VI

Patterns of Agriculture and Land Use at Medieval Gritille

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Gritille was a small mound in Adıyaman province, southeastern Turkey. Even before it was flooded by the lake behind the Atatürk Dam, part of it had been cut away by the Euphrates River. The site yielded a wealth of plant remains from Neolithic, Early Bronze Age, and medieval levels. This report deals only with the medieval deposits, when the site was occupied by Christians, at first under Christian rule and later under Muslim. Gritille was situated about 10 kilometers upstream from Samsat, its regional center.[1] A previous report that dealt with the Crusader period fortress appeared in *Anatolica* and is incorporated in the present chapter.[2]

Gritille lies well within the rainfall agriculture zone; annual precipitation in the nearest city, Adıyaman, is 835 millimeters,[3] though Gritille is probably between the 500 and 600 millimeter isohyets.[4] The site is located in the steppe-oak forest zone of southeastern Turkey near its border with two other major phytogeographical zones: to the west lies the Mediterranean woodland climax, also an oak dominated steppe-forest, and to the south lies the northern extension of the Syrian steppe.[5] A remnant of open oak forest on steep slopes lies only about 20 kilometers from the site.[6] Riparian forest (poplar, willow, and tamarisk) probably grew adjacent to the site. Based on historical references[7] as well as the archaeobotanical data, one can imagine fields, both irrigated and unirrigated, and pasture surrounding the site.

Archaeological Background

A number of medieval occupation phases have been delineated. Following S. Redford's advice,[8] the archaeological contexts have been combined for purposes of analysis as follows:

Phase 2: Small eleventh-century A.D. Byzantine garrison, excavated in a small area. Only two samples from this phase were available for study.

Phase 3: Crusader-period fortress and farming village occupied during the middle of the twelfth century A.D. under the sovereignty of the County of Edessa (Urfa), until it was sacked and burned. Most of the samples come from the domestic area of the burnt fortress and consist of in situ seed deposits and fallen construction debris. Samples from Phase 3 non-destruction lev-

[1] Redford, "Excavations at Gritille (1982–1984)."
[2] Miller, "Crusader Period Fortress."
[3] Meteoroloji Bülteni, *Ortalama ve Ekstrem Kıymetler Meteoroloji Bülteni.*
[4] Atalay, *Türkiye Vejetasyon Coğrafyasına Giriş*, 17, Fig. 7.
[5] Zohary, *Geobotanical Foundations.*
[6] Gil Stein, personal communication.
[7] Redford, this volume.
[8] Information provided by Redford, letter of April 15, 1995.

FROM: The Archaeology of The Frontier in The Medieval Near East: Excavations at Gritille, Turkey, by Scott Redford. (Univ. of Pennsylvania Museum) American Inst. of Archaeology Monograph n.s. 3 (1998)

el occupation debris have been combined for analysis with those from Phase 4.

Phase 4: Brief reoccupation of the site, with botanical samples consisting of occupation debris.

Phases 5 and 6: First occupation of the site under Muslim rule. Most of the excavated samples appear to be the result of intermittent industrial activity, though these deposits also include mudbrick collapse. It is not clear whether people actually lived on the site.

Phases 7 and 8: During the first 40 years of the thirteenth century A.D., Gritille once again appears to have been a small farming community, still under Muslim rule. It was probably abandoned in the third decade of the thirteenth century.

ARCHAEOBOTANICAL RESEARCH QUESTIONS

The medieval plant assemblage from Gritille represents the first such assemblage reported from this period in Anatolia, and one of the only ones in the entire Near East.[9] Fortunately there is at least some documentary evidence for agricultural and land use practices.[10] But as is true of historic sites in general, textual evidence pertaining to any particular site is rarely available, and historical records are no substitute for evidence out of the ground.

The first task of the archaeobotanist is simply to record the presence of agricultural products and other evidence of land use practices. Archaeobotanical studies of Bronze Age sites are helpful in developing interpretations of the plant remains, even though they bear little direct relationship to medieval remains.

The second task is to attempt to see if and how known historical events or processes affected plant use and whether they are reflected in the assemblage. Redford proposes that Gritille's circumstances were tied to those of Samsat. When Samsat was a reasonably secure local center (Phases 3/4, 7/8), Gritille would have been important for its agricultural hinterland in a relatively well-populated valley, and when Samsat and its region declined in importance (Phases 5/6), lower intensity land use strategies would have prevailed.[11]

SAMPLING AND LABORATORY PROCEDURES

The samples come from a variety of deposit types, including hearths and ovens, pits, ashy fill, and wall collapse (Table 6:1). Out of the 138 flotation and unfloated seed samples taken, about half could be assigned to one of the architectural phases (2 through 8), and analysis concentrated on these samples (Table 6:2).

The archaeobotanist did not participate in the excavation. Gil Stein had a SMAP-type flotation device constructed locally[12] and organized the sampling. Staff members who volunteered carried out flotation in the shade of the Euphrates riparian vegetation. Excavators were instructed to take 8-liter soil samples from a variety of deposits and to record the volume. In some cases, volume information was not recorded or is not available, so density of charred material is not always calculated. For very large samples that were subsampled before laboratory analysis, soil volume is calculated in proportion to the quantity analyzed.

In the laboratory, archaeobotanical samples were poured through nested geological sieves. Plant material caught in the 2 millimeter mesh was sorted totally into three categories and weighed: wood charcoal, seeds and seed fragments, and other (rachis and straw fragments, grape peduncles, pod fragments). Charred dung was also separated out and weighed. In the size fraction between 1 and 2 millimeters, whole seeds and identifiable seed and other plant part fragments were separated out and identified. In the size fraction smaller than 1 millimeter, only whole seeds and identifiable rachis fragments were separated out and identified.

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[9] E.g., Samuel, "Plant Remains"; see Miller, "The Near East."

[10] See A. Watson, "Agricultural Innovation."

[11] Chapter 2, this volume.

[12] Named for the Shell Mound Archaeological Project (Kentucky), this flotation device uses an oil drum modified so that pumped water flows in at the bottom and is directed upward and over a spout. Soil is poured into a screened insert set into the tank. Heavy material is caught in the screen ("heavy fraction") and examined for sinking plant materials, bone, chipped stone, etc. Floating material ("light fraction") is caught in a small-mesh screen after it flows past the spout. See P. J. Watson, "In Pursuit of Prehistoric Subsistence."

TABLE 6:1. CATALOG OF ANALYZED ARCHAEOBOTANICAL SAMPLES FROM GRITILLE MEDIEVAL LEVELS

GT #	Yr	Op	Locus	Lot	Phase	Description
105	82	9	5	8	8	Oven
113	82	9	11	10	8	Ash
365	82	9	16	18	7	Oven
627	82	9	15	34	7	Oven
631	82	9	23	35	Upper	Oven
1422	82	10	38	40	-	Pit
1754	82	10	52	47	-	Hearth
1763	82	10	49	49	-	Pit
1959	82	10	61	60	-	Oven
2341	82	11	26	41	6	Pit
3135	82	8	53	99	Upper	Exterior surface
3314	82	8	54	109	Upper	Oven
4558	83	25	28	32	8	Floor deposit
4587	83	25	31	41	7	Pit
4593	83	25	32	42	7	Pit
4908	83	27	2	16	8	Oven
4923	83	27	3	19	8	Oven
5515	83	26	20	29	7	Pit
5543	83	26	20	34	7	Pit
5566	83	25	35	61	5	Ash lenses
5580	83	25	5	64	7	Oven
5831	83	26	21	44	7	Pit
5845	83	26	21	44	7	Pit
6307	83	25	47	77	3	Ash, above burnt phase
6710	83	11	11	48	5	Pyrotechnic installation
6731	83	11	25	47	3B	Fill over floor
6982	83	26	11	70	7	Trash
7318	83	31	4	12	Upper	Oven
7327	83	31	2	13	7	Oven and pit
7660	83	26	32	78	5	Oven
7868	83	25/10	58	95	8	Pit w/ ashy lenses
7884	83	25/10	61	98	5	Ash
8075	83	11	41	75	4	Pit
8113	83	25/10	57	103	3B	Animal pen roof
8151	83	31	9	22	Upper	Ashy fill & wall collapse
8165	83	31	15	24	Upper	Pit
8567	83	11	46	88	3	Pit
8721	83	25/10	68	115	5	Floor deposit
8748	83	25/10	70	119	5	Between floors
9002	83	11	49	92	3	Oven
9187	83	25/10	75	128	3B	Burnt debris assoc w/ burnt level
13725	83	31	26	48	Upper	Brick collapse
13803	83	25/10	75	133	3B	Animal pen, surface
13806	83	25/10	75	133	3B	Animal pen, surface
13809	83	25/10	75	130	3B	Animal pen, not floated
13815	83	25/10	75	133	3B	Animal pen, not floated
13828	83	25/10	75	140	3B	Animal pen, surface, not floated
13832	83	25/10	75	140	3B	Animal pen, surface, not floated
15572	84	9	6	7	5	Pit
15746	84	42	12	13	5	Bricky wash on surface
16271	84	43	17	17	-	Pyrotechnic installation
16662	84	43	22	21	-	Oven
16915	84	42	19	28	3B	Surface
17048	84	26/27	22	23	4	Oven or exterior surface
17137	84	26/27	24	31	4	Above road
17748	84	47	10	13	4	Wall
17830	84	26/27	31	47	4	Oven, on exterior surface
18164	84	26/27	35	55	4	Oven, on exterior surface

TABLE 6:1 (CONT.). CATALOG OF ANALYZED ARCHAEOBOTANICAL SAMPLES FROM GRITILLE MEDIEVAL LEVELS

GT #	Yr	Op	Locus	Lot	Phase	Description
18210	84	26/27	40	62	Upper	Pit
18245	84	26/27	43	69	3B	Hearth
18249	84	26/27	44	70	3B	Oven
18377	84	45	15	21	3B	Bricky collapse on floor
18380	84	45	16	22	Upper	Bricky collapse on surface
18824	84	26/27	56	85	3B	Oven
18875	84	10	58	124	3B	Floor, in stable
19119	84	26/27	43	95	3B	Hearth
19579	84	26/27	72	111	2	Oven
19591	84	26/27	76	115	4	Pit
19598	84	26/27	77	116	2	Pit
20959	84	55	19	26	-	Oven
22091	84	55	38	44	-	Oven
22467	84	10	88	185	3B	Pit
22469	84	55	43	51	-	Oven
22492	84	55	41	48	Upper	Oven
22495	84	55	40	49	-	Oven
22606	84	47	25	34	-	Oven
22663	84	9	90	190	3B	Oven

TABLE 6:2. DISTRIBUTION OF GRITILLE MEDIEVAL ARCHAEOBOTANICAL SAMPLES BY PHASE

Phase	2	3*	4	5	6	7	8	Upper	Med.
No. taken	2	33	8	11	4	11	7	22	40
No. different loci	2	17	7	11	4	7	7	11	37
No. loci analyzed	2	14	7	11	3	7	7	10	6
No. analyzed	2	21	8	11	3	8	7	10	6

*Phase 3 includes several samples from the same burnt room, Locus 75, but from different deposits recognized as seed concentrations on the floor.

The data charts (Tables 6:3–6:8) are organized by phase, and within phase by operation, locus, and lot. Basic descriptive data head the charts. The plant taxa are listed as follows: cereals, pulses and other economic/food plants, and then wild and weedy plants listed in alphabetical order by family. Charred plant parts and mineralized seeds complete the tables. Weight of cereals and pulses is reported because these types occur mostly as fragments. To estimate whole-seed equivalents, conversion factors can be applied to the cereals. Seed identifications were made with the help of modern comparative material housed at the Ethnobotanical Laboratory of the University of Pennsylvania Museum, seed atlases, and published seed illustrations.[13]

The provenience of the samples is designated by excavation square (operation) and stratigraphic unit (locus). The lot number defines the actual unit of excavation. Sample numbers are prefixed "GT."

THE TAXA

Most of the samples contain mixtures of various amounts of charcoal, cultigens, and wild and weedy plant seeds. Just a few taxa account for the bulk of the cultivated plants: durum/bread wheat, barley, lentil, and grape. It is only the samples from the burnt Crusader period settlement which had in situ concentrations of crop plants: fava beans, vetchling, and wheat. Other cultigens occur in such low quantities that they may have been incidental admixtures from animal fodder or dung fuel, or crops whose seeds accidentally fell into a fire: einkorn, foxtail millet, rice, vetchling, bitter vetch (probably a fodder crop), chickpea, pea, cotton, and flax. Fig and tentatively identified fenugreek, pistachio,

[13] E.g., van Zeist and Bakker-Heeres, "Archaeobotanical Studies in the Levant."

