.1: 9). Although the presence of bread wheat is established, on the basis of only one rachis segment we cannot say whether or not tetraploid, macaroni, wheat was grown too. In South-East Turkey today most villages grow both types.

Both types of wheat are known in Anatolia from the Aceramic Neolithic onwards.[13] Until the end of the Chalcolithic period they are usually grown alongside the glume wheats, einkorn and emmer. In South-East Turkey the start of the Early Bronze Age sees the near total disappearance of the glume wheats at Aşvan and Korucutepe.[14] The cultivation of naked wheats at Tille, with only slight contamination by glume wheats, fits with this pattern.

A whole range of uses is ethnographically documented for both macaroni wheat and bread wheat, including bulgur (parboiled cracked wheat), leavened and unleavened bread, and porridge.[15]

Glume wheats
Einkorn *Triticum monococcum*
Emmer *Triticum dicoccum*
The glume wheats presented some difficulty in identification. The size range of the spikelet forks in sample 14 suggest both species may be present, but overall, they most closely resemble emmer (fork no. 3 is shown in Fig. 15.1: 7); none have the graceful curving shape typical of Chalcolithic einkorn spikelet forks. The most einkorn-like fork is shown in Fig. 15.1: 8. The six well-preserved forks were measured:

	Scar width	*Spikelet width*	*Glume width*
1	0.45	1.38	0.63 (Fig. 15.1: 8)
2	0.61	1.36	0.59
3	0.99	2.01	0.79 (Fig. 15.1: 7)
4	0.83	1.48	0.67
5	0.61	1.42	0.77
6	0.87	1.71	0.83

In terms of glume width, which has proved a useful character for separating spikelet forks at other sites,[16] 1, 2 and 4 (all <0.70mm) are possibly einkorn, 3, 5 and 6 are probably emmer. All the spikelet forks have the torn scars typical of domesticated glume wheats.

One grain (Fig.15.1: 2) from sample 5, scored as einkorn, closely resembles standard domesticated einkorn in all respects. It is a reasonable size and has the characteristic protruding beak, as well as being laterally compressed with a convex ventral side and with longitudinal grooves on its dorsal flanks. A much larger class of grains, scored as glume wheat (one-grained type) has proved more difficult to classify. The grains are markedly ventrally convex in lateral view – much more so than typical bread wheat grains, the ventral face has a more compressed appearance, and sometimes there are lateral groove marks on the dorsal flanks (Fig. 15.1: 1). However the grains have a distinctive, slightly puffy appearance, and the shape does not quite match classic emmer or einkorn grains. I am reasonably sure that these grains are not of free-threshing wheat, and they are far too large to be any wild grass. In the light of the spikelet fork evidence, it seems likely they are one of the glume wheats.

13 Hillman 1978.
14 Nesbitt, Samuel 1996.
15 Hillman 1985.
16 Nesbitt 1993.

Naked wheat grains (sample 1)

n=100	L	B	T	L:B	L:T	T:B
Minimum	3.32	1.78	1.38	132	153	74
Average	4.76	2.95	2.49	163	193	85
Maximum	5.83	3.73	3.08	215	241	107
Standard deviation	0.50	0.39	0.32	14.83	18.69	5.73

Straight hulled barley grains (sample 5)

n=50	L	B	T	L:B	L:T	T:B
Minimum	5.18	2.27	1.38	184	228	61
Average	6.41	2.94	2.19	219	296	74
Maximum	7.78	3.65	2.75	266	411	91
Standard deviation	0.60	0.33	0.28	17.53	29.94	5.45

Chickpea (sample 19)

n=100	L	B	H	L:B	L:H	H:B
Minimum	3.97	2.92	3.08	112	119	84
Average	4.81	3.73	3.66	129	132	98
Maximum	6.16	4.54	4.13	155	149	118
Standard deviation	0.32	0.29	0.23	8.36	6.24	6.89

Bitter vetch (sample 8)

n=100	L	B	H	L:B	L:H	H:B
Minimum	1.46	1.46	1.70	88	83	94
Average	2.67	2.59	2.71	103	99	105
Maximum	3.40	3.32	3.56	121	121	116
Standard deviation	0.26	0.24	0.26	5.98	6.02	3.99

Pea (sample 18)

n=100	L	B	H	L:B	L:H	H:B
Minimum	2.03	2.67	3.00	60	61	94
Average	3.43	3.55	3.77	98	92	107
Maximum	4.62	4.46	4.62	133	120	125
Standard deviation	0.46	0.40	0.37	16.27	13.42	5.76

Grass pea (sample 18)

n=100	L	B	H	L:B	L:H	H:B
Minimum	2.51	2.03	2.67	78	71	96
Average	3.88	3.32	3.86	118	101	117
Maximum	5.10	4.29	5.10	172	163	148
Standard deviation	0.62	0.48	0.51	17.44	16.66	11.86

Table 15.5. Measurements of seeds from Tille Höyük (mm). Abbreviations: L: length; B: breadth; H: height; T: thickness.

Grape pips

Sample 13

n=50	L	B	T	B:L	L:T	T:B	Stalk L	Stalk %	chalzea L	chalzea %
Minimum	3.97	2.19	1.70	55	135	66	0.73	17.0	1.94	42.7
Average	4.61	3.19	2.61	69	179	82	1.04	22.6	2.57	55.4
Maximum	5.27	3.73	3.24	81	248	95	1.54	30.7	3.08	65.3
Standard deviation	0.32	0.30	0.33	5.71	22.62	7.17	0.17	3.14	0.29	5.21

Sample 14

n=100	L	B	T	B:L	L:T	T:B	Stalk L	Stalk %	chalzea L	chalzea %
Minimum	2.67	1.30	1.05	49	130	38	0.73	16.4	1.94	43.6
Average	4.60	3.26	2.53	71	188	78	1.13	24.7	2.67	58.2
Maximum	5.67	4.21	3.56	92	373	109	1.70	37.8	3.40	72.7
Standard deviation	0.54	0.54	0.52	8.30	37.30	8.97	0.19	4.32	0.29	5.10

Measurements of whole charred grapes

		L	Maximum diameter
Unshrivelled grapes			
Sample 4	Minimum	6.14	5.51
n=7	Average	9.14	8.30
	Maximum	11.34	10.71
	Standard deviation	1.71	1.73
Sample 13	Minimum	6.62	7.25
n=24	Average	8.62	8.43
	Maximum	10.24	10.40
	Standard deviation	0.96	0.84
Raisins			
Sample 4	Minimum	6.93	6.93
n=24	Average	9.51	8.49
	Maximum	10.87	10.55
	Standard deviation	1.04	1.03

Table 15.6. Measurements of grape fruits and pips from Tille Höyük (mm). Abbreviations: L: length; B: breadth; T: thickness.