TABLE 6:3. GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 2, 3, AND 4

GT no.	19579	19598	22663	8567	9002	6307	18249	18824	17748	8075	17048	17137	17830	18164	19591
Year	84	84	84	83	83	83	84	84	84	83	84	84	84	84	84
Operation	26/27	26/27	9	11	11	25	26/27	26/27	47	11	26/27	26/27	26/27	26/27	26/27
Locus	72	77	90	46	49	47	44	56	10	41	22	24	31	35	76
Lot	111	116	190	88	92	77	70	85	13	75	23	31	47	55	115
Phase	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4
Volume (l)	8	4	8	8	8	?	8	8	8	8	?	8	8	8	3.84
Density (g/l)	0.55	0.91	0.50	0.24	0.15	n/c	0.30	0.23	0.29	1.64	n/c	0.08	0.10	0.52	2.02
Charcoal >2mm (g)	3.75	3.60	2.29	1.69	1.06	0.67	2.24	1.50	2.14	12.14	4.56	0.65	0.70	4.06	7.45
Seed >2mm (g)	0.61	0.01	1.59	0.19	0.17	0.10	0.19	0.30	0.20	0.98	0.14	0.01	0.09	0.13	0.32
Misc. >2mm (g)	+	0.01	0.11	.	+	+	.	0.03	+	0.02	+	.	.	.	+
Seed/charcoal (g/g)	0.16	+	0.69	0.11	0.16	0.15	0.08	0.20	0.09	0.08	0.03	0.02	0.13	0.03	0.04
Wild seed (#)	145	.	859	67	63	11	29	40	19	466	20	6	61	10	148
Wild seed/charcoal (#/g)	39	.	375	40	59	16	13	27	9	38	4	9	87	2	20
Wild/cereal (#/g)	279	.	573	419	394	157	161	138	633	590	167	n/c	871	100	1480
Cereal (g)															
Hordeum distichum	0.17	0.01	0.90	0.05	0.04	0.03	0.03	0.07	.	0.06	0.09	+	.	0.01	0.01
Triticum durum/aestivum	0.18	.	0.36	0.08	0.08	.	0.03	0.06	.	0.51	.	.	0.06	0.08	0.01
T. monococcum	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Triticum sp.	+	.	.	.	.	0.01	.	.	0.02	.	+	.	.	.	0.03
Cereal indet.	0.17	+	0.24	0.03	0.04	0.03	0.12	0.16	0.01	0.22	0.03	.	0.01	0.01	0.05
Pulse (g)															
Cicer	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.06
Lathyrus	.	.	.	.	.	.	.	.	.	0.10	.	.	.	.	.
Lens	0.04	.	0.13	.	0.01	0.03	0.03	0.01	0.11	0.06	0.01	.	.	0.01	0.06
Pisum	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Vicia ervilia	.	.	.	0.01	.	.	.	.	.	.	.	.	.	.	.
Pulse indet.	.	.	0.02	0.01	.	.	0.01	0.01	0.01	0.16	.	.	.	.	0.04
Other food/economic items															
cf. *Pistacia* (g)	0.01	.	.	.	.	0.02	.	.	.	.	.	.	.	.	.
Gossypium	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Ficus	1	7	1	3	3	.	.	.	.	5	.	.	3	.	.
Secale	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.
Setaria	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.
Vitis	.	.	1	1	.	.	.	.	.	1	1	.	2	.	.

TABLE 6:3 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 2, 3, AND 4

GT no.	19579	19598	22663	8567	9002	6307	18249	18824	17748	8075	17048	17137	17830	18164	19591
Wild and weedy															
GT-Apiaceae 2	4	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Apiaceae	.	.	14	.	.	.	.	4	1	.	.	.	1	1	86
Centaurea	.	.	2	.	1	.	1	1	.	1	.	.	.	.	.
GT-Asteraceae 1	2	.	28	.	.	.	.	.	.	.	1	.	.	.	.
Asteraceae	.	.	.	1	.	.	.	.	.	3	1	.	.	.	.
Heliotropium	.	.	1	1	4	.	.	.	.	2	.	.	1	.	.
cf. *Alyssum*	.	.	3	.	.	.	2	.	.	.	.	.	.	.	.
Brassicaceae	2	.	12	.	.	.	.	.	2	6	.	.	.	.	.
Capparis	.	.	10	.	.	.	.	.	.	12	.	.	2	.	.
Gypsophila	1	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Silene	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodium	.	.	2	.	.	.	1	.	.	5	.	.	.	.	.
GT-Chenopodiaceae 1	2	.	7	.	1	.	.	.	.	1	.	.	.	.	.
cf. *Salsola*	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodiaceae	14	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Carex	.	.	4	.	.	.	1	.	.	3	.	.	.	.	.
cf. *Scirpus*	1	.	5	.	2	2	.	1	.	6	.	.	.	.	.
Cyperaceae (GT-7)	.	.	.	.	.	.	.	.	.	1	.	.	1	.	2
Cyperaceae	.	.	2	.	.	.	.	1	.	1	.	.	.	.	.
Cephalaria	2	.	5	2	.	.	.	2	.	2	.	.	.	.	.
Euphorbia	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Astragalus	.	.	5	.	.	.	2	.	.	2	.	.	.	.	1
Coronilla	4	.	12	3	3	.	.	.	1	7	.	.	2	.	.
Glycyrrhiza	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Medicago	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Prosopis	2	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Trifolium/Melilotus	1	.	23	1	1	1	.	2	.	14	1	.	8	1	.
Trigonella astroites-type	.	.	43	.	2	.	.	.	.	1	.	.	.	.	.
Trigonella	6	.	40	2	25	2	.	2	.	29	3	.	2	3	4
GT-Fabaceae 4	.	.	29	.	1	.	.	.	.	.	.	.	.	.	.
GT-Fabaceae 5	8	.	.	2	2	.	1	.	2	64	.	.	10	.	.
Fabaceae	7	.	47	7	8	.	1	2	.	9	3	.	2	.	2
Ajuga	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Ziziphora	1	.	7	.	.	.	.	.	.	.	.	.	.	.	.
Lamiaceae	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.
Malva	.	.	.	.	.	.	.	4	2	46	.	.	.	.	.
Fumaria	.	.	.	.	.	.	.	.	.	12	.	.	.	.	.

TABLE 6:3 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 2, 3, AND 4

GT no.	19579	19598	22663	8567	9002	6307	18249	18824	17748	8075	17048	17137	17830	18164	19591
Papaver	.	.	5	.	.	.	.	.	.	1	.	.	.	.	.
cf. *Plantago*	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Bromus	.	.	6	.	.	.	.	.	.	.	.	1	.	.	.
Hordeum murinum-type	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.
Hordeum	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.
Lolium remotum-type	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Lolium	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Phleum-type	15	.	145	24	.	2	4	2	.	46	1	4	1	.	25
GT-Poaceae 1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
GT-Poaceae 3	.	.	.	.	.	.	.	.	.	2	.	.	1	.	.
GT-Poaceae 5	.	.	.	.	.	.	.	.	.	8	.	.	.	.	.
GT-Poaceae 7	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GT-Poaceae 8	15	.	174	2	1	.	.	.	.	.	.	.	.	.	.
GT-Poaceae 12	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.
Poaceae	10	.	41	2	.	1	1	6	3	13	4	1	5	3	3
Rumex	.	.	4	1	.	.	.	.	1	.	.	.	.	.	.
Portulaca	3	.	6	1	.	.	.	.	.	.	.	.	4	.	.
Androsace	.	.	2	.	.	.	.	.	.	2	.	.	.	.	.
Adonis	.	.	1	.	.	1	1	.	.	2	.	.	.	.	.
Reseda	.	.	6	2	.	.	.	.	.	1	.	.	2	1	.
Galium	.	.	1	.	.	.	.	2	.	2	.	.	1	.	.
GT-Rubiaceae 1	.	.	3	.	.	.	.	.	1	6	.	.	.	.	1
Hyoscyamus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Solanum	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Thymelaea	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Valerianella coronata	1	.	3	.	.	.	.	.	.	.	.	.	.	.	.
Valerianella dentata	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Verbena	.	.	3	2	1	.	1	1	.	.	.	.	1	.	.
Peganum	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.
Unknown, GT-5	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Unknown, GT-11	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Unknown, GT-15	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Unknown, GT-23	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Unknown, GT-25	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Unknown, GT-28	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Unknown, misc.	40	.	142	9	10	2	11	7	3	145	3	.	17	1	24

TABLE 6:3 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 2, 3, AND 4

GT no.	19579	19598	22663	8567	9002	6307	18249	18824	17748	8075	17048	17137	17830	18164	19591
Other charred plant parts															
Hordeum int.	21	.	100	2	.	1	.	8	.	9	1	.	2	.	1
Triticum durum/aestivum int.	17	.	50	1	.	.	.	8	.	3	.	.	.	.	.
Triticum gb	19	.	.	4	1	2	.	23	1	47	1	.	.	.	.
Trit mono/dicoccum sf	.	.	1	1	.	.	.	1	.	.	.	.	.	.	.
grass culm node	6	.	20	.	.	.	1	13	1	1	1	.	.	.	2
Vitis peduncle	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Vitis fruit	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Mineralized seeds															
Asteraceae	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alkanna	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Lithospermum tenuifolium	.	.	.	4	.	.	.	1	.	.	.	.	.	.	.
cf. *Capparis*	1	.	.	.	.	.	.	.	.	.	.	.	1	.	1
Chenopodiaceae	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fimbristylis	17	.	2	1	3	.	.	.	.	.	.	.	1	.	1
Cyperaceae	1	.	1	1	3	.	.	.	.	.	.	.	.	.	.
Ficus	.	.	.	2	.	.	.	.	.	1	.	4	.	.	.
Papaver	.	.	.	2	.	.	.	.	.	1	.	.	.	.	1
Unknown, misc.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.

Abbreviations for Tables 6:3–6:8
nf = not floated; n/c = not calculable; int. = internode; gb = glume base; sf = spikelet fork; frg = fragment

TABLE 6:4. GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 5 AND 6

GT no.	15572	1754	1959	6710	5566	7660	15746	16662	8721	7884	8748	1422	1763	2341
Year	84	82	82	83	83	83	84	84	83	83	83	82	82	82
Operation	9	10	10	11	25	26	42	43	25/10	25/10	25/10	10	10	11
Locus	6	52	61	11	35	32	12	22	68	61	70	38	49	26
Lot	7	47	60	48	61	78	13	21	115	98	119	40	49	41
Phase	5	5	5	5	5	5	5	5	5	5	5	6	6	6
Volume (l)	4.3	6	6	?	8	8	4	8	1.8	?	?	8	3.8	8
Density (g/l)	0.07	0.05	0.19	n/c	0.02	0.13	2.56	0.16	0.86	n/c	n/c	0.17	2.10	0.03
Charcoal >2mm (g)	0.11	0.26	1.05	0.02	0.08	0.96	9.62	0.84	1.26	0.58	10.42	0.18	7.71	0.07
Seed >2mm (g)	0.17	0.02	0.06	0.22	0.04	0.06	0.56	0.45	0.27	0.05	0.21	1.15	0.24	0.15
Misc. >2mm (g)	0.04	.	0.02	0.01	.	.	0.04	.	0.01	0.02	.	+	0.02	+
Seed/charcoal (g/g)	1.55	0.08	0.06	11.00	0.50	0.06	0.06	0.54	0.21	0.09	0.02	6.39	0.03	2.14
Wild seed (#)	15	99	181	252	62	35	68	37	1815	250	17	123	64	17
Wild seed/charcoal (#/g)	136	381	172	12600	775	36	7	44	1440	431	2	683	8	243
Wild/cereal (#/g)	125	3300	3017	813	2067	583	105	142	15125	8333	89	96	221	850
Cereal (g)														
Hordeum	0.08	.	+	0.03	0.01	0.01	.	0.02	0.08	0.02	0.04	0.37	0.05	.
Triticum durum/aestivum	0.02	.	.	0.20	.	0.05	0.55	0.07	0.04	.	0.10	0.44	0.10	.
Triticum sp.	.	.	+	.	0.01	.	.	0.01	.	+	.	.	.	+
Cereal indet.	0.02	0.03	0.06	0.08	0.01	.	0.10	0.16	+	0.01	0.05	0.47	0.14	0.02
Pulse (g)														
Cicer	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Lens	.	.	0.01	.	.	+	0.01	0.10	.	.	0.03	+	0.01	+
Vicia ervilia	.	.	.	0.01	.	.	.	0.02	.	.	.	.	.	.
Pulse indet.	0.04	.	.	0.03	.	.	.	0.07	0.01	.	0.01	.	.	0.13
Other food/economic items														
Linum	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Gossypium	.	.	.	.	.	.	.	1	2	.	.	.	.	.
Ficus	.	.	.	.	.	.	4	2	3	2	.	.	.	.
Setaria	.	.	.	.	.	.	.	.	20	.	.	.	.	.
Prunus (almond; g)	.	0.01	.	.	.	.	.	.	.	.	.	.	.	.
Vitis	.	.	.	.	.	.	1	4	1	.	.	.	.	1

TABLE 6:4 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 5 AND 6

GT no.	15572	1754	1959	6710	5566	7660	15746	16662	8721	7884	8748	1422	1763	2341
Wild and weedy														
GT-Apiaceae 2	.	.	2	.	.	.	.	.	7	.	.	.	1	.
Centaurea	.	.	1	2	.	.	1	.	5	2	.	.	.	.
GT-Asteraceae 1	.	2	.	.	.	.	.	.	6	.	.	.	.	.
Asteraceae	.	.	.	.	.	.	.	.	2	.	.	.	1	.
Heliotropium	.	.	1	.	.	1	.	.	.	.	.	.	.	.
cf. *Alyssum*	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Brassicaceae	.	2	.	63	1	1	3	.	14	.	.	.	.	2
Capparis	.	.	.	.	.	.	2	.	1	.	.	.	.	.
Gypsophila	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Silene	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Vaccaria	.	.	.	.	.	.	.	.	5	.	1	.	.	.
Caryophyllaceae	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Atriplex	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Chenopodium	.	.	2	.	.	.	2	.	4	5	.	1	4	1
GT-Chenopodiaceae 1	.	1	.	.	1	13	3	.	8	.	.	.	.	.
Suaeda	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Chenopodiaceae	.	.	.	.	.	.	.	.	.	1	1	.	.	.
cf. *Scirpus*	.	1	.	.	.	.	.	.	9	.	.	.	3	.
Cyperaceae (GT-7)	.	1	4	.	.	.	.	.	15	3	.	.	.	.
Cyperaceae	.	.	.	.	.	.	2	.	.	.	.	.	.	.
Cephalaria	.	.	.	.	.	.	.	1	11	.	3	1	.	.
Astragalus	.	.	.	2	6	.	2	.	12	2	.	1	.	.
Coronilla	.	.	.	.	1	.	.	.	17	1	.	.	2	.
Glycyrrhiza	4	.	.	.	.	.	.	.	.	.	.	.	.	.
Medicago radiata	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Medicago	.	.	1	.	.	.	1	.	.	.	.	.	.	1
Trifolium/Melilotus	.	6	1	4	6	.	1	.	10	.	.	.	3	.
Trigonella astroites-type	.	4	.	.	1	1	.	.	3	12	.	1	.	.
Trigonella	.	39	7	.	12	3	.	4	30	21	4	1	3	2
GT-Fabaceae 4	.	11	.	.	.	.	.	.	.	.	1	.	.	.
GT-Fabaceae 5	.	.	1	.	1	.	5	.	90	.	.	.	1	.
Fabaceae	.	3	5	3	7	.	3	6	8	5	2	.	3	1
Hypericum	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Ajuga chamaepitys-type	.	.	.	.	.	.	.	.	.	.	.	1	.	.
cf. *Nepeta*	.	.	.	.	.	.	.	.	2	.	.	.	.	.