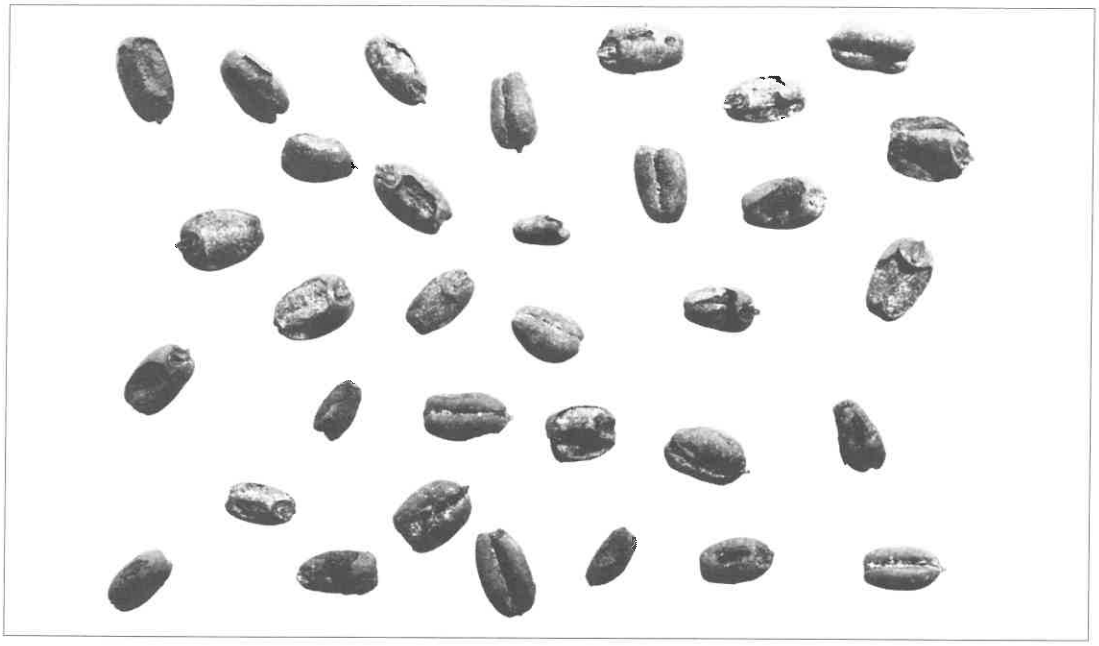

Fig. 15.3. Grains of free-threshing wheat (sample 1), × 4. (Mark Nesbitt).

Emmer and einkorn probably grew as weeds in crops, but it is not impossible that they were grown in small quantities, as in the Pontic mountains of Turkey today, specifically for animal feed or bulgur.

Barley

Two-row hulled barley *Hordeum distichum*
Six-row hulled barley *Hordeum vulgare*

None of the characteristic rounded, transversely wrinkled grains of naked barley were present; indeed, in Anatolia it seems to have become virtually extinct before the fourth millennium BC. The angular appearance and frequent adhering patches of husk give no doubt that the Tille material is hulled (Fig. 15.4). It remained to be decided whether it was the two-row or six-row type. The lateral spikelets in six-row barley are twisted, and the presence of twisted grains in the Tille samples (scored in Tables 15.1 and 15.2) shows that six-row barley is present. However the ratio of twisted: straight grains does not approach the 2:1 ratio expected of pure six-row barley. The complicating factor is, as so often, the presence of large numbers of grains that have severely deformed in the heat. It is sometimes possible to make allowance for this in judging degree of twistedness, but here the numbers of indeterminate grains are large. Often at relatively late sites preservation is better and its possible to arrive at a clear answer. For example, in material I have seen, at Sardis the Lydian barley is clearly six-rowed; at Phrygian Gordion it is clearly two-rowed. Despite the number of indeterminate grains, there is a distinct shortage of twisted looking grains at Tille, and this would suggest the crop is mainly two-row barley, with some admixture of the six-row type.

The barley rachis segments are often rather battered, but one is two-row, and four (all in one sample, which may have derived from a field of six-row barley) are six-row. Figure 15.2: 4 shows the small lateral florets on the two-row rachis segment (viewed from above), compared to the large ones on the six-row rachis segment (Fig. 15.2: 5).[17]

The changing pattern of distribution of the different types of barley remains something of a mystery, largely owing to the difficulty of distinguishing two- and six-row types reliably in the archaeological record. Today six-row hulled barley is more common in Mediterranean areas of Turkey, while two-row barley dominates the interior. The results from Sardis, Gordion and Tille suggest the same pattern held good in the Iron Age. If, as the modern distribution suggests, there are good reasons for growing each type in a specific climatic zone, this pattern may well go back much further in time.

Barley has just as wide a range of uses as wheat, although today it is usually thought of as a fodder plant.[18] At Lydian Sardis it occurs in large quantities in domestic contexts, and is unquestionably an important human foodstuff. It likewise appears to have been the main cereal at Tille, and was presumably the main foodstuff. Evidence from a wide range of other sites confirms that barley was more important than wheat in the past; at what point wheat became more favoured is not clear in the archaeobotanical record.

17 I am grateful to Delwen Samuel for pointing out this rachis character.

18 Hillman 1985.

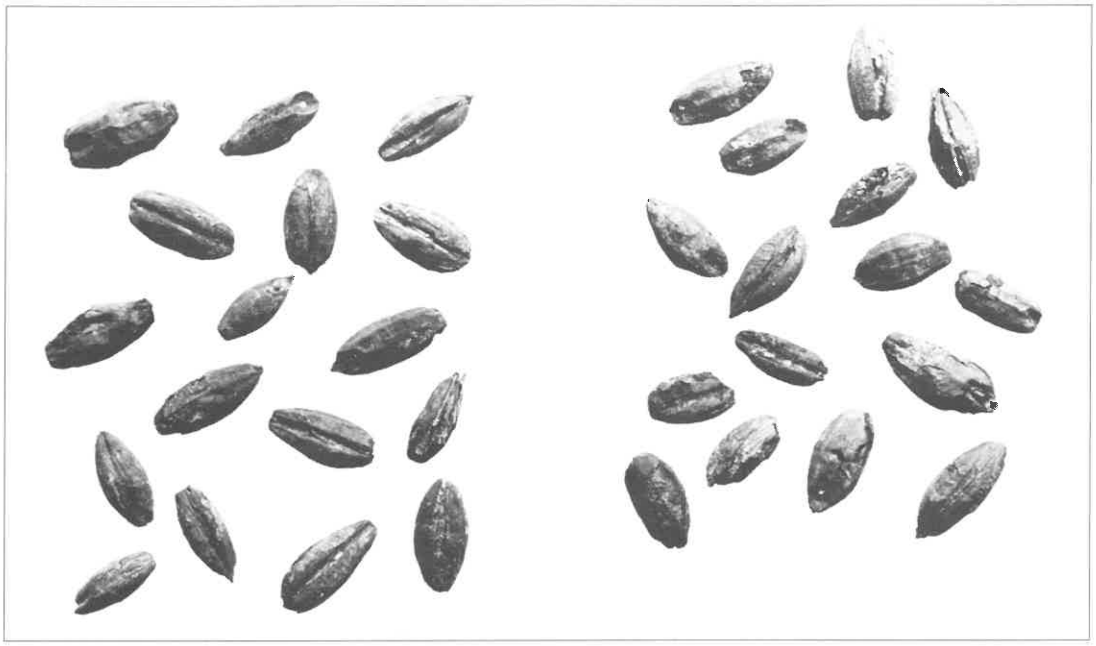

Fig. 15.4. Grains of hulled barley (sample 5), ×4. Left: straight; right: twisted. (Mark Nesbitt).

Other crops

Foxtail millet *Setaria italica*

The millet remains from Tille (Fig. 15.2: 1) have been published previously.[19] They consist of a large storage deposit in the Neo-Assyrian burnt level (sample 7), and small quantities in a further eight Iron Age samples. For this final publication I have sorted a further sub-sample of the millet, and the components recorded here represent the definitive analysis. The identification criteria and historical survey presented in the first report still hold good. There are now two further sites with foxtail millet in the Near East, at Late Bronze Age Kuşaklı in central Turkey, and at Iron Age Tell Schech Hamad in Syria, but it remains far less common than common millet (*Panicum miliaceum*).[20] Both species of millet are summer crops, which must be planted in the early summer so as to catch the hot temperatures, before harvest in late summer. In contrast, the cereals and pulses that formed the basis of Anatolian agriculture from the Neolithic to the Bronze Age are sown in the autumn or early spring, and harvested in early summer. The special importance of millet thus lies in making the summer season agriculturally productive.