TABLE 6:4 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 5 AND 6

GT no.	15572	1754	1959	6710	5566	7660	15746	16662	8721	7884	8748	1422	1763	2341
Teucrium	.	.	2	.	.	.	.	.	2	2	.	.	.	.
Ziziphora	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Lamiaceae	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Malva	.	.	.	.	.	.	.	.	2	6	1	.	.	.
Fumaria	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Papaver	.	.	1	47	.	.	.	.	.	.	.	.	.	.
Bromus	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Hordeum murinum-type	.	.	.	.	.	.	.	.	.	1	.	1	1	.
Hordeum	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Lolium remotum-type	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Lolium	.	.	.	.	.	.	.	.	3	.	.	.	.	.
Phalaris	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Phleum-type	.	6	97	55	10	.	10	4	1138	96	.	2	6	1
GT-Poaceae 3	.	.	.	.	.	.	.	.	23	.	.	.	.	.
GT-Poaceae 5	.	.	.	.	.	.	.	.	1	.	.	.	.	.
GT-Poaceae 7	.	.	.	1	.	.	.	.	.	.	.	.	.	.
GT-Poaceae 8	2	2	3	.	.	.	2	2	77	4	.	.	.	.
GT-Poaceae 12	.	1	2	.	.	1	.	.	4	.	.	.	.	.
Poaceae	9	3	15	4	5	1	5	1	125	12	.	14	6	1
Polygonum persicaria-type	.	.	.	.	.	.	.	.	.	1	.	.	.	.
cf. *Polygonum*	.	.	.	1	.	1	.	.	.	.	.	.	.	.
Portulaca	.	.	1	.	.	.	.	.	8	2	.	.	.	.
Reseda	.	.	4	2	.	3	.	.	15	.	.	85	1	.
cf. *Potentilla*	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Galium	.	.	.	.	.	.	.	2	.	.	.	1	.	2
GT-Rubiaceae 1	.	2	.	2	.	.	.	.	4	1	.	.	1	.
Solanum	.	.	.	.	.	.	2	.	.	2	.	.	.	.
Solanaceae	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Valerianella	.	.	1	.	.	.	.	.	1	.	.	.	.	.
Verbena	.	1	1	.	3	1	.	.	3	.	.	.	.	.
Peganum	.	.	.	.	.	1	.	.	.	.	1	.	.	.
Unknown, GT-5	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Unknown, GT-23	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Unknown, misc.	.	11	27	63	7	7	23	16	145	70	3	13	27	6

TABLE 6:4 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 5 AND 6

GT no.	15572	1754	1959	6710	5566	7660	15746	16662	8721	7884	8748	1422	1763	2341
Other charred plant parts														
Hordeum int.	2	.	17	.	1	.	.	.	74	28	.	1	.	2
Triticum durum/aestivum int.	5	8	7	2	.	.	.	.	.	17	1	1	13	.
Triticum glume base	25	.	24	54	1	3	.	.	31	.	.	.	.	21
T. mono/dicoccum sf	.	.	.	.	.	.	.	.	.	.	.	2	.	.
Grass culm node	3	1	10	2	.	.	1	.	11	1	.	1	5	3
Oryza glume frg	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Vitis peduncle	2	.	1	.	.	.	.	.	1	.	.	.	.	1
Vitis fruit	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Glycyrrhiza pod frg	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Mineralized seeds														
Arnebia decumbens	.	.	.	.	.	.	.	2	.	.	.	.	.	.
Heliotropium	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Fimbristylis	.	1	.	3	.	12	.	.	.	4	.	3	.	.
Cyperaceae	.	.	.	.	.	.	.	2	.	.	.	2	.	.
Ficus	.	.	.	.	.	.	.	.	.	.	.	.	11	.
Papaver	.	.	.	123	.	.	.	.	.	.	.	.	2	.
Unknown, misc.	.	1	.	.	.	.	.	.	.	.	.	.	1	.

TABLE 6:5. GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 7 AND 8

GT no.	365	5580	4587	4593	6982	5515	5543	5831	5845	7327	105	113	627	4558	7868	4908	4923
Year	82	83	83	83	83	83	83	83	83	83	82	82	82	83	83	83	83
Operation	9	25	25	25	26	26	26	26	26	31	9	9	9	25	25/10	27	27
Locus	16	5	31	32	11	20	20	21	21	2	5	11	15	28	58	2	3
Lot	18	64	41	42	70	29	34	44	44	13	8	10	34	32	95	16	19
Phase	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8
Volume (l)	8	8	8	8	8	8	?	?	8	?	8	8	8	8	?	8	?
Density (g/l)	0.19	0.21	0.02	0.04	0.12	0.08	n/c	n/c	0.07	n/c	+	0.11	0.02	0.12	n/c	+	n/c
Charcoal >2mm (g)	.	0.84	0.11	0.30	0.92	0.22	0.90	0.22	0.51	+	0.02	0.12	0.07	0.93	0.04	0.01	+
Seed >2mm (g)	1.37	0.40	0.01	0.05	0.03	0.40	0.03	0.34	0.04	+	.	0.78	0.01	0.05	0.41	+	0.02
Misc. >2mm (g)	0.15	0.41	.	.	.	0.01	.	0.03	.	.	.	.	0.09	.	0.03	.	.
Seed/charcoal (g/g)	n/c	0.48	0.09	0.17	0.03	1.82	0.03	1.55	0.08	n/c	.	6.50	0.14	0.05	10.25	n/c	n/c
Wild seed (#)	120	124	28	45	8	24	.	12	32	1	.	216	5	8	22	8	.
Wild seed/charcoal (#/g)	n/c	148	255	150	9	109	.	55	63	n/c	.	1800	71	9	550	800	n/c
Wild/cereal (#/g)	74	653	2800	1125	800	92	.	32	1600	n/c	n/c	225	500	800	138	n/c	n/c
Cereal (g)																	
Hordeum distichum	0.93	0.03	.	0.02	.	0.10	.	0.04	.	.	.	0.18	.	.	0.01	.	.
Triticum durum/aestivum	0.28	0.13	0.01	.	.	0.09	0.01	0.22	.	.	.	0.26	.	+	0.07	.	.
Triticum sp.	.	.	.	0.01	0.01	.	.	.	0.01	.	.	0.05	.	.	.	.	.
Cereal indet.	0.41	0.03	+	0.01	.	0.07	0.02	0.11	0.01	.	.	0.47	0.01	0.01	0.08	+	.
Pulse (g)																	
Lens	.	.	.	.	.	.	0.01	+	0.02	.	.	.	.	.	.	.	0.01
Pisum	.	.	.	.	.	0.02	.	.	.	.	.	.	.	.	0.01	.	.
Vicia ervilia	.	.	.	.	.	.	.	.	.	.	+	.	.	.		.	.
Pulse indet.	.	.	.	.	.	0.10	.	+	.	.	.	.	.	.	0.12	.	.
Other food/economic items																	
Setaria	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vitis	.	6	.	.	.	1	.	.	.	.	.	.	.	.	5	.	1
Wild and weedy																	
Centaurea	5	.	.	.	1	.	.	.	.	1	.	2	.	.	.	.	.
GT-Asteraceae 1	48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asteraceae	2	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Brassicaceae	.	5	.	.	1	.	.	1	.	.	.	3	.	.	.	.	.
Capparis	1	.	.	1	.	.	.	1	.	.	.	1	.	.	.	.	.

TABLE 6:5 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 7 AND 8

GT no.	365	5580	4587	4593	6982	5515	5543	5831	5845	7327	105	113	627	4558	7868	4908	4923
Silene	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chenopodium	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GT-Chenopodiaceae 1	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.
Convolvulus	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
cf. *Bryonia*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Cyperaceae (GT-7)	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Cyperaceae	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Cephalaria	.	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	.
Astragalus	1	.	2	.	.	.	.	1	.	.	.	1	.	.	.	.	.
Coronilla	.	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.
Medicago	.	1	.	1	.	.	.	.	.	.	.	2	.	.	.	.	.
Prosopis	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Trifolium/Melilotus	3	6	4	2	.	.	.	.	2	.	.	33	.	.	.	.	.
Trigonella astroites-type	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Trigonella	.	3	1	9	.	7	.	3	8	.	.	1	.	.	.	1	.
GT-Fabaceae 4	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.
GT-Fabaceae 5	.	2	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Fabaceae	5	1	1	2	4	2	.	1	5	.	.	34	2	2	6	.	.
Hypericum	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lamiaceae	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Malva	3	2	.	.	.	.	.	.	2	.	.	2	.	.	.	.	.
Avena	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Hordeum murinum-type	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lolium remotum-type	.	9	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Lolium	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.
Phleum-type	14	13	8	3	.	.	.	.	.	.	.	20	1	.	3	5	.
Triticoid	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
GT-Poaceae 8	.	9	.	.	.	1	.	.	3	.	.	2	.	.	1	.	.
GT-Poaceae 11	11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
GT-Poaceae 12	.	6	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Poaceae	1	16	2	4	.	7	.	.	.	.	.	4	.	.	10	1	.
Polygonum lapathifolium-type	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rumex	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Reseda	.	1	.	2	.	.	.	.	.	.	.	.	.	.	1	.	.

TABLE 6:5 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, PHASES 7 AND 8

GT no.	365	5580	4587	4593	6982	5515	5543	5831	5845	7327	105	113	627	4558	7868	4908	4923
Galium	.	4	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
GT-Rubiaceae 1	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Solanum	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Solanaceae	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Valerianella coronata	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
V. dentata	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.
Verbena	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Peganum	.	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Unknown, misc.	21	23	4	13	1	4	.	2	7	.	.	101	.	5	1	1	.
Other charred plant parts																	
Hordeum int.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	19	.	.
Triticum durum/aestivum int.	1	.	.	.	.	19	.	5	.	.	.	2	.	.	40	.	.
Triticum glume base	.	.	.	4	.	.	.	9	.	.	.	.	.	1	3	.	.
T. mono/dicoccum sf	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Grass culm node	1	6	.	.	.	.	.	2	.	.	.	.	.	.	11	.	.
Fabaceae (pod fragment)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Vitis peduncle	.	2	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Vitis fruit	.	3	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Mineralized seeds																	
Centaurea	1	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Onopordum	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.
Alkanna	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Heliotropium	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
cf. *Capparis*	.	.	.	.	.	.	1	.	.	1	.	28	.	.	.	.	.
Suaeda	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Fimbristylis	.	46	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Ficus	.	1	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.
Fumaria	5	.	.	.	.	.	.	1	.	.	.	7	.	3	.	.	.
Papaver	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.
Hyoscyamus	.	.	.	.	.	.	.	1	.	.	.	3	.	.	.	.	.
Solanaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Unknown, misc.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1

TABLE 6:6. GRITILLE ARCHAEOBOTANICAL SAMPLES, UPPER PHASES (5–8, ISLAMIC PERIOD)