A wide range of uses is recorded for millet, including bread, porridge and beer.

Chickpea *Cicer arietinum*

The three large samples of chickpea all come from the Hellenistic levels, but it is present as a minor element in three Neo-Assyrian samples. The seeds are easily identified by their protruding beak (Fig. 15.5). Chickpeas are cultivated in the Near East from the Aceramic Neolithic onwards[21] and are still an important crop. Today the large, rounded white seeds of the 'kabuli' variety are most widely grown in Turkey, but archaeological finds are more angular and much smaller, more closely resembling the dark-coloured 'desi' variety found in India and Afghanistan, and the seeds of the chickpea's wild ancestor, *C. reticulatum*.[22]

Bitter vetch *Vicia ervilia*

The characteristic pyramidal-shaped seeds of bitter vetch are abundant in the Iron Age levels (Fig. 15.6). This is another pulse that forms part of the original 'Neolithic package' and is common in archaeobotanical samples from all periods in Turkey. Today it is still widely grown, but exclusively as an animal feed. Its abundance at archaeological sites has led to suggestions that it was a human food, like barley, in the past.[23] Unlike barley, there is not yet unequivocal evidence of bitter vetch in kitchen contexts that would demonstrate its use as food, but its abundance does support this idea. Bitter vetch is toxic to humans, but can be detoxified by simple soaking or boiling.

19 Nesbitt, Summers 1988.

20 Riehl, Kümmel 2005, accessed 8 August 2006.

21 Tanno, Willcox 2006.

22 Hawtin *et al.* 1980.

23 van Zeist 1988.

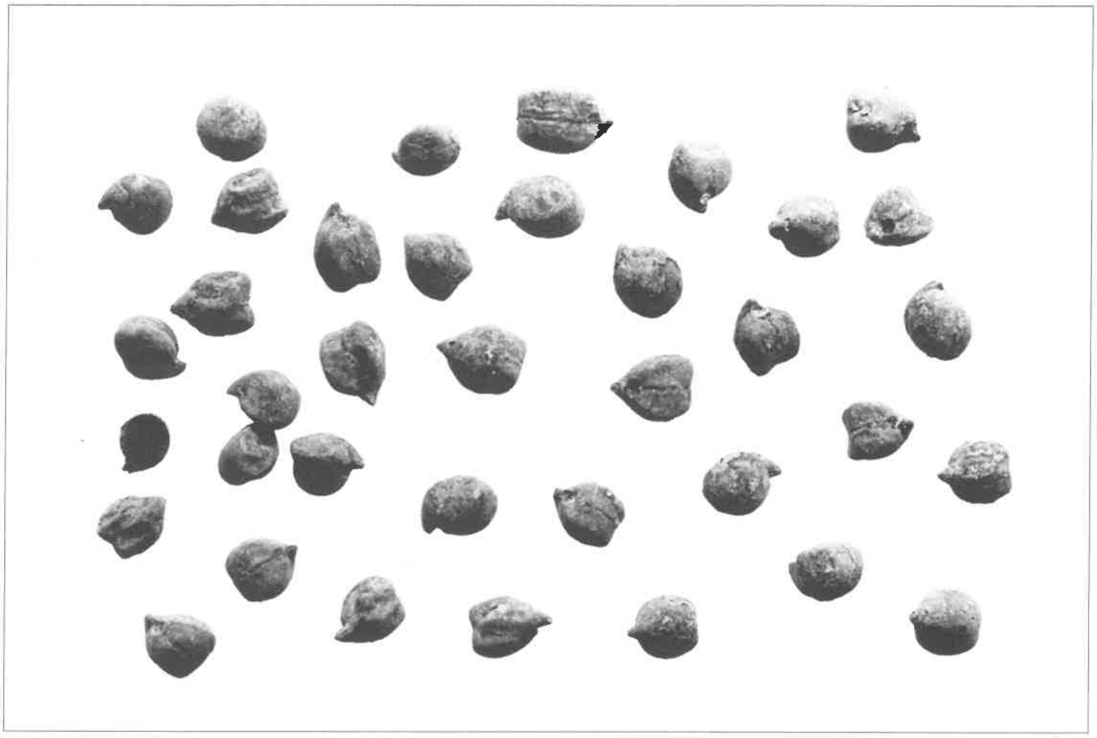

Fig. 15.5. Chickpea (sample 19), × 4. (Mark Nesbitt).

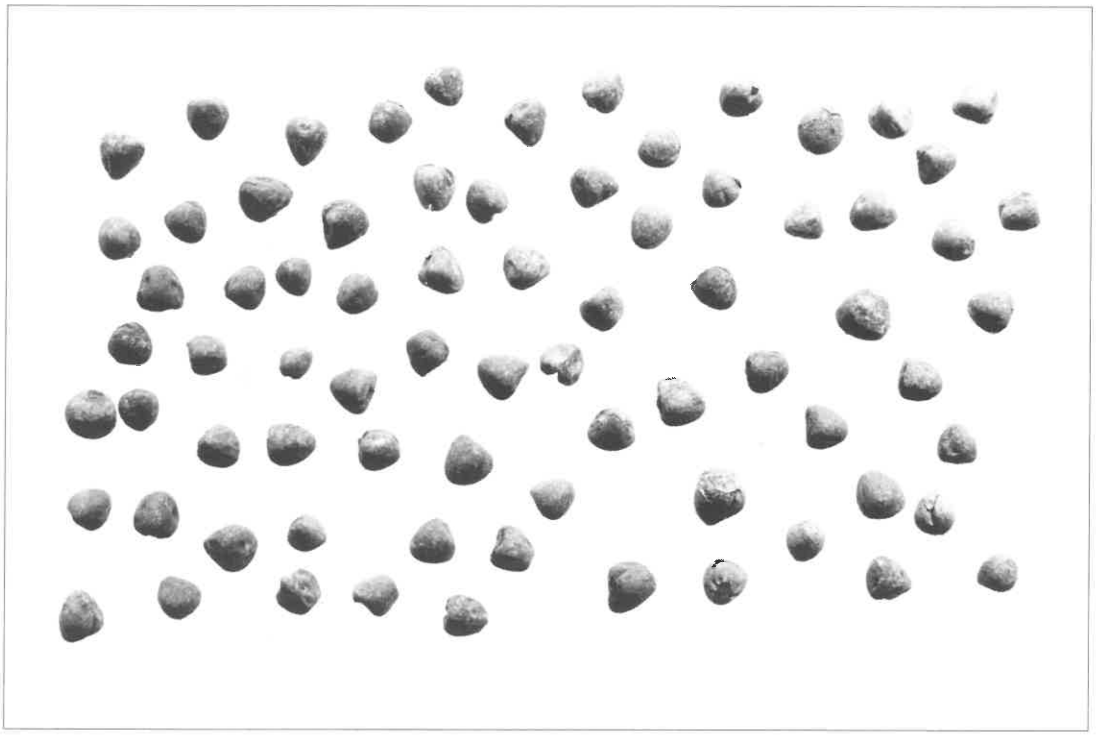

Fig. 15.6. Bitter vetch (sample 8), × 4. (Mark Nesbitt).