GT no.	3135	3314	631	18210	7318	8151	8165	13725	18380	22492
Year	82	82	82	84	83	83	83	83	84	84
Operation	8	8	9	26/27	31	31	31	31	45	55
Locus	53	54	23	40	4	9	15	26	16	41
Lot	99	109	35	62	12	22	24	48	22	48
Volume (l)	8	8	8	8	?	8	8	6.9	8	8
Density (g/l)	0.02	0.06	0.07	0.29	n/c	0.29	0.15	1.76	0.33	0.21
Charcoal >2mm (g)	0.14	0.46	0.03	2.19	0.16	2.25	1.17	12.21	2.47	1.44
Seed >2mm (g)	+	+	0.55	0.13	0.36	0.10	0.06	0.02	0.15	0.20
Misc. >2mm (g)	.	.	.	+	.	.	.	.	+	.
Seed/charcoal (g/g)	+	+	18.33	0.06	2.25	0.04	0.05	.	0.06	0.14
Wild seed (#)	4	.	88	10	5	30	14	17	10	6
Wild seed/charcoal (#/g)	29	.	2933	5	31	13	12	1	4	4
Wild/cereal (#/g)	400	.	463	77	50	750	200	850	100	120
Cereal (g)										
Hordeum distichum	.	.	+	0.06	0.01	+	.	0.01	+	0.03
Triticum durum/aestivum	.	.	0.07	0.02	0.04	0.02	0.02	0.01	.	0.02
Triticum sp.	.	.	.	.	.	.	.	.	0.02	.
Cereal indet.	0.01	0.01	0.12	0.05	0.05	0.02	0.05	.	0.08	.
Pulse (g)										
Cicer	.	.	.	.	.	.	.	.	.	0.04
Lens	+	.	0.03	.	0.08	0.02	0.01	.	.	0.17
Pisum	.	.	.	.	0.09	.	.	.	.	.
Vicia ervilia	.	.	0.13	.	0.02	.	.	.	.	.
Pulse indet.	.	.	0.07	.	0.12	.	.	.	0.01	.
Other food/economic items										
Linum	.	.	.	.	.	2	.	.	.	.
Gossypium	.	.	5	.	.	.	.	.	2	.
Ficus	.	.	.	.	.	.	.	7	1	.
Setaria	.	.	.	.	1	.	.	.	.	.
Vitis	.	.	2	.	1	.	.	.	.	.
Wild and weedy										
Centaurea	.	.	.	.	.	1	1	1	.	.
Brassicaceae	.	.	2	2	1	.	1	.	.	.
Gypsophila	.	.	.	.	.	.	.	1	.	.
Chenopodium	.	.	.	.	.	.	.	1	.	.
Convolvulus	.	.	.	.	.	1	.	.	.	.
cf. *Scirpus*	.	.	.	.	.	.	.	.	1	.
Cyperaceae	.	.	1	.	.	.	.	.	1	.
Astragalus	.	.	.	.	.	1	1	.	.	.
Coronilla	1	.	.	2	.	.	.	1	.	.
Medicago	.	.	.	.	.	2	.	.	.	.
Trifolium/Melilotus	.	.	.	.	.	2	.	2	.	.
Trigonella astroites-type	.	.	.	.	.	6	.	.	.	.
Trigonella	.	.	12	1	.	2	3	.	.	.
GT-Fabaceae 4	.	.	.	1	.	.	.	.	.	.
GT-Fabaceae 5	.	.	1	.	.	1	.	1	.	.
Fabaceae	.	.	1	.	.	4	1	1	.	.
Lamiaceae	.	.	.	.	.	.	.	1	.	.
Malva	.	.	1	.	.	1	.	.	.	.
Papaver	.	.	1	.	.	.	.	.	.	.

TABLE 6:6 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, UPPER PHASES (5–8, ISLAMIC PERIOD)

GT no.	3135	3314	631	18210	7318	8151	8165	13725	18380	22492
Phleum-type	.	.	3	.	.	.	2	.	1	.
GT-Poaceae 8	3	.	10	.	.	.	.	.	.	.
Poaceae	.	.	.	.	1	1	3	.	2	4
Adonis	.	.	.	.	.	.	.	2	.	.
Reseda	.	.	.	.	.	.	2	.	.	.
Galium	.	.	.	.	.	1	.	.	1	.
GT-Rubiaceae 1	.	.	3	.	.	.	.	.	1	.
Verbascum	.	.	.	.	1	.	.	.	.	.
Hyoscyamus	.	.	.	.	1	.	.	.	.	.
Solanum	.	.	1	.	.	.	.	.	.	.
Unknown, misc.	.	.	51	4	1	7	.	.	1	2
Other charred plant parts										
Hordeum int.	.	.	1	.	.	.	.	.	.	.
Triticum durum/aestivum int.	.	.	.	.	.	.	.	.	1	.
Triticum glume base	.	.	.	3	.	.	.	.	.	5
Grass culm node	.	.	.	3	.	.	.	1	1	.
Vitis fruit	.	.	+	.	.	.	.	.	.	.
Mineralized seeds										
Onopordum	.	.	.	.	1	.	.	.	.	.
Lithospermum tenuifolium	1	.	.	.	.	.	.	.	.	.
Boraginaceae	.	.	.	.	1	.	.	.	.	.
Fimbristylis	.	.	1	.	.	.	.	.	.	.
cf. *Reseda*	.	.	.	.	.	.	.	.	1	.

TABLE 6:7. GRITILLE ARCHAEOBOTANICAL SAMPLES, MEDIEVAL DEPOSITS OF INDETERMINATE PHASE

GT no.	16271	22606	20959	22091	22495	22469
Year	84	84	84	84	84	84
Operation	43	47	55	55	55	55
Locus	17	25	19	38	40	43
Lot	17	34	26	44	49	51
Volume (l)	?	8	8	8	8	8
Density (g/l)	n/c	0.95	0.16	0.48	0.02	0.15
Charcoal >2mm (g)	1.02	6.75	0.49	2.90	0.11	0.97
Seed >2mm (g)	0.50	0.72	0.75	0.86	0.09	0.24
Misc. >2mm (g)	.	0.12	0.02	0.06	+	0.02
Seed/charcoal (g/g)	0.49	0.11	1.53	0.30	0.82	0.25
Wild seed (#)	152	521	76	340	12	46
Wild seed/charcoal (#/g)	149	77	155	117	109	47
Wild/cereal (#/g)	390	734	113	791	63	256
Cereal (g)						
Hordeum distichum	0.07	0.37	0.06	0.07	0.03	0.06
Triticum durum/aestivum	0.28	0.13	0.49	0.26	0.11	0.05
Cereal indet.	0.04	0.21	0.12	0.10	0.05	0.07
Pulse (g)						
Lathyrus	.	.	.	0.14	.	.
Lens	0.04	0.10	0.03	.	.	0.02
Vicia ervilia	.	.	.	.	0.01	.
Pulse indet.	.	0.01	.	0.20	0.01	.
Other food/economic items						
Trigonella foenum-graecum	.	.	.	3	.	.
cf. *Juglans*	.	.	.	.	.	+
Gossypium	1	.	.	5	.	1
Ficus	1	.	.	.	.	.
Vitis	1	.	2	1	.	.
Wild and weedy						
GT-Apiaceae 2	.	5	2	.	.	.
Centaurea	.	1	1	4	1	3
GT-Asteraceae 1	.	2	1	.	.	.
GT-Asteraceae 3	.	2	.	.	.	.
Asteraceae	.	1	1	7	.	1
Heliotropium	.	3	.	2	.	.
Brassicaceae	.	5	3	18	2	.
Capparis	1	.	.	.	.	.
Gypsophila	.	.	1	.	.	.
Silene	1	.	.	.	.	.
Vaccaria	.	.	1	.	.	.
Chenopodium	2	6	1	.	.	.
Chenopodiaceae	.	.	3	.	.	.
Carex	2	2	.	.	.	.
cf. *Scirpus*	1	.	.	.	.	.
Cyperaceae	.	4	.	.	.	.
Cephalaria	.	.	2	5	.	.
Astragalus	1	2	.	2	.	.
Coronilla	2	22	2	2	.	1
cf. *Hippocrepis*	.	.	.	.	.	1
Medicago	.	.	.	2	.	.
Trifolium/Melilotus	.	.	1	9	.	1

TABLE 6:7 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, MEDIEVAL DEPOSITS OF INDETERMINATE PHASE

GT no.	16271	22606	20959	22091	22495	22469
Trigonella astroites-type	.	.	3	.	.	1
Trigonella	20	7	.	67	.	1
GT-Fabaceae 4	.	.	.	2	.	.
GT-Fabaceae 5	10	24	1	.	.	.
Fabaceae	4	21	3	7	.	8
cf. *Nepeta*	2	.	.	.	.	.
Teucrium	1	2	.	.	.	.
Ziziphora	2	.	.	.	.	.
Malva	1	.	.	1	.	.
Fumaria	.	.	.	.	.	1
Papaver	.	.	.	.	.	1
Aegilops	.	1	.	.	.	.
Avena	.	2	1	.	.	.
Bromus sterilis-type	.	6	.	.	.	.
Hordeum murinum-type	.	3	.	.	.	3
Lolium remotum-type	.	.	3	.	.	.
Lolium	.	.	.	1	.	.
Phalaris	.	.	5	1	.	.
Phleum-type	7	86	5	1	1	11
GT-Poaceae 1	1	.	.	.	.	.
GT-Poaceae 3	.	.	.	.	.	1
GT-Poaceae 5	2	.	.	.	.	.
GT-Poaceae 7	1	.	13	.	.	.
GT-Poaceae 8	19	180	.	2	.	1
GT-Poaceae 12	6	.	.	.	.	.
Poaceae	49	60	14	10	3	2
cf. *Polygonum*	.	.	1	.	.	.
Rumex	1	.	.	.	.	1
Androsace	1	.	.	.	.	.
Adonis	.	1	1	.	.	.
Reseda	3	1	.	3	.	.
GT-Rubiaceae 1	.	2	.	3	.	.
Valerianella coronata	.	2	.	.	.	.
Verbena	.	.	.	1	.	.
Peganum harmala	.	.	.	116	.	.
Unknown, GT-19	.	2	.	.	.	.
Unknown, misc.	10	66	7	73	5	8
Other charred plant parts						
Hordeum int.	4	95	.	11	.	1
Triticum durum/aestivum int.	1	38	4	29	.	6
Triticum glume base	.	95	2	124	5	9
Aegilops glume base	.	3	.	.	.	.
Grass culm node	.	40	1	22	1	2
Vitis peduncle	.	.	.	3	.	1
Asteraceae (capitulum)	.	1	.	1	.	.
Glycyrrhiza pod segment	.	1	.	.	.	.
Mineralized seeds						
Arnebia decumbens	.	.	.	.	1	.
Lithospermum arvense	.	1	.	1	.	.
L. tenuifolium	1	.	.	1	.	.
Fimbristylis	.	7	.	.	.	1
Cyperaceae	.	1	.	.	.	.
Ficus	.	3	.	.	.	.

TABLE 6:8. GRITILLE ARCHAEOBOTANICAL SAMPLES, BURNT DEPOSITS OF CRUSADER-PERIOD SETTLEMENT (PHASE 3)

GT no.	18875	22467	6731	8113	9187	13809	13803	13806	13815	13828	13832	18245	19119	16915	18377
Year	84	84	83	83	83	83	83	83	83	83	83	84	84	84	84
Operation	10	10	11	25/10	25/10	25/10	25/10	25/10	25/10	25/10	25/10	26/27	26/27	42	45
Locus	58	88	25	57	75	75	75	75	75	75	75	43	43	19	15
Lot	124	185	47	103	128	130	133	133	133	140	140	69	95	28	21
Volume (l)	8	?	?	8	?	nf	1	0.6	nf	nf	nf	?	1	?	3
Density (g/l)	9.99	n/c	n/c	0.47	n/c	n/c	27.70	21.60	n/c	n/c	n/c	n/c	31.04	n/c	2.03
Charcoal >2mm (g)	79.91	21.04	8.12	3.45	14.02	.	3.07	0.82	.	0.04	0.05	1.35	0.24	4.98	5.61
Seed >2mm (g)	0.03	0.11	0.19	0.28	0.19	31.39	23.61	11.73	0.01	81.63	8.14	2.55	29.86	1.84	0.63
Misc. >2mm	+	0.27	0.02	+	0.01	.	0.04	+	+	.	.	+	+	.	.
Seed/charcoal (g/g)	.	0.01	0.02	0.08	0.01	n/c	7.69	14.30	n/c	2040.80	162.80	1.89	124.42	0.37	0.11
Wild seed (#)	2	37	46	78	100	1	482	271	1	.	.	275	79	102	4
Wild seed/charcoal (#/g)	.	2	6	23	7	n/c	157	330	n/c	.	.	204	329	20	1
Wild/cereal (#/g)	67	925	242	709	1457	n/c	17	19	100	n/c	.	75	2	84	5
Cereal (g)															
Hordeum	.	.	0.05	0.02	0.01	+	0.49	0.17	+	.	.	0.21	0.24	0.08	+
Triticum durum/aestivum	.	0.04	0.10	0.02	0.06	.	28.45	9.47	0.01	.	.	3.10	31.74	0.96	0.62
T. mono/dicoccum	.	.	.	.	.	.	0.14	.	.	.	.	.	.	.	.
T. monococcum	.	.	.	.	.	.	0.05	0.22	.	.	.	+	.	.	.
Triticum sp.	0.02	.	.	.	.	.	.	3.64	.	.	0.09	0.04	.	.	.
Cereal indet.	0.01	+	0.04	0.07	+	.	.	0.66	.	.	.	0.33	0.06	0.17	0.12
Pulse (g)															
Lathyrus	.	.	.	.	0.07	.	0.11	0.09	.	.	7.98	.	.	.	.
Lens	.	.	0.04	.	0.05	0.01	0.15	0.05	.	0.05	0.05	0.18	0.04	0.04	.
Pisum	.	.	.	.	.	1.06	.	.	.	1.40	.	.	.	.	.
Vicia faba	.	.	.	.	.	31.32	.	.	.	80.17	.	.	.	0.67	.
Pulse indet.	.	.	0.01	.	.	0.11	0.16	.	.	0.01	.	.	.	.	.
Other food/economic items															
Linum	.	.	.	.	.	.	.	.	.	.	.	2	4	.	.
Gossypium	.	.	.	.	.	.	.	.	.	.	.	7	31	.	.
Ficus	.	1	2	.	2	.	.	.	.	.	.	7	.	7	.
Secale	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Vitis	.	.	1	.	.	.	.	.	.	.	.	1	1	2	.
Nutshell/pit frg (g)	.	.	.	.	.	.	.	.	.	.	.	0.04	.	.	.