Horsebean *Vicia faba* var. *minor*
Only one seed was found, but it shows all the typical morphological characters of horsebean (Fig. 15.2: 8). In lateral view it is oval, and the seed is generally rounded but somewhat laterally compressed. Looking end on at the seed, the short radicle reaches only a short distance down the hilum end. The large, wide hilum extends all the way down this end. In dorsal view the hilum end is markedly wider. In contrast, grass pea is very angular, and the radicle reaches further down the hilum. Wild relatives of the horsebean, such *Vicia narbonensis*, have much more spherical seeds and can be ruled out in this case. In terms of shape and size, the Tille specimen is a good match for cultivated horsebean from other sites.

	L	B	H	L:B	L:H	H:B
Tille (n=1)	6.16	4.21	4.62	146	133	110

On the basis of just one seed, its difficult to say whether this is a chance contaminant of crops, or whether it was also grown in its own right as a crop at Tille. Finds of horsebean are generally scarce in the ancient Near East. The earliest record of large quantities of *Vicia faba* is from early-PPNB Tell el-Kerkh in Syria, dating to about 9200 uncal BP;[24] thereafter records are scarce until the third millennium BC.[25] Even after then, it is found at few east Mediterranean sites, and even at those only in small quantities. Horsebean seems to have been more important as a crop in central and western Europe.

Lentil *Lens culinaris*
Like chickpea and bitter vetch, lentils are amongst the earliest domesticates, and are an important crop in the Near East from the Aceramic Neolithic to the present day. The distinctive discoid seeds of lentil were found in three samples. Lentil, like chickpea, is probably one of the Iron Age pulses which was grown as a crop but of which, by chance, no bulk samples were recovered.

Grass pea *Lathyrus cicera/sativus*
The large sample (18) of grass pea is of Hellenistic date, but its occurrence in small quantities in one Neo-Assyrian and one Late Bronze Age sample show its earlier presence. Grass pea seeds have a highly distinctive sharp dorsal ridge, giving them a triangular cross section (Fig. 15.7). Two species share this shape: *L. cicera*, a common wild plant and weed of crops in South-East Turkey, and *L. sativus*, today grown as a fodder plant in parts of Turkey. Modern accessions of *L. cicera* and *L. sativus* overlap in size. At Dimini, Kroll has distinguished two classes: smaller, more angular seeds, and larger, more rounded seeds; the first tentatively identified as *L. cicera*, the second as *L. sativus*.[26] I have not been able to distinguish two such groups at Tille, and have not attempted identification to species. Although we clearly have a fully domesticated crop at Tille, there are records of *L. cicera* being cultivated.[27]

The early history of *L. cicera/sativus* is unclear. Occasional finds of one or a few seeds are common, and probably represent *L. cicera* growing as a field weed. Kislev suggests that the earliest finds of grass pea as a definite crop are in the eastern Balkan Peninsula.[28] It is found in large quantities at Greek sites in the sixth and fifth millennia BC and has recently also been found in large quantities in fourth millennium contexts at Kuruçay, western Turkey.[29] As with horsebean, this is a crop with such a patchy pattern of finds that it is difficult to assess its importance in antiquity.

Like bitter vetch, grass pea is a plant that is today just grown as animal feed, but which almost certainly has a long history as a human food, although archaeological evidence that explicitly shows its use for human food (such as finds in kitchen contexts) is still lacking. Today grass pea is an important food in India, and is still sold for use in soups in the Baghdad bazaar (personal observation, 1988). Although often thought of as a poisonous food, the alkaloids which can cause Lathyrism are only dangerous if the seeds are inadequately soaked before cooking. When adequately prepared, and consumed as part of a mixed diet, grass pea is a safe food.[30]

Pea *Pisum sativum*
Pea, of which one Neo-Assyrian and one Hellenistic store were found, is another of the Neolithic package of crops, with numerous records from then to the present day. The seeds lack the triangular angularity of bitter vetch and grass pea (Fig. 15.8). Their shape ranges from spherical to flattened in longitudinal axis.

Grape *Vitis vinifera*
The size of the unwrinkled grapes, and of the raisins, is comparable to the smaller grapes found on bunches of current day Turkish grapes (Fig. 15.9).

24 Tanno, Willcox 2006.
25 Zohary, Hopf 2000.
26 Kroll 1979.
27 Butler 1989.
28 Kislev 1989.
29 Nesbitt 1996.
30 Getahun *et al.* 2003.

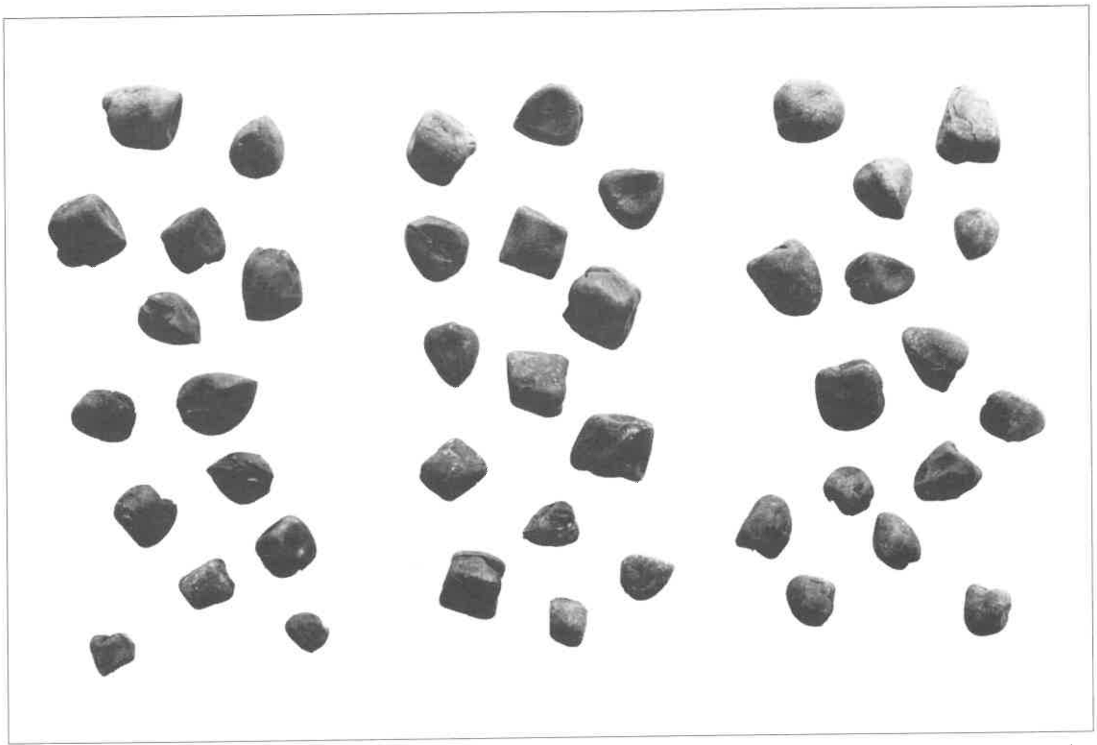

Fig. 15.7. Grass pea (sample 18), × 4. Left: seeds from distal end of pod; centre: central seeds; right: seeds from proximal end of pod. (Mark Nesbitt).