TABLE 6:8 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, BURNT DEPOSITS OF CRUSADER-PERIOD SETTLEMENT (PHASE 3)

GT no.	18875	22467	6731	8113	9187	13809	13803	13806	13815	13828	13832	18245	19119	16915	18377
Wild and weedy															
GT-Apiaceae 2	.	.	1	.	2	1	.	.	.	.	.	1	2	3	.
Apiaceae	.	.	.	.	1	.	.	.	.	.	.	.	.	2	.
Centaurea	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
GT-Asteraceae 1	.	.	.	1	2	.	.	.	.	.	.	3	.	.	.
GT-Asteraceae 3	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Asteraceae	.	.	.	.	.	.	.	.	.	.	.	4	.	2	.
Heliotropium	.	.	.	1	2	.	.	.	.	.	.	1	.	1	.
cf. *Alyssum*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Brassicaceae	.	.	1	.	.	.	.	.	.	.	.	2	1	1	1
Capparis	.	.	.	1	.	.	.	.	.	.	.	1	.	2	.
Vaccaria	.	.	.	.	.	.	4	1	.	.	.	.	.	.	.
Chenopodium	.	.	.	.	2	.	.	.	.	.	.	15	1	.	.
GT-Chenopodiaceae 1	.	.	.	.	3	.	.	.	.	.	.	6	.	2	.
Chenopodiaceae	.	.	.	5	.	.	2	.	.	.	.	.	.	.	.
cf. *Scirpus*	.	.	.	2	3	.	.	.	.	.	.	1	.	.	.
Cyperaceae (GT-7)	.	.	.	9	.	.	.	.	.	.	.	.	.	.	.
Cyperaceae	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cephalaria	.	.	3	.	4	.	68	63	.	.	.	4	29	2	.
Astragalus	.	2	2	1	.	.	.	.	.	.	.	11	.	4	.
Coronilla	.	.	2	4	2	.	3	.	.	.	.	8	.	2	.
Prosopis	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Trifolium/Melilotus	.	.	2	2	.	.	.	.	.	.	.	16	.	1	.
Trigonella astroites-type	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Trigonella	.	1	3	10	4	.	.	.	.	.	.	26	2	17	.
GT-Fabaceae 5	.	.	1	.	1	.	.	.	.	.	.	.	2	.	.
Fabaceae	.	2	1	1	1	.	13	.	.	.	.	29	2	13	.
Ajuga	.	.	.	.	.	.	6	3	.	.	.	.	.	.	.
Teucrium	.	.	.	.	1	.	7	.	.	.	.	.	.	.	.
Malva	.	.	.	.	2	.	.	.	.	.	.	.	1	.	.
Fumaria	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Lolium remotum-type	.	.	.	.	3	.	315	186	.	.	.	6	10	.	.
Phleum-type	.	4	2	.	1	.	2	.	.	.	.	70	4	1	.
Triticum cf. *boeoticum*	.	.	.	.	.	.	14	.	.	.	.	.	.	.	.

TABLE 6:8 (CONT.). GRITILLE ARCHAEOBOTANICAL SAMPLES, BURNT DEPOSITS OF CRUSADER-PERIOD SETTLEMENT (PHASE 3)

GT no.	18875	22467	6731	8113	9187	13809	13803	13806	13815	13828	13832	18245	19119	16915	18377
GT-Poaceae 3	.	.	.	.	7	.	.	.	.	.	.	2	.	.	.
GT-Poaceae 5	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
GT-Poaceae 8	.	1	1	1	.	.	.	.	.	.	.	4	.	4	.
GT-Poaceae 7	.	1	.	.	.	.	.	.	.	.	.	2	.	.	.
GT-Poaceae 12	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.
Poaceae	.	13	6	12	3	.	21	10	.	.	.	5	4	10	2
Polygonum cf. *lapathifolium*	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
cf. *Polygonum*	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Adonis	.	.	.	.	.	.	2	.	.	.	.	.	.	1	.
Ranunculus repens-type	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Reseda	1	.	5	2	2	.	.	.	.	.	.	1	7	2	1
Galium	.	.	.	.	1	.	12	2	.	.	.	1	.	1	.
GT-Rubiaceae 1	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.
Solanum	.	.	2	.	.	.	.	.	.	.	.	.	.	1	.
Thymelaea	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Verbena	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.
Unknown, GT-15	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Unknown, GT-23	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Unknown, misc.	1	13	11	17	49	.	13	6	.	.	.	53	13	30	.
Other charred plant parts															
Hordeum int.	.	1	1	4	3	.	.	.	.	.	.	.	5	.	.
Triticum durum/aestivum int.	.	.	.	2	6	.	14	10	.	.	.	.	1	.	.
Triticum gb	1	.	3	.	.	.	.	.	.	.	1	.	.	1	.
T. mono/dicoccum sf	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Grass culm node	.	4	2	.	.	.	1	.	.	.	.	.	5	.	.
Vitis peduncle	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Mineralized seeds															
cf. *Capparis*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Ficus	.	3	.	.	2	.	.	.	.	.	.	.	.	.	.

TABLE 6:9. MISCELLANEOUS ITEMS FOUND IN FLOTATION SAMPLES

GT No.	Dung, >2 mm (g)	Silicified cereal awns, straw	Other items
1422	+	Many	Silicified Asteraceae capitulum
1959	21.84		Silicified *Oryza* glume fragment
2341	+	Many	
5845	+		
6710	0.20*	Many	Many square stem fragments (mint?) *Includes 2 sheep/goat pellets
6731			Silique (Brassicaceae)
7868	11.76*	Many	*Sheep/goat pellet fragments
7884	0.08	Many	
8721	0.43		
8748	0.01		
9002		Many	
9187			Many twiglets
13803			Pod (Fabaceae)
13806			Pod (Fabaceae)
13809			9 larvae (in fava bean sample)
13815	9.39	Many	Dung sample, not floated
13828			33 larvae (in fava bean sample)
15572	7.68	Many	
17048	0.20		
18249		Many	
18824		Many	
19579	0.79	Many	
19591		Many	1 larva
22467			*Phragmites* (reed) culm fragment
22492	0.44*	Many	*Includes 3 sheep/goat pellets
22606	0.15*	Many	*Sheep/goat pellet fragments
22663	0.13	Many	

TABLE 6:10. GRITILLE ARCHAEOBOTANICAL SUMMARY*

Phase	2	3/4	5/6	7/8
No. samples	2	12	13	5 (6‡)
Mean				
Seed/charcoal (g/g)	0.08	0.15	1.74	4.12
Wild/charcoal (#/g)	20	58	1302	532
Wild/cereal (#/g)	140	475	2639	202 ‡
% wheat (relative to barley)	33	51	68	46 ‡
Total amount wheat & barley (g)	0.36	2.62	2.24	2.39 ‡

* Includes only samples with at least ≥1.0 g charcoal, ≥0.1 g seed, or ≥ 50 wild/weedy seed.
‡ Includes GT 365.

and walnut constitute the remainder of the likely food plants.

Before Gritille was flooded by the waters behind the Atatürk Dam, land use around the village emphasized "cereal farming with viticulture and a minor component of lentil cultivation. Cash crops include[d] rice along some perennial streams as well as tobacco [a post-1492 introduction] and cotton."[14]

CEREALS

WHEAT

The most numerous cereal grain in these samples is a naked wheat, either durum wheat or bread wheat (*Triticum durum* or *T. aestivum*; Pl. 6:1). Many of the grains have a compact form. The rachis internodes do not have a shield shape, but they are so short that a compact hexaploid wheat cannot be ruled out. Two deposits from an animal pen in the Crusader period settlement (GT 13803 and GT 13806) consisted of the harvested crop plus a few weed contaminants. The grains in that sample are fairly small (about 0.96 to 0.98 g/100 grains). In contrast, the grains of wheat samples from a contemporary hearth weigh approximately 1.55 grams/100 grains (GT 19119) and 1.10 grams/100 grains (GT 18245). A few grains of einkorn (*T. monococcum*), and possibly emmer (*T. dicoccum*) occur as minor components of some samples.

BARLEY

The barley is from the two-row type (*Hordeum vulgare* var. *distichum*).[15] Compared with what is found in many other sites in the Near East, the amount of barley is quite low relative to wheat, although it is more ubiquitous. None of the barley occurs in high densities; in the seed concentrations of the burnt Crusader settlement, it occurs either as a crop contaminant or mixed in with fuel remains. For example, in the sample containing the most barley, only two-thirds of the identified cereal grain is barley; the rest is wheat (GT 22663, see below). Barley grains weigh about 0.01 gram, but because the Gritille barley is scattered, weight per 100 grains cannot be calculated. Note, however, that in GT 22663, 77 grains weigh 0.64 gram, or approximately 0.79 gram/100 grains.

FOXTAIL MILLET

A few samples contain a few grains of foxtail millet. The puffed grains cannot be measured accurately, but based on size and shape at least some are likely to be the cultivated type, *Setaria italica* (Fig. 6:1F).[16] Given the small number, it is not certain that millet was grown at Gritille. If it were, it would have been an irrigated, summer-sown crop.

RICE

Rice (*Oryza sativa*) glumes can be recognized by their characteristic wafflelike texture. At Gritille, a single sample contained one charred and one silicified glume fragment, not quite enough on which to base any conclusions about trade or agriculture! If grown locally, rice would have been irrigated.

OTHER CEREALS

Many fragments of cereal grains could not be further distinguished, though they are almost certainly wheat or barley. Similarly, charred culm nodes of grasses are probably from wheat or barley straw. A number of samples contained a substantial amount of silicified culm and awn fragments of grasses, but quantification was not possible (many fragments fall through even a 0.5 mm mesh sieve) (Table 6:9).

PULSES

Fava bean (*Vicia faba*; Pl. 6:2) and vetchling (*Lathyrus*; Pl. 6:3) are the only two pulses found in concentrations in the Crusader period settlement.

FAVA BEAN

The two samples of nearly pure fava beans are probably part of the same seed stock, for they come from the same area in the Burnt Phase building complex (GT 13809 and GT 13828). Field beans (*V. faba* var. *equina*), which are usually used as a high quality fodder, are about 10 to 17 millimeters (uncharred), and broad beans (*V. faba* var. *minor*), which are eaten

[14] Wilkinson, *Town and Country*, 49–50.

[15] Miller, in "Crusader Period Fortress," mistakenly identified the barley as the six-row type.

[16] Cf. Nesbitt and Summers, "Some Recent Discoveries of Millet."

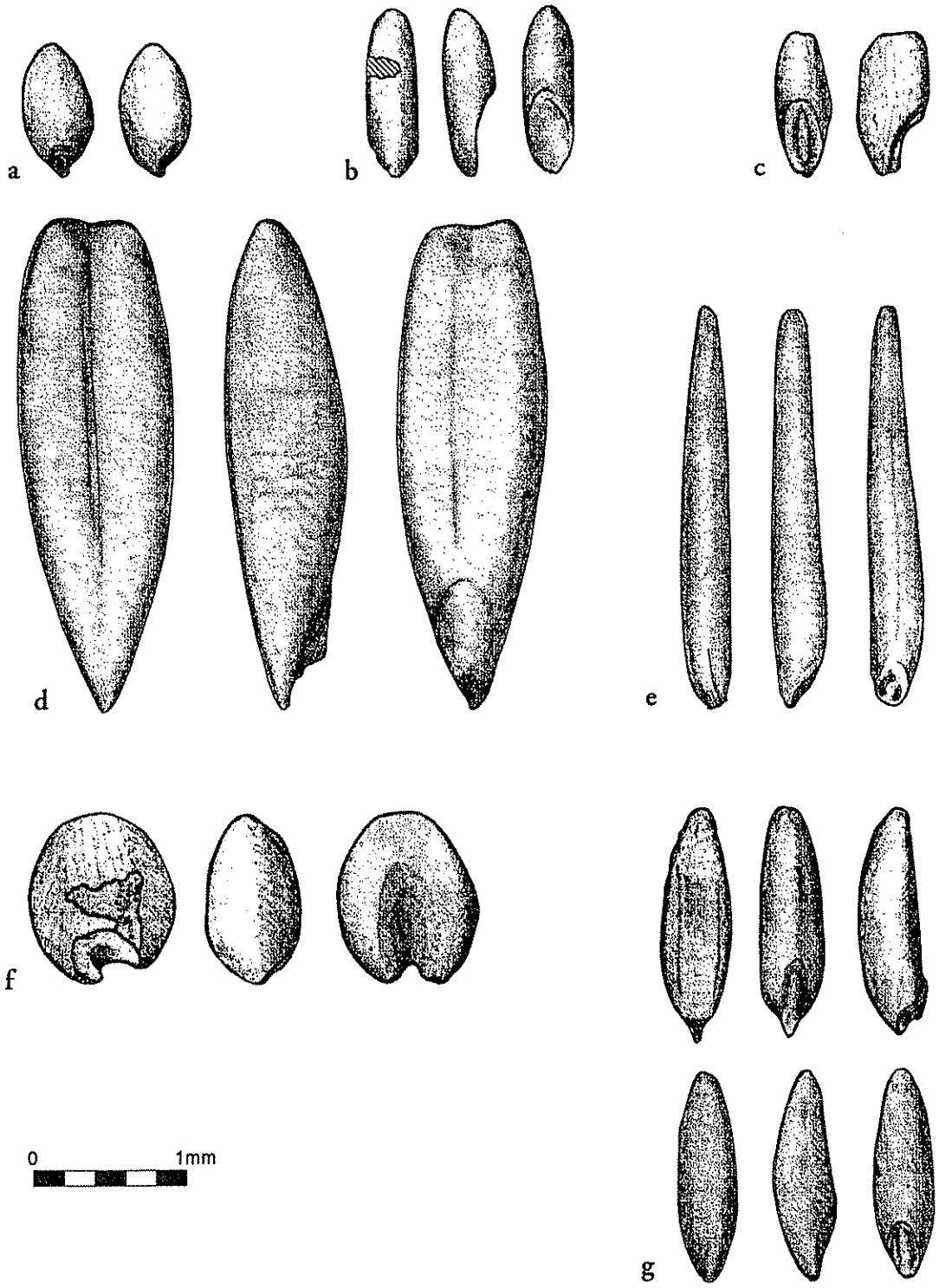

Figure 6:1. Grasses. (A) Phleum*-type [GT 22663]; (B) GT-Poaceae 7 [GT 6710]; (C) GT-Poaceae 12 [GT 22663]; (D)* Hordeum murinum*-type [GT 22663]; (E) GT-Poaceae 5 [GT 16271]; (F)* Setaria *[GT 22663]; (G) GT-Poaceae 8 [GT 22663].*

by people, are about 15 to 25 millimeters (uncharred).[17] Since the Gritille fava beans are quite small, less than 11 millimeters long, it seems likely that the material represents stored fodder. The store was infested with bruchid larvae;[18] about 10 percent of the whole beans had bruchid holes, and many of the individual cotyledons did as well. Some of these holes contained the charred remains of their creators.