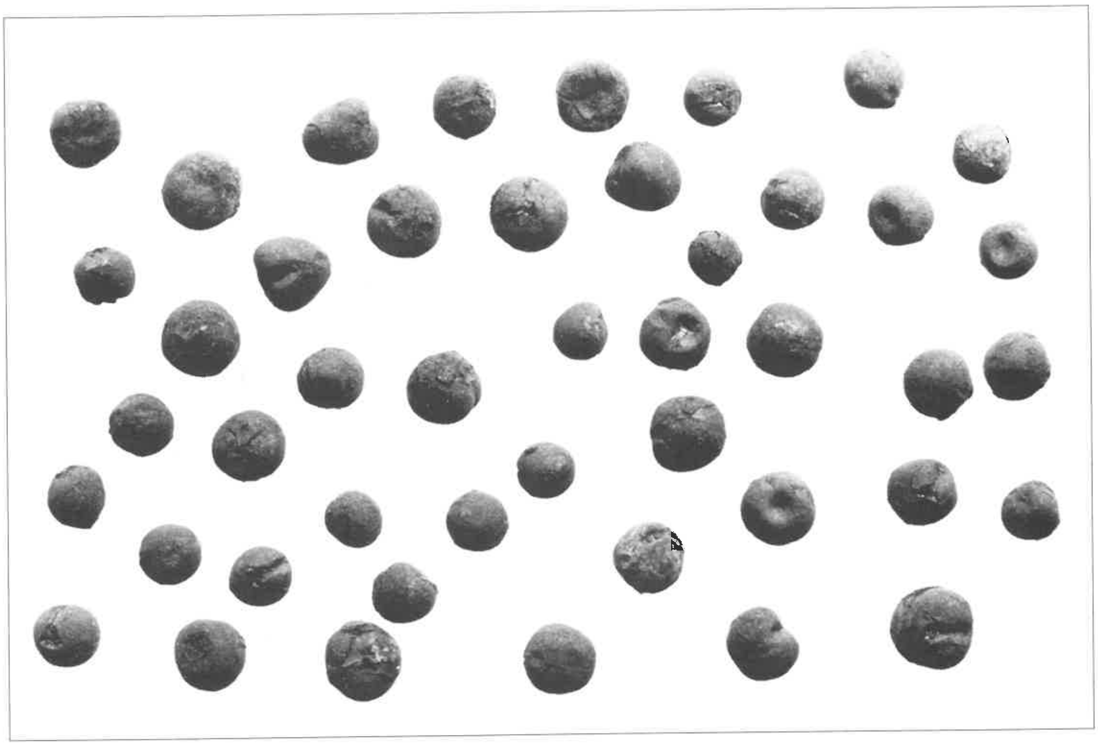

Fig. 15.8. Pea (sample 18), × 4. (Mark Nesbitt).

Eight of the grapes in one sample were cut open in order to count their seed content: seven contained one pip, one contained two pips. The internal structure of the flesh of the charred fruits was highly vesicular with many air spaces.

The distinction between grape pips of wild vines and the domesticated vine is a difficult area. Many archaeobotanists have used length:breadth indices, on the grounds that these give reasonable separation in modern material (work reviewed by Riviera Núñez).[31] However, the effects of charring raise L:B indices, in the direction of 'wildness',[32] and this has led archaeobotanists to suggest that even quite recent, Iron Age, material is wild or partly wild. My own view is that differences between wild and domesticated grape pips are likely to be most apparent in morphological change within a long chronological sequence of seeds preserved by the same method (in the Near East, by charring) and within the same region. At present the identification of the Tille grape pips as domesticated is based on their appearance, in particular their distinct long stalks compared to Late Chalcolithic specimens that I have seen, and secondly on the grounds of their late, Iron Age, date (Fig. 15.10). Overall, a combination of archaeobotanical and textual evidence suggests that grapes were first domesticated some two and a half millennia earlier, in the Early Bronze Age.

Flax *Linum usitatissimum*

The flattened seeds of flax, with their typical beaked ends, are one of the most common crops in the Tille samples (Fig. 15.11). In addition to four bulk samples, flax seeds occur in four of the other samples. Flax is known as a probable crop from late Aceramic Neolithic Ramad. Large quantities of flax, i.e., of sample types typical of burnt levels, are uncommon, but small quantities of seed are present at Near Eastern sites of all periods. Flax can be grown both as a fibre plant, and as a food plant and for oil.

Weeds of flax

Archaeobotanists have long noticed that a group of specialised weeds is associated with flax cultivation, both in current-day fields and, in Europe, as far back as the second millennium BC.[33] Two of these weeds, the ryegrass *Lolium remotum* (a smaller-seeded relative of *L. temulentum*), and gold-of-pleasure *Camelina sativa*, are found associated with large stores of flax at the Late Chalcolithic, fourth millennium BC, site of Kuruçay, western Turkey.[34] Other Near Eastern records of *Lolium remotum* are from Pre-Pottery Neolithic B Ramad, Syria,[35] Early Bronze Age Tell al-Rawda, and Late Bronze Age Tell Atchana;[36] it is also found at Aegean sites such as Early Bronze Age Kastanas.[37] A near pure deposit of *Camelina sativa*, presumably grown as a crop, was found at Late Bronze Age Hadidi, northern Syria,[38] and is a weed in a sample of free-threshing wheat from Iron Age Gordion. It is also present at Early Bronze Age Demircihüyük and Tell Shiukh Fawqani, and from the Middle Bronze Age onwards at Troy.[39] At Tille, *Camelina sativa* is the only specialist weed of flax to be present.

No intact seeds of gold-of-pleasure, *Camelina sativa*, were found in the Tille samples, but the characteristic folded embryos were found. Although a number of other Cruciferae have a similar embryo morphology, these closely match the naked embryos of *Camelina sativa* seeds from Kuruçay in morphology and size.

n=7	B	L	T	L:B	L:T	T:B
Minimum	1.76	0.90	0.66	165	236	61
Average	2.15	1.11	0.77	196	280	71
Maximum	2.34	1.37	0.86	230	348	87

Weeds of millet

The dominant weed in the Tille foxtail millet sample is *Setaria viridis/S. verticillata* (Fig. 15.2: 2). I have not been able to distinguish the seeds of these two wild species. *S. viridis* is a common weed and wild plant, while *S. verticillata* is a weed of damp ground and would thus be a good indicator of soil conditions. The smaller, tadpole-like seeds (Fig. 15.2: 3) whose identification was uncertain[40] now seem more certainly to be a variant of the main *S. viridis/verticillata* type, with a somewhat smaller 'body' of endosperm in proportion to the embryo. They have similar lemma and palea cell patterns to the larger grains.

Weeds of wheat and barley

Three specialist weeds of cereals are present. Darnel, *Lolium temulentum*, seeds have the typical swollen, turgid appearance that separates them from the other *Lolium* species (Fig. 15.2: 6). The only other current day species with turgid seeds is *L. remotum*, a specialist weed of flax with smaller seeds (see above), but the size of the Tille seeds in sample 3 closely matches that of other ancient finds of *L. temulentum*.

31 Riviera Núñez, Walker 1989.
32 Smith, Jones 1990.
33 Hjelmquist 1950.
34 Nesbitt 1996.
35 van Zeist, Bakker-Heeres 1982.
36 Riehl, Kümmel 2005.
37 Kroll 1983.
38 van Zeist, Bakker-Heeres 1985.
39 Riehl, Kümmel 2005, accessed 8 August 2006.
40 Nesbitt, Summers 1988.

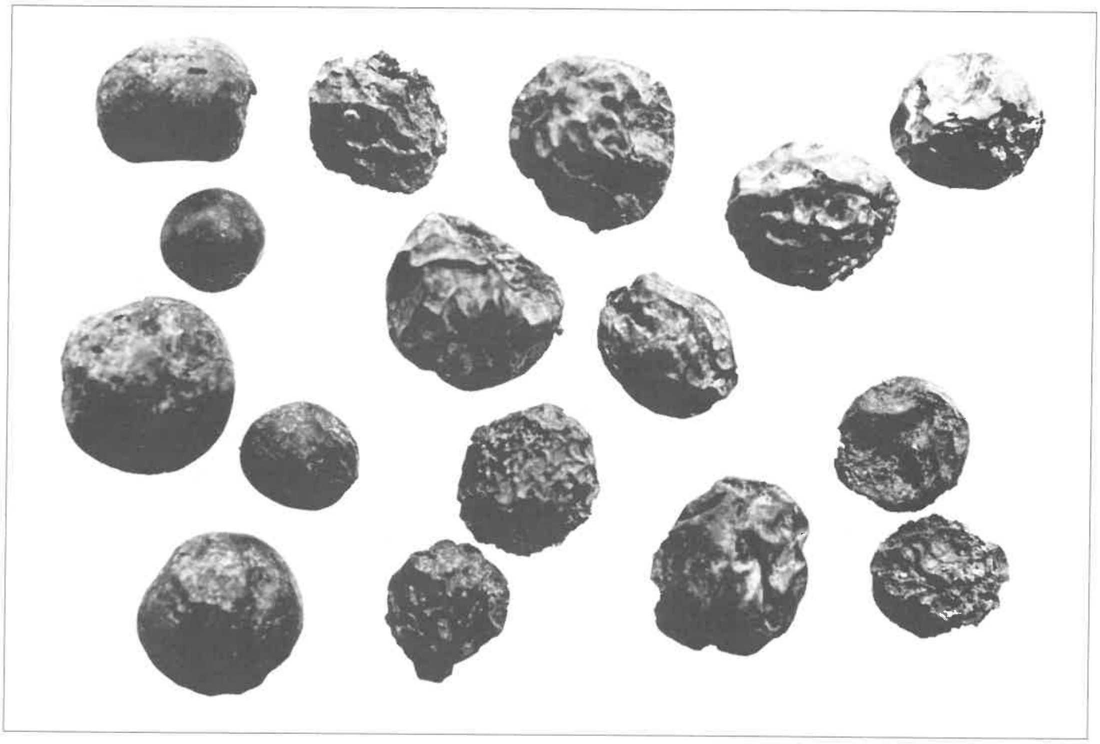

Fig. 15.9. Whole grapes (sample 4), × 4. (Mark Nesbitt).

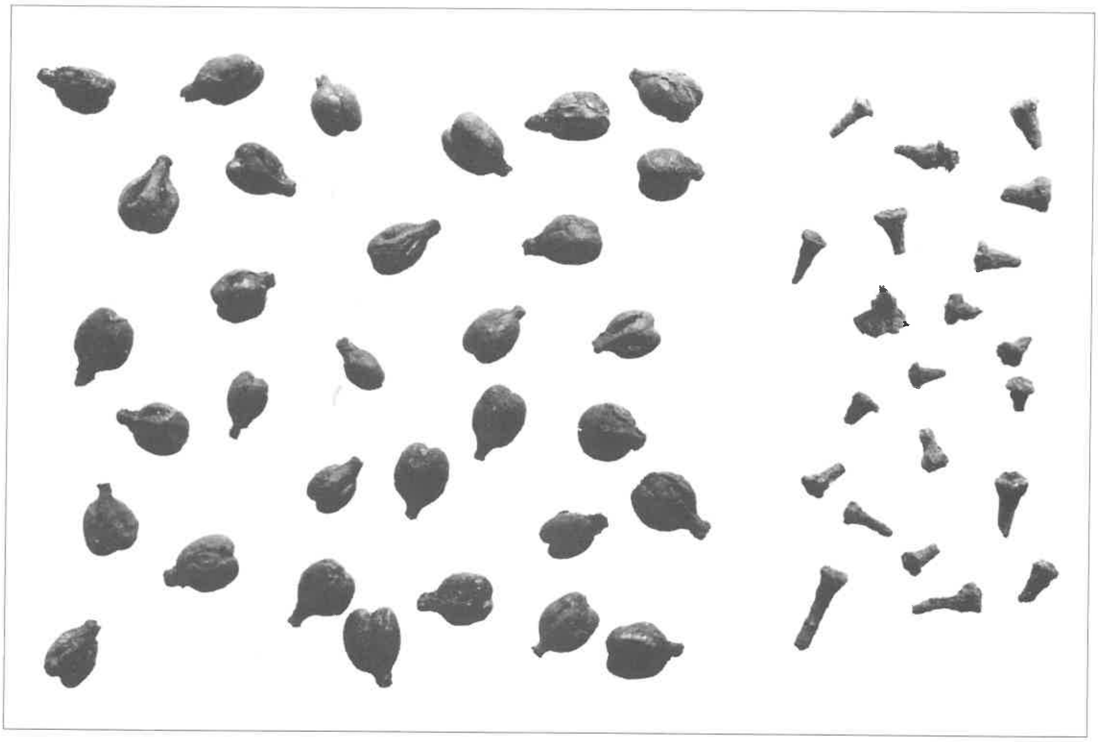

Fig. 15.10. Grape (sample 13), × 4. Left: pips; right: stalks. (Mark Nesbitt).

n=25	L	B	T	L:B	T:B
Minimum	2.67	1.22	0.89	183	68
Average	3.55	1.66	1.30	216	79
Maximum	4.29	2.03	1.62	272	113
Standard deviation	0.35	0.22	0.19	22.45	8.53

Another *Lolium* species is also present; its seeds have a rectangular cross section (Fig. 15.2: 7), in contrast to the swollen, rounded appearance of darnel, and its seeds are generally narrower and flatter (compare the L:B ratios of the two types).

n=10 sample 6	L	B	T	L:B	T:B
Minimum	3.00	1.05	0.65	286	55
Average	4.12	1.31	0.87	313	66
Maximum	4.70	1.54	1.13	347	82
Standard deviation	0.50	0.15	0.14	19.47	7.36

At present I have not attempted identification to species, in part because so few of the seeds are intact, but these seeds are rather small for *L. persicum* and perhaps derive from the *L. perenne/multiflorum/rigidum* group. The measurements and ratios are similar to those of the *Lolium* specimens found in North Syria, at Ramad, Aswad and Ras Shamra.

Syrian scabious, *Cephalaria syriaca*, like darnel, has weed seeds that match the size and density of cereal grains making separation in crop processing difficult. The charred seeds range from 4.05–5.3mm long and 1.6–2.4mm in maximum diameter (Fig. 15.2: 9). The seeds of cow basil, *Vaccaria pyramidata*, are much smaller (the Tille specimens have a maximum diameter averaging 1.6mm), but it is a common weed both in ancient and in modern fields.

Enough evidence is accumulating to show that these weeds have an evolutionary history as complex and closely linked to human intervention as the crops with which they live. Darnel is an obligate weed of cultivation, whose wild ancestor remains uncertain. It seems to have evolved in symbiosis with a fungus which causes the seed to swell – making it better adapted to harvesting with the cereals among which it grows.

As usual, bedstraw, *Galium*, seeds are common in the pulse and cereal samples. Some are of a small seeded species (diameter < 1mm), perhaps *G. verum*. Most have a maximum diameter of 1.6–3.2mm, and probably belong to one of the two common weed species, *G. tricorne* or *G. aparine*; the diagnostic cell patterns are not present and a more precise identification is not possible.

Some *Medicago* fruits, and a large number of seeds, are present in sample 14. The diameter of the fruits varies from 4–5.7mm (Fig. 15.12). They are spirally coiled, with at least four coils (none of the fruits is intact).