VETCHLING

One nearly pure sample of vetchling (*Lathyrus* sp.) was recovered from the same area of the Burnt Phase as the fava beans (GT 13832). Like the fava beans, these seeds probably came from a store of fodder. Although vetchling can be eaten by humans, it requires special processing to remove the toxins that bring on lathyrism and is usually grown as a fodder crop.[19]

OTHER PULSES

Lentil (*Lens culinaris*), the most common pulse in the ordinary occupation debris, was probably also grown locally. Chickpea (*Cicer arietinum*), pea (cf. *Pisum*), and bitter vetch (*Vicia ervilia*) occur in such small numbers that their importance in the agricultural and subsistence systems appears to be minor.

FIBER PLANTS

COTTON

Cotton seeds (*Gossypium* sp.) occur in consistently low numbers in Phases 3 through 5 and possibly later (Fig. 6:2F, G). These large seeds are very variable in shape. The seed coat can show a distinctive crackled texture, and a beak is sometimes preserved at one end.[20] Sometimes the seed coat is not preserved on these specimens. Cotton is thought to have spread to the Near East in the first millennium B.C. from the Indian subcontinent, where it had been established since the second millennium B.C.[21] Cotton provides both oil and fiber. Being an irrigated summer crop, its presence is an indicator of fairly intensive agriculture. If, as Andrew Watson stipulates, "Crusader villages tended to concentrate on subsistence, not cash crops" like cotton,[22] the Gritille finds would represent a minor contribution to the local economy. It is not possible to argue that the absence of cotton from levels clearly postdating Phase 5 reflects a significant agricultural shift in the region or at the site, because chance factors of recovery cannot be ruled out.

Trade in cotton cloth was widespread, but Watson puts the northern limit of cotton-growing before A.D. 1100 in the Near East to just north of Urfa.[23] Cotton seeds are more direct evidence of agricultural production than cloth, so cotton-growing by the mid-twelfth century is now documented as far north as Gritille. Finds from medieval deposits at Gordion (Phase 1 in the Yassıhöyük Stratigraphic Sequence)[24] extend the range into central Anatolia, but precise dating is not yet available.[25] Elsewhere in Anatolia, cotton seeds have been recovered from deposits dated to the twelfth to fourteenth centuries A.D. at Aşvan and to the sixteenth to eighteenth centuries A.D. at Kaman-Kalehöyük.[26]

FLAX

A few flax (*Linum usitatissimum*) seeds were seen. Some are small, and may be wild, but others are large enough (more than 4 mm long) to be considered the domesticated type. Like cotton, flax could have provided oil or fiber.

OTHER ECONOMIC PLANTS

A single seed tentatively identified as the culinary herb fenugreek (*Trigonella foenum-graecum*) was seen.

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[17] Townsend and Guest, *Leguminales*; Gill and Vear, *Dicotyledonous Crops*.

[18] So-called poppy seeds in GT 13809 (Miller, "Crusader Period Fortress") are actually charred bruchid larvae (Eva Panagiotakapulu, personal communication, June 11, 1996).

[19] Townsend and Guest, *Leguminales*.

[20] Delwin Samuel, personal communication, April 16, 1996.

[21] Zohary and Hopf, *The Domestication of Plants*, 127.

[22] A. Watson, *Agricultural Innovation*, 183 fn. 18.

[23] Ibid., 33.

[24] Author's unpublished laboratory notes.

[25] Mary Voigt, personal communication.

[26] Mark Nesbitt, personal communication, April 24, 1996.

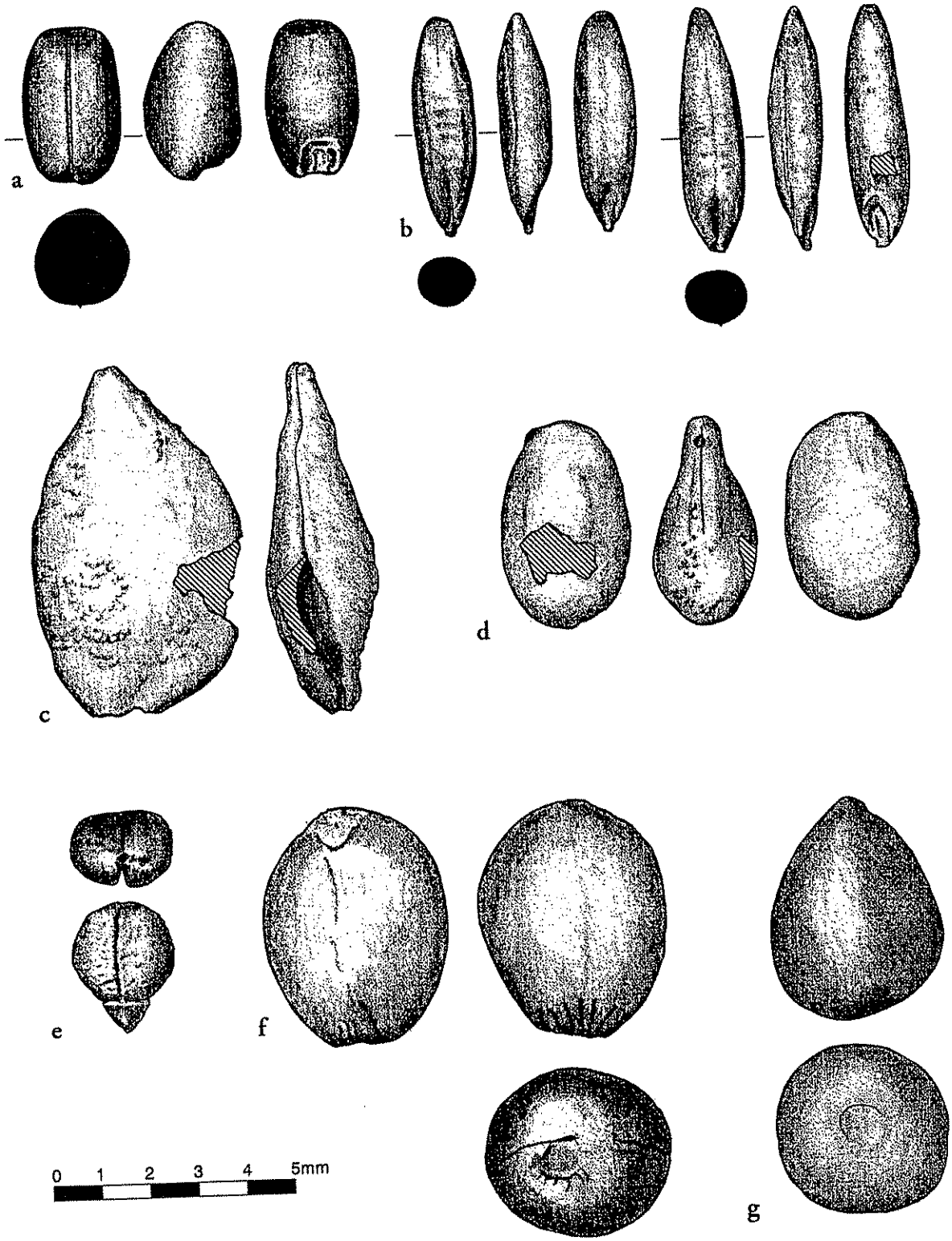

Figure 6:2. Grasses and other seeds and fruits. (A) GT-Poaceae 1 [GT 8567]; (B) GT-Poaceae 3 [GT 8721]; (C) Glycyrrhiza glabra *pod segment [GT 15572]; (D) cf.* Bryonia *[GT 6982]; (E) GT-19 [GT 22606]; (F)* Gossypium *[GT 8721]; (G)* Gossypium *[GT 8721].*

FRUIT

Remains of grape (*Vitis vinifera*) appear in small numbers throughout the sequence, primarily as seeds, but also as peduncles (fruit stems) and charred bits of the fruit itself still attached to seeds. Although grape is a natural part of the riparian vegetation, it is more likely that grape at Gritille was cultivated. Fig seeds (*Ficus carica*), sometimes burned, sometimes mineralized, also occur throughout the sequence but are a little more numerous in the earlier phases (3/4).

NUTSHELL

A small amount of almond (*Prunus* sp.), pistachio (cf. *Pistacia*), and a fragment of walnut (cf. *Juglans*) were encountered.

WILD AND WEEDY PLANT TAXA

Most of the wild seed types found at Gritille are known from other archaeological sites in the Near East. The most common ones in this assemblage are members of the pea (Fabaceae) and grass (Poaceae) families, especially *Trigonella* and cf. *Phleum*. Most are herbaceous and are palatable to livestock.

Many of the seeds have been determined only to family or genus. At that taxonomic level, it is usually not possible to infer growth habit (e.g., herb or shrub) or environmental requirements (e.g., disturbed ground, moisture). Where possible, however, I have tried to indicate the type of plant(s) under consideration, based on descriptions in the *Flora of Turkey*.[27]

Small seeds were recovered primarily from the flotation samples, but unfloated crop samples were not totally devoid of wild seeds. For example, two large seed types, vetchling and fava bean, occurred in such high concentrations they were just sampled en masse, without processing by flotation. Only a few wild seeds remained, probably because simple sieving by the medieval inhabitants had removed seed impurities before storage.

Archaeobotanical reconstructions presume the material is earlier than or contemporary with the artifacts associated in the same deposit. By Near Eastern archaeological standards, the Gritille medieval material is not very old, so one can imagine that degradation in the soil matrix might be incomplete. For that reason, some taxa that are occasionally encountered in partially charred form (e.g., *Reseda*, some Chenopodiaceae) are counted along with the charred seeds. It should further be noted that some small uncharred black seeds are not readily distinguished from their charred counterparts. This is particularly true for *Chenopodium*, *Portulaca*, and *Reseda*. If these small seeds are modern, the only plausible source would be as contamination in the river water used in flotation. I think this unlikely, however, as there are too many of them scattered throughout the samples. In this analysis, these probably charred seeds have been counted as archaeological rather than recent. In contrast, seeds that have become mineralized, frequently silicified, are treated separately, as they do not appear to have been preserved through burning.

APIACEAE

A few members of the carrot family were seen.

ASTERACEAE

Members of the daisy family occur sporadically. Only the very diverse genus *Centaurea* has been distinguished. One unknown, GT-Asteraceae 1 (Fig. 6:3G), is reminiscent of *Anthemis* or *Matricaria*. Two charred specimens of an Asteraceae capitulum (flower head) were also seen.

BORAGINACEAE

A few silicified achenes of boraginaceous plants are found (*Alkanna*, *Arnebia*, *Heliotropium*, *Lithospermum arvense*, *L. tenuifolium*). They are not included in calculations concerning the charred seeds, however, because of differences in preservation processes. One type, *Heliotropium*, does occur in charred form.

BRASSICACEAE

Several members of the mustard family have been seen but not further classified. A few are reminiscent of *Alyssum*, and a few look somewhat like *Hirschfeldia*.

[27] Davis, *Flora of Turkey*.

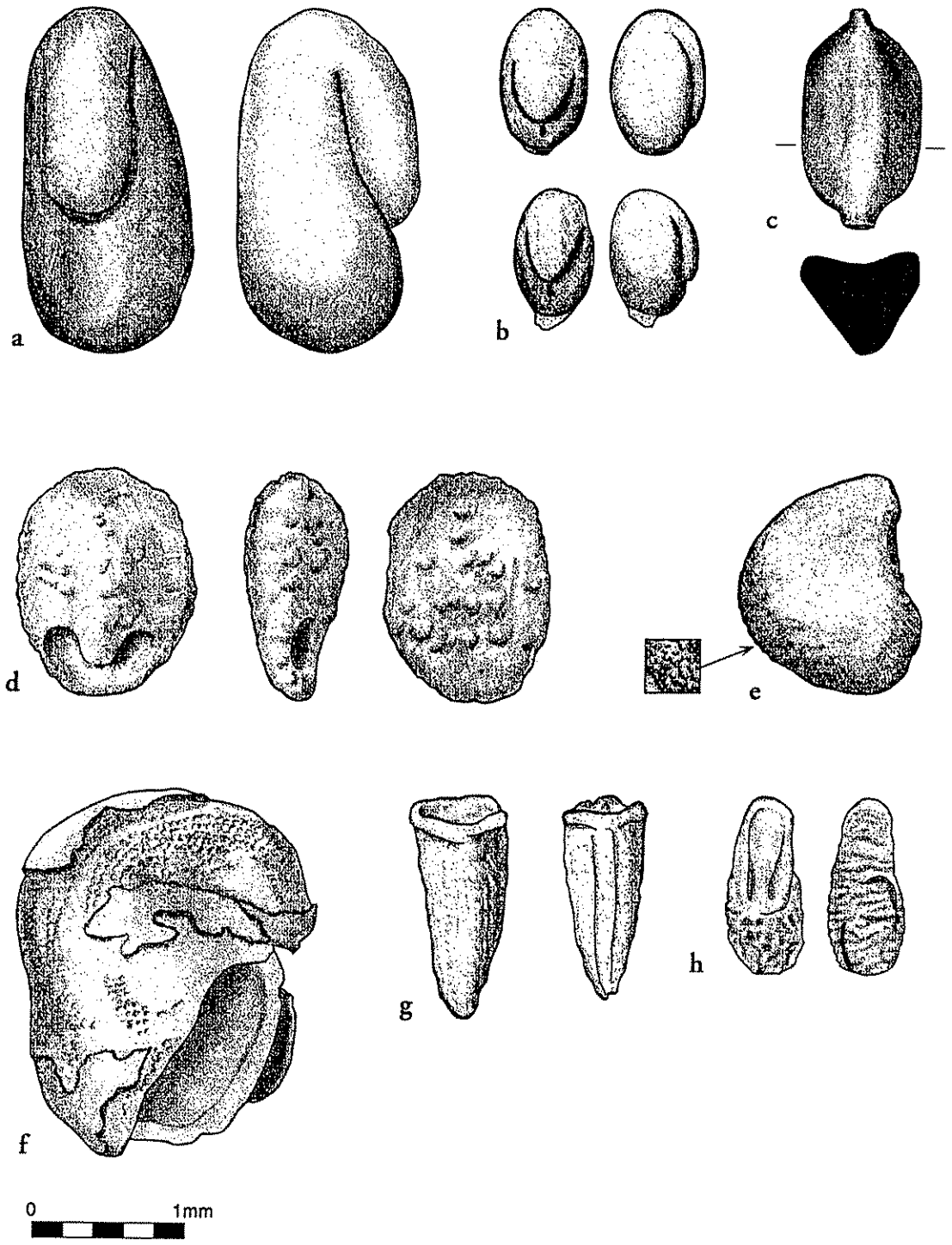

Figure 6:3. Seeds. (A) GT-Fabaceae 5 [GT 8075]; (B) GT-Fabaceae 4 [GT 1754]; (C) GT-7 [GT 8075]; (D) cf. Nepeta congesta*-type [GT 8721]; (E) cf.* Potentilla *[GT 1422]; (F)* Capparis *[GT 4593]; (G) GT-Asteraceae 1 [GT 22663]; (H)* Ajuga chamaepitys*-type [GT 1422].*

CAPPARIS

Caper seeds occur in small numbers throughout the sequence, usually charred but occasionally mineralized. Caper is a thorny shrub, but buds, fruits, leaves, and shoots have culinary uses, and animals can feed on the plants as well.[28] In some examples, the seed coat has fallen off, revealing the distinctive texture of the inner seed (Fig. 6:3F).

CARYOPHYLLACEAE

Several genera of the pink family were recognized. *Gypsophila* and *Silene* are quite diverse genera. Only one species of *Vaccaria* occurs in Turkey, *V. pyramidata*; it is a field weed.

CHENOPODIACEAE

Chenopodium is the most common genus of the goosefoot family represented. Small numbers of *Atriplex, Salsola, Suaeda,* and unidentified Chenopodiaceae are also seen.

CONVOLVULUS

Morning glory is represented by a couple of seeds.

CF. *BRYONIA*

The sole example of this seed makes it difficult to be certain of its identity (Fig. 6:2D). It is most probably from a trailing plant of the cucumber family.

CYPERACEAE

Sedges are typically plants of moist ground and might be expected to be found growing near the Euphrates, along canals, and in natural seeps. *Carex* and cf. *Scirpus* have been distinguished, but several other types occur as well. Silicified examples of small sedges also occur, primarily *Fimbristylis*; they are presumed modern as no charred examples were seen.

CEPHALARIA

Cephalaria is a noxious weed whose seeds are about the same size as the cereals and therefore cannot be removed from seed corn by simple sieving. Van Zeist and Bakker-Heeres note that though quite common today, it is rare up to the early historic period.[29] We can now demonstrate its increasing numbers by the twelfth century A.D.

EUPHORBIA

The sticky latex of spurge renders it unpalatable to herbivores when fresh.

FABACEAE

Small-seeded legumes, mainly *Trigonella* and *Trifolium* (clover) or *Melilotus*, constitute a substantial portion of the wild seed remains. Most had probably been eaten by herbivores. *Trigonella,* the most numerous type, is commonly a plant of the steppe. *Glycyrrhiza* (licorice) might be an indicator of degraded pasture, as it tends to be avoided by animals. *Prosopis* is shrubby, and like *Glycyrrhiza,* has a deep taproot that allows it to become established in cultivated fields. *Coronilla* is most likely a field weed. *Trifolium/Melilotus* would have grown on relatively moist ground. *Astragalus* is such a complex genus that not much can be deduced from its presence.

Glycyrrhiza (Fig. 6:2C) is today widespread in the Middle East, thanks to its deep taproot (harvested for licorice) and unpalatable leaves. It is rarely found in archaeobotanical assemblages.

GT-Fabaceae 4 may be a very small-seeded clover type (Fig. 6:3B). GT-Fabaceae 5 remains unidentified (Fig. 6:3A).

HYPERICUM

Like *Euphorbia*, St. John's wort is avoided by herbivores. It is a varied and widespread genus.

LAMIACEAE

It has been possible to identify four mints to genus: *Ajuga, Teucrium, Ziziphora,* and *Nepeta* (Fig. 6:3D). One example of a long *Ajuga* resembles *A. chamaepitys* (Fig. 6:3H), a plant that grows on stony slopes and in vineyards. Several unidentified members of the mint family also occur.

MALVA

Mallow occurs sporadically in the samples and is recognized by its wedge-shaped seed. (In sample GT 113, a bit of pericarp remains attached.)

[28] Townsend and Guest, *Cornaceae to Rubiaceae,* 140.

[29] "Archaeobotanical Studies in the Levant," 289.

PAPAVERACEAE

Three members of the poppy family have been recognized: *Fumaria*, *Glaucium*, and *Papaver*. Of these, *Papaver* (poppy) occurs in both charred and mineralized form (sometimes it is white, and probably silicified).

CF. *PLANTAGO*

Plantain is only tentatively identified.

POACEAE

Along with legumes, the grass family contributes a substantial number to the wild seed remains. Grasses are notoriously difficult to classify when fresh. This is even more the case with the seeds. Even so, several determinations are proposed:

Aegilops. Goat-face grass is rare.

Hordeum. A small-seeded barley whose size and shape is similar to that of the widespread species *Hordeum murinum* (Fig. 6:1D) is a minor constituent of the assemblage.

cf. *Phleum* (Fig. 6:1A) is tentatively assigned to a small rounded seed less than 1 millimeter in length. It is the most numerous wild grass in the assemblage.

Several as yet unidentified grasses are illustrated (Figs. 6:1B, C, E, G; 6:2A, B).

POLYGONACEAE

Both cf. *Polygonum* and *Rumex* were seen in very small numbers. One of the *Polygonum* seeds compares well with *P. lapathifolium*, and another with *P. persicaria*.

PORTULACA

Purslane seeds, rarely reported on Near Eastern archaeological sites, occur here in low numbers. Unfortunately, this tiny seed is black, and it is possible that some or all are recent.

ANDROSACE

This is another little herbaceous plant. It occurs only early in the sequence.

RANUNCULACEAE

Adonis and *Ranunculus repens*-type are the two members of the buttercup family recognized in these samples.

RESEDA

Reseda, which is a relatively common plant today, has not been reported in ancient times. Its habitat in Turkey is mainly rocky ground, but the most common species, *R. lutea*, is ubiquitous also as a weed. The seeds are small and black.

CF. *POTENTILLA*

A few examples of this seed are reminiscent of *Potentilla*, a herbaceous member of the Roseaceae (Fig. 6:3E).

GALIUM

Galium occurs in moderate amounts and is one of the larger wild seed types. It is easily recognized by its spherical shape with a hole on one side. GT-Rubiaceae 1 may simply be an undeveloped *Galium*.

SCROPHULARIACEAE

Verbascum (mullein), with its large, candelabra-like inflorescence, is a prominent part of late spring/early summer vegetation in Turkey but appears only sporadically in the archaeological samples.

SOLANACEAE

Hyoscyamus and *Solanum* occur in the samples, recognized by a reticulate surface. *Hyoscyamus* tends to be more oblong, and *Solanum* flatter and rounder in outline.

THYMELAEA

A few examples of this seed occur.

VALERIANELLA

On morphological grounds, two types as described by van Zeist and Bakker-Heeres have been distinguished: *Valerianella coronata* and *V. dentata*.[30]

VERBENA OFFICINALIS

Designation to species is plausible because *V. officinalis* is the more common type of those growing in Turkey.

PEGANUM HARMALA

This monospecific genus is widespread today, and in large quantity might be evidence

[30] Van Zeist and Bakker-Heeres, "Archaeobotanical Studies in the Levant."

of degraded pasture. It is not palatable to livestock when fresh and tends to expand with overgrazing, as tastier plants are eaten. In the traditional ethnobotanical system, the seeds of *Peganum* are tossed onto fires against the evil eye.

ILLUSTRATED UNKNOWN TYPES

A number of types were encountered that are distinctive but not identifiable to genus, or even to family. They include GT-5 (Fig. 6:4A), GT-7 (Fig. 6:3C), GT-11 (Fig. 6:4D), GT-15 (Fig. 6:4E), GT-19 (Fig. 6:2E), GT-23 (Fig. 6:4C), GT-25 (Fig. 6:4F), GT-28 (Fig. 6:4B).

WOOD CHARCOAL

Poplar (*Populus*), tamarisk (*Tamarix*), and ash (*Fraxinus*) have been identified from one of the flotation samples. In addition to poplar and tamarisk, pine (*Pinus*), oak (*Quercus*), and possibly buckthorn (*Rhamnus*) have been noted from some of the medieval hand-picked charcoal samples.[31] As Willcox found in the Keban region,[32] pine charcoal occurs first in medieval deposits; it has not been seen in Chalcolithic through Hellenistic samples.[33]

DEPOSITS FROM THE CRUSADER PERIOD SETTLEMENT

Material dating to the destruction by fire of the Crusader period settlement is analyzed separately because it consists primarily of construction debris and stored crops (Table 6:8). The rest of the assemblage is probably the remnants of spent fuel mixed in with incidentally burned trash from the daily activities of the inhabitants (e.g., crop-processing debris) (Table 6:3).

Charred botanical materials are abundant in several of the burned rooms in the Crusader period fortress. Charred seed concentrations found in place identify crop storage areas within a room thought to be an animal pen.

ANIMAL PEN? (OP. 25/10, LOCUS 75)

Room just inside the fortification wall, with internal subdivisions.

LOT 133. MATERIAL IN NORTH SIDE OF ROOM

The nearly pure dung ash (unfloated; GT 13815) could be stable litter. Two flotation samples from Lot 133 are essentially pure wheat deposits, and their contents are virtually identical (GT 13803, GT 13806). The floated deposit was described in the field notes as "dark brown earth with seeds and very little else on top of straw deposit."

LOT 140. MATERIAL IN SOUTH HALF OF ROOM

Two unfloated samples were analyzed, one a collection of vetchling seeds (GT 13832), the other a collection of fava beans (GT 13828). Lot 140 "contains burnt planks, twigs, clay, and seeds," and is therefore presumed to include roofing material.[34] The virtually pure seed samples analyzed here presumably come from material that had been stored in the room before the roof fell.

LOT 130

Directly above Lot 140 (material in south side of room; GT 13809); virtually identical to the lower fava bean sample.

Op. 25/10, Locus 75 was thought to be an animal pen.[35] The independent archaeobotanical evidence supports this interpretation, as fodder seems to have been stored in the structure; the floor, at least in the north side of the room, was covered with dung.

ROOF OF "ANIMAL PEN"? (OP. 25/10, LOCUS 57)

Directly above Locus 75 "animal pen."

LOT 103

Described in the field notes as consisting of mudbrick chunks with "large lumps of charcoal

[31] Miller, "Gritille Charcoal."
[32] Willcox, "History of Deforestation."
[33] See also Miller, "Vegetation and Land Use."
[34] S. Redford, personal communication.
[35] S. Redford, personal communication.