The seeds of campion, *Silene*, have the typical reniform shape of Caryophyllaceae seeds. Two characters allow its identification to genus: firstly and most distinctively, the sunken inner lateral face with its sharp transition to the raised outer face. Secondly, the papillae are markedly elongated (each about 0.2mm long), lining up with each other. The pattern is overall of lines radiating out from the marginal notch. On the dorsal face, farthest from the marginal notch, the lines are horizontal, composed of about four rows of ridges. Measurements of 10 seeds (following the measuring points of Jacomet)[41] are:

	B	L	T	L:B	L:T	T:B
Minimum	1.13	0.98	0.82	72	93	62
Average	1.37	1.10	1.00	81	111	74
Maximum	1.56	1.25	1.09	88	133	87
Standard deviation	0.10	0.09	0.07	4.89	12.08	7.00

Sea club-rush, *Bolboschoenus maritimus* (previously known as *Scirpus maritimus*) seeds are abundant in one sample. They are common in archaeobotanical samples. Although their presence has sometimes been interpreted as evidence for irrigation, they often grow today in locally damp patches in unirrigated fields. Given the large number of springs surrounding the fields of Tille, we may be looking at the result of such a damp area, or the seeds may have passed through dung after being grazed by domestic animals.

The seeds of wild einkorn (one-grained type) are laterally compressed with a strongly curved ventral face in lateral view; the grain is very narrow (Fig. 15.1: 3; 4). The two-grained type has narrow grains with a flattened, concave, ventral face and dorsal grooving (Fig. 15.1: 5, 6).

There are three types of goatgrass, *Aegilops*, grains present. The first is the standard, rather wide and flattened type of grain (Fig. 15.1: 10). The second, found only in sample 15, has a markedly wider distal end. The third type, found only in sample 3, is higher backed with a blunt end; it does not closely resemble any of the goatgrasses or wild wheats that I have seen, but is clearly related to that group.

41 Jacomet *et al.* 1989.

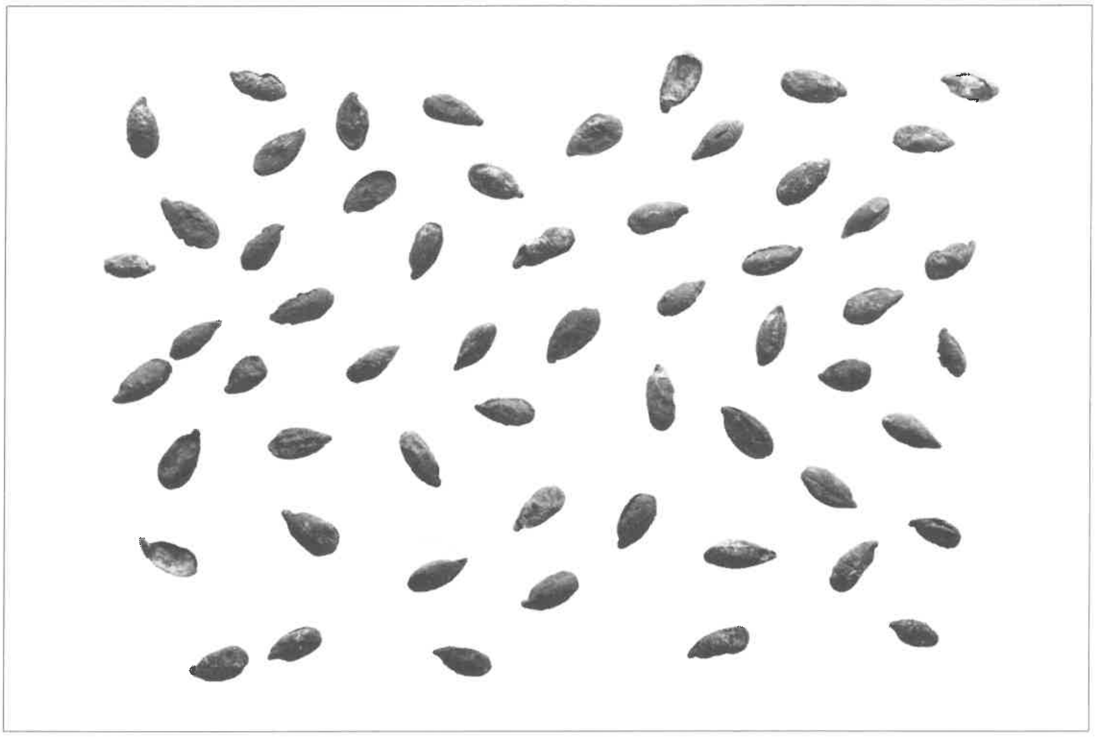

Fig. 15.11. Flax (sample 10), × 4. (Mark Nesbitt).

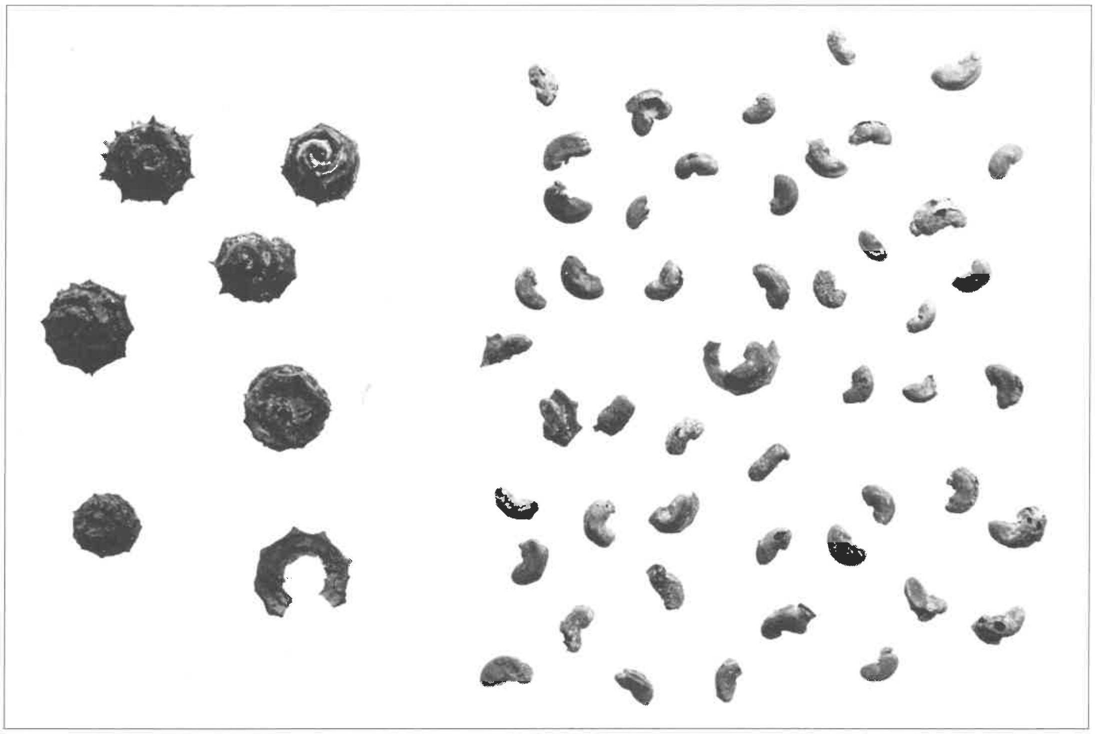

*Fig. 15.12. Medick (*Medicago *sp.) (sample 14), × 4. Left: whole fruits; right: seeds. (Mark Nesbitt).*

A group of spikelet forks in sample 14 have sturdy glumes rising out of a strongly striated rachis (Fig. 15.1: 11). All the rachis segments are broken mid-rachis, indicating the original spike must be of a tough-rachised, non-disarticulating type. A number of *Aegilops* species, including those common in the Tille region such as *Ae. speltoides*, *Ae. triuncialis*, and *Ae. umbellulata*, match the ancient material. All three species grow on field margins today.

The Iron Age environment of Tille

Direct archaeobotanical evidence for the past environment is slim. All the crops and weed flora found at Tille will grow well in unirrigated soil in areas such as Tille, with a reasonably high rainfall (average 440mm at Urfa, 550mm at Kahta). If springs were as abundant in the past as today, then there would be the possibility of irrigated gardens of the kind kept by villagers around the springs at Tille, but there is nothing about the weed flora that points to large-scale irrigation. The current topography of the Euphrates valley would not make it easy to take a leat off the Euphrates near the site, but the geomorphology of the valley may have been different in the past.

Only one species of wild edible fruit or nut was found: a fragment of *Pistacia* nut. The area of Tille must have been forested in the past with the same kind of oak and *Pistacia* woodland as is found nearby, on the lower slopes of Nemrut Dağ. We do not know when woodland disappeared from the Euphrates Valley in this area, giving its current-day barren and eroded appearance. The wild nuts could easily have been carried in from woodland elsewhere.

Tille in regional perspective

The seed assemblage from Tille can be most closely compared to the seventh-century BC material from Nimrud in northern Iraq,[42] an almost contemporary site also under the domination of the Neo-Assyrian empire. Most of the crops are the same, save that common millet, *Panicum miliaceum*, is the only millet species present at Nimrud. No horsebean or pea were found, although the Nimrud samples, as at Tille, derive mainly from a burnt level and may similarly be unrepresentative. The main difference lies in the additional species present at Nimrud: hazelnut, date, olive, fig, pomegranate, and cucumber. The first three species certainly could not have grown at Nimrud; their import was presumably a facet of the international trade in which an important city such as Nimrud would have participated.

The seventh–sixth-century BC plant remains from Bastam, in northwest Iran, are from a wider range of smaller samples and are dominated by six-row hulled barley.[43] Bitter vetch, horsebean and flax are absent; the place of flax as an oilseed is taken by sesame; common millet is present. As at Nimrud, small amounts of a glume wheat are present: at Nimrud, einkorn; at Bastam, emmer. Samples from the eighth-century burnt level at Gordion, central Turkey, contain two-row hulled barley, naked wheat, small amounts of emmer, common millet, chickpea, bitter vetch and lentils. At Sardis a large number of deposits recovered by careful excavation from three small burnt Lydian rooms, burnt *c*.550 BC, are dominated by six-row hulled barley and chickpeas, with smaller quantities of lentil and naked wheat.

The chance of discerning any pattern in these finds is reduced by the incomplete nature of all the seed assemblages: large-scale recovery techniques have rarely been applied to Iron Age sites in the Near East, and the sequence of change in crop husbandry is therefore not nearly as well documented as in the excellent Bronze Age–Iron Age sequence from Kastanas in Greece.[44] At present, I suspect the rather sporadic occurrence of the pulse species is a result of chance. However, chance surely cannot account for the single appearance of foxtail millet at Tille, for millet remains – almost uniformly of common millet – are now known from a significant number of other sites. The ecological needs of the two millets are so similar that the reason for growing one species rather than the other must surely be of cultural origin.

In the case of barley, the distribution of species at Tille, Gordion and Sardis does match the present day distribution, presumably based on the ecological preference of each type, of six-row barley in Mediterranean areas and two-row inland. However the number of samples at each site in which the ratio of straight: twisted grains could be determined is small. The mixture of species at Tille testified by the barley rachis remains suggests both types were grown – as is still the case in some Turkish villages today. Elucidation of this problem will come with large scale flotation, which almost invariably leads to the recovery of numerous rachis fragments. The same applies to the free-threshing wheat: more rachis remains are necessary in order to determine which species were grown. However, the minor role (perhaps just as a weed) of einkorn and emmer seems to be universal at this period, and a distinct contrast to the Aegean, where hulled wheats continue to be important into the Iron Age.[45]

42 Helbaek 1966.

43 Hopf, Willerding 1988.

44 Kroll 1983.

45 Riehl, Nesbitt 2003.

Tille in local perspective

We can compare the Tille plant remains to two nearby sites, one much earlier and one much later. Hassek Höyük is 2km east of Tille, on the opposite bank of the Euphrates. It is an Uruk site, occupied in the late fourth millennium BC. Burnt rooms contained stores of six-row hulled barley, flax and chickpea.[46] The narrow range of species, lack of wheat, and (perhaps) the choice of type of barley might reflect the role of the site as an Uruk colony, practising an Uruk form of agriculture imported from the drier south.[47]

Medieval (12th–13th century) plant remains are published from the excavations at Gritille, on the Euphrates, but 50km south of Tille.[48] Free-threshing wheat and two-row hulled barley are equally important; barley is not dominant as it is at Tille. Lentil is the most abundant pulse; grass pea, chickpea, pea and bitter vetch are also present. Rarer finds include cotton seed, rye grains, foxtail millet, and flax. Overall the crop flora is similar to that of Tille, with the addition of a further summer crop, cotton, which must have been grown under irrigation.

Conclusions

The fresh state of some of the grapes, and the stratigraphic evidence that some of the stored crops were on top of roofs at the time the settlement was burnt show that the destruction is likely to have taken place in late summer, most likely August–October. Destruction of the village at this time of the year, so soon after the field crops such as pulses and cereals had been harvested, would have been doubly disastrous. Any remaining inhabitants would have been left with minimal food supplies for the coming winter. It has been possible to use the composition of the samples to deduce their taphonomy and, in particular, to confirm that several samples from pits (1, 2, 12, possibly 4) represent redeposited material from destruction events, and some burnt level samples (14–16) are composed of plant refuse.

Most of the samples derive from stored crops, and thus contain few weed seeds. The presence of chickpeas as a contaminant in a number of samples, but the absence of any Iron Age stores of this crop, strongly suggests we have only a partial record: either the chickpea stores failed to survive burning, or they were not sampled, or they were located in a part of the site that did not survive.

Little can be said about the crop husbandry techniques of Iron Age Tille. Many of the weed species are typical of those found in fields around Tille today. One specialised weed of flax is present.

Using the presence of crop seeds as a contaminant in other crops as a crude index of relative importance, barley and bitter vetch appear to be the most important cereal and pulse respectively, but it would be unwise to draw broader conclusions from so few samples. Overall the range of species is as would be expected at an Iron Age site, or indeed any Syro-Anatolian site in the preceding two millennia with the striking exception of the foxtail millet. The position of the two more unusual pulses, grass pea and horsebean, remains uncertain because the Tille seeds remain one of a small number of finds. However, horsebean does appear to become more common at Iron Age sites.[49] There are now more records of foxtail millet than at the time of its first publication in 1988, but its presence remains enigmatic. It however fits into a pattern of widespread appearance of millet (usually *Panicum milaceum*) in the Iron Age of the Near East.[50]

The Tille samples have not preserved the herbs and spices, whether cultivated (such as the garlic found at Lydian Sardis), or gathered from the wild, which would have made the daily diet more tasty in the days before the post-Columbian arrival of tomato and pepper, staples of Turkish diet today. However, it is worth bearing in mind that a remarkable diversity of grain and pulse foodstuffs is represented at Iron Age Tille, a large part of which (millet, barley, bitter vetch and grass pea) has since disappeared from human diet in the region.

46 Gregor 1992.
47 Miller 1997.
48 Miller 1998.
49 Riehl, Nesbitt 2003.
50 *Ibid.*

TİLLE HÖYÜK 3
The Iron Age

2. Pottery, Objects and Conclusions

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