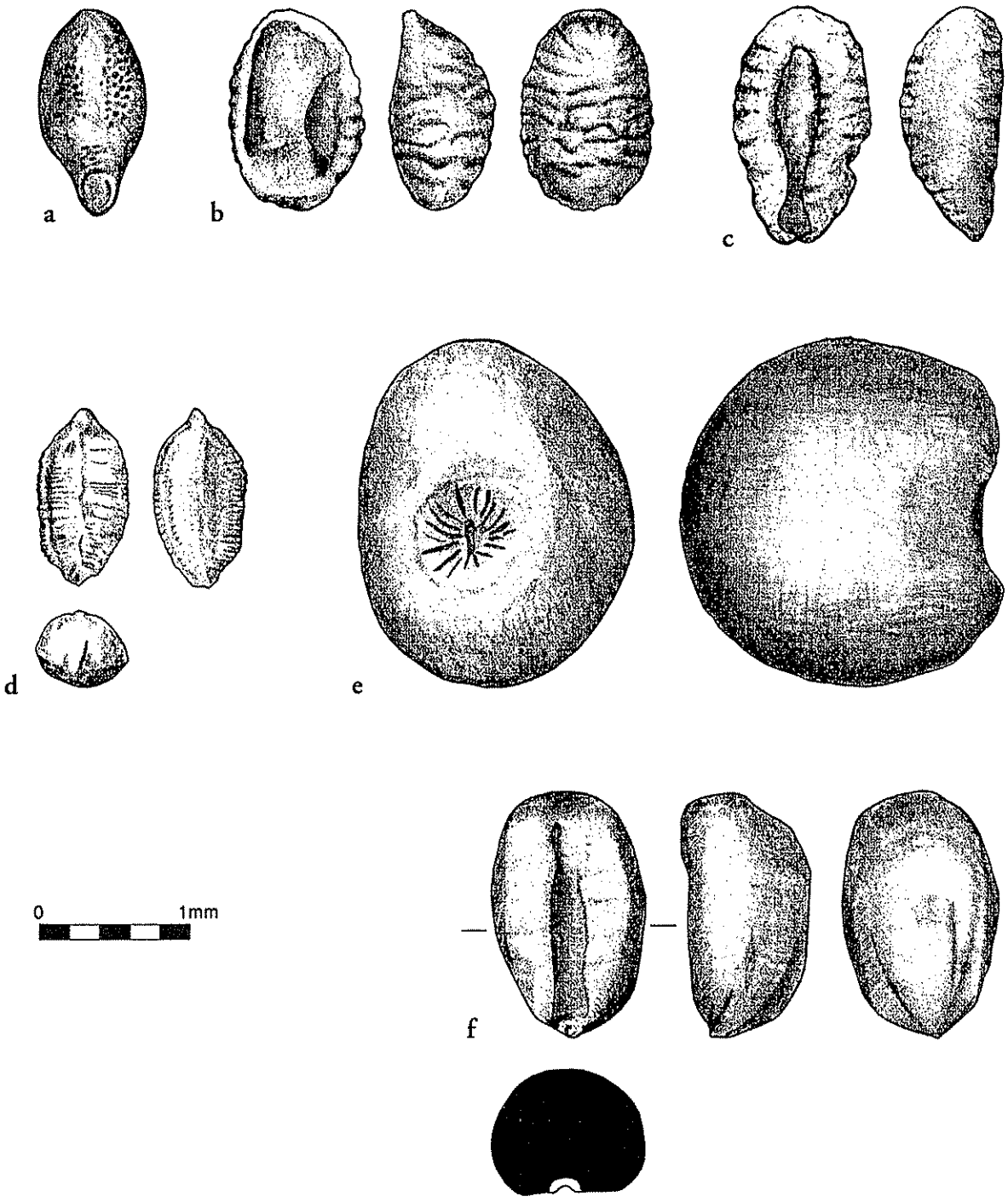

Figure 6:4. Unknown seeds. (A) GT-5 [GT 8721]; (B) GT-28 [GT 8075]; (C) GT-23 [GT 1754]; (D) GT-11 [GT 17748]; (E) GT-15 [GT 8075]; (F) GT-25 [GT 8075].

and lime and a lot of burnt pottery and unburnt bone" (GT 8113).

Its composition is quite different from the other Locus 75 samples in that it is primarily charcoal. The charcoal seems to be poplar/willow, which is consistent with the interpretation that the deposit consists of fallen roofing material. The roof would have protected the fodder stored in the Locus 75 "animal pen." The only cultigens are cereals, but one cannot tell from the plans or notes whether the sample was taken from the north or south side of the room, or from somewhere else. Many of the seeds are glossy and distorted by popping, probably from having been burned in an intense blaze.

FLOOR DEPOSIT IN ROOM NORTH OF "ANIMAL PEN" (OP. 10, LOCUS 58)

LOT 124

The sample consists almost entirely of wood charcoal. Three types in approximately equal quantities were noted: poplar, tamarisk, and ash wood (GT 18875).[36] Since a large proportion of the pieces in the flotation sample are twiglets and small branches, with diameters under 20 millimeters, this sample could be from a store of firewood. Roofing material is a less likely identification, because of the small diameters; furthermore, the excavator does not mention other construction debris (mud or plaster).

PIT (GT 22467, OP. 10, LOCUS 88)

Like the previous deposit, this sample is nearly all wood charcoal and probably is just burnt building debris that incidentally fell into the pit.

FILLS OVER FLOOR

Two samples consisting primarily of charcoal are most readily explained as fallen and burnt building debris: GT 6731 (Op. 11, Locus 25) and GT 18377 (Op. 45, Locus 15). Surface deposit GT 16915 has a greater seed admixture, but because of its relatively high amount of charcoal, it may be explained as mixed fallen debris.

OVEN IN ROOM NORTH OF "ANIMAL PEN," FIRST OCCUPATION PHASE OF THE MEDIEVAL PERIOD (OP. 9, LOCUS 90)

LOT 190

For a Phase 3 sample, GT 22663 contains a high proportion of seeds relative to charcoal, both wild and cultivated. The cultigens consist primarily of barley, but also include wheat and lentil. The density of wild seeds and barley rachis segments is extremely high. Since the sample comes from an oven, it is reasonable to suppose that the wood is the residue of fuel. The seeds may be plausibly explained in at least two ways, either as the discarded and burnt residue of grain cleaning,[37] or as burnt dung.[38]

Several points can be made in support of the first interpretation, that the seeds come from grain cleaning debris, which was then tossed in a fire: (1) The ratio of wild and weedy seeds to cereal (#/g) is 573. In contrast, the ratio of wild and weedy seeds to cereal in a nearly pure wheat sample (GT 13806) is only 19. (2) Most of the seeds are much smaller than cereals, and simple sieving (rather than hand-picking) would have separated grain from small impurities. Rodent(?) droppings, too, are a plausible impurity in grain, easily removed by sieving. (3) There is a close correspondence between the sample composition and that described for "fine sievings (smaller than prime grain)" in Hillman's chart describing glume wheat crop products.[39] The grain in this sample consists of barley and durum/bread wheat, so there is not an exact analogy. Nevertheless, most of the assemblage consists of seeds smaller than prime grain, and there are many barley rachis internodes. This stage of processing frequently occurs just prior to use; in the present day, the debris is commonly fed to animals, especially fowl, or tossed into a fire.[40] Even if the defenders of the Crusader fortress did not engage in agricultural production,[41] the residents had to eat. This type of residue is what might be expected in a food preparation context, since fine-sieving, as a

[36] Number of pieces, type, and weight: 6 poplar (4.77 g); 8 tamarisk (5.47 g), and 6 ash wood (6.52 g).
[37] Hillman, "Interpretation of Archaeological Plant Remains."
[38] Miller and Smart, "Intentional Burning of Dung."
[39] Hillman, "Interpretation of Archaeological Plant Remains," 10.
[40] Ibid., 4.
[41] S. Redford, personal communication.

household task, occurs toward the end of the grain processing sequence.

Some evidence supports the view that the seeds represent dung fuel residue: (1) The bulk of the flotate consists of charcoal, as expected for the material greater than 2 millimeters. The flotate less than 2 millimeters has many charred and some silicified straw fragments; this would be expected of dung fuel, which is frequently mixed with straw. The very high density of barley rachis internodes might also have come from straw and poorly cleaned grain in an animal's diet. (2) The wild seeds come from common fodder plants, some of which are not common in grain fields (e.g., *Carex*, *Scirpus*); many of the types in GT 22663 are those reported in sheep dung by Bottema.[42] Unfortunately, one cannot directly compare the densities of seeds in modern dung with those from a flotation sample, which, after all, has been mixed with dirt and other debris. (3) Barley, which is more likely than wheat to be grown as a fodder crop, predominates in this sample.[43]

It is possible that fine sievings were tossed into a fire fueled by wood and dung; this would account for ambiguities in the interpretation.

OVEN (OP. 26/27, LOCUS 43)

The two samples taken from this oven demonstrate the complexity of the archaeobotanical record. One, GT 19119, is a nearly pure wheat sample. It could have come from the accidental burning of food that occurred in the conflagration that destroyed the fortress. The other (GT 18245), probably lying above, shares many taxa and general characteristics (e.g., wheat predominates), but a closer examination reveals that it is more of a mixed deposit, like that described just above (GT 22663). It contains much more charcoal, and many more wild seed impurities; perhaps it is mixed with building debris fallen from above.

Comparison with two samples from the animal pen (Op. 25, Locus 75, Lot 133) is also instructive. Of the four samples, the two from the animal pen had the lightest (smallest) grains, the mixed oven sample had intermediate weight grain, and the pure wheat deposit in the oven had the heaviest, prime grain. In this instance, one might surmise that the poorest grain was fed to animals and prime grain was saved for human consumption. This leaves the intermediate weight grain (GT 18245) unexplained, except perhaps as a mixed sample.

CRUSADER-PERIOD SETTLEMENT SUMMARY

The samples reported here are of three general types: stored crops, accidentally burned in the conflagration that destroyed the Crusader-period fortress; material deposited on the floors of the intramural settlement before or during the conflagration (dung in the "animal pen," roof collapse, and/or the remains of stored fuel or furnishings); and concentrated fuel remains found in or near ovens.

The deposits from the Burnt Phase reflect a moment in time over a restricted area. There is no way to tell how representative of crop choice and agricultural practices these remains are for Gritille, let alone for the medieval period of southern Turkey and northern Mesopotamia generally. The stored crops that have been preserved, especially the fava beans and vetchling, are probably fodder supplies; the wheat is likely to be a store of food. The cultigen admixtures of pea, lentil, cotton, barley, emmer, and einkorn found in these samples as well as in the trashy debris samples of the entire medieval occupation indicate that the medieval inhabitants of Gritille also grew these crops to feed people or animals.

INTERPRETATIONS OF THE REST OF THE ASSEMBLAGE

In interpreting archaeobotanical assemblages, it is usually helpful to compare results with nearby sites. Contemporary assemblages are not available, but plant remains from several sites along the Euphrates have been examined. The most relevant are from Kurban Höyük, a few kilometers downstream and across the river from Gritille.

Results are tentative owing to an inadequate data base; there are many unknowns, and the number of samples analyzed per phase is too low to encompass the full variability of the assemblage. Nonetheless, previous research has

[42] Bottema, "Composition of Modern Charred Seed Assemblages."
[43] Cf. Miller, "Interpretation of Carbonized Cereal Remains."

suggested some useful ratios to evaluate characteristics of the economy and vegetation. These ratios should not be taken as absolute numbers that directly reflect vegetation or economic variables, but rather as relative measures that allow some degree of comparison between samples, sites, or time periods. Because between-sample variability is so high, the numerical mean of the ratios discussed here is not meaningful and is reported in Table 6:10 merely as a summary of the bar graphs in Figures 6:5 through 6:7.

DISTRIBUTION OF TAXA THROUGH TIME

There are no major changes discernible in the distribution of the plant taxa through time. Most common taxa are spread throughout the sequence. Three possible exceptions are cotton, fig, and sedges, all of which seem to be a bit more common earlier. Given the relatively small number of samples, chance is a more plausible explanation for the distribution.

The stability in the assemblage over time probably reflects what actually happened in the past. That is, the medieval settlement period is less than 200 years, and land use practices did not change to an extraordinary degree. The limits of interpreting small amounts of data may also be a factor. As most taxa occur in only one or two of the seven phases, inferences concerning the disappearance or arrival of a rare taxon are not valid.

RATIOS AS INDICATORS OF THE AGROPASTORAL ECONOMY AND LANDSCAPE

In the ancient Near East, the proportion of seeds relative to charcoal is a rough indication of the state of the woody vegetation.[44] Based on the idea that the seeds originated in dung used as fuel and that wood is a preferred fuel, these ratios reflect the availability of wood in fairly close proximity to the site. Although one cannot use the information predictively, high levels of population and industry, ordinarily associated with prosperity, are also frequently associated with deforestation. Subsequent population declines may sometimes allow a degree of forest recovery as indicated by a reduction in the average value of seed/charcoal.

SEED/CHARCOAL (G/G), WILD AND WEEDY/CHARCOAL (#/G)

Although relative proportions of seeds and wood charcoal could be calculated in a variety of ways, I have found two to be most useful.[45] First, the weight in grams of seed and charcoal material that is caught in a 2 millimeter mesh generally compares material from cultivated grain fodder with wood fuel. Second, the number of seeds of wild and weedy plants (all sizes) compared with the weight of the wood charcoal larger than 2 millimeters is useful for skeptics who consider most charred cultigens to represent food.

Ideally, one would calculate the various ratios in order to determine mean values and standard deviations for each period. For the current set of samples, this is not statistically appropriate because for each ratio there are outlier values that strongly affect the mean. The distribution of the values for the various ratios by time period illustrates the point. That said, however, there are two subjective generalizations that can be made (Figs. 6:5–6:7). (1) The seed-to-charcoal ratio is higher in later periods than in earlier ones; and (2) the wild seed-to-charcoal ratio is somewhat higher later than earlier. Both these ratios are indicators of dung fuel use relative to wood. There does appear to be a general increase over time, which suggests an overall decline in woody vegetation, presumably due to fuel cutting.

WILD AND WEEDY/CEREAL (#/G)

If one accepts the notion that the charred seeds originated in dung fuel, then the proportion of wild seeds (count) to cereal greater than 2 millimeters (weight) can be a way to evaluate pasture and foddering practices. That is, a relatively large amount of cereal in the assemblage would suggest people devoted substantial effort to growing fodder for the herds, whereas a large number of wild seeds would suggest animals were being sent out to pasture. At Gritille, the wild and weedy-to-cereal ratios are highest in Phase 5.

To interpret this pattern, it is instructive to consider other sites along the Euphrates. In the arid steppe of north Syria, where sheep/goat

[44] Miller, "Clearing Land"; idem, "The Near East," 154.
[45] Miller, "Ratios in Paleoethnobotanical Analysis."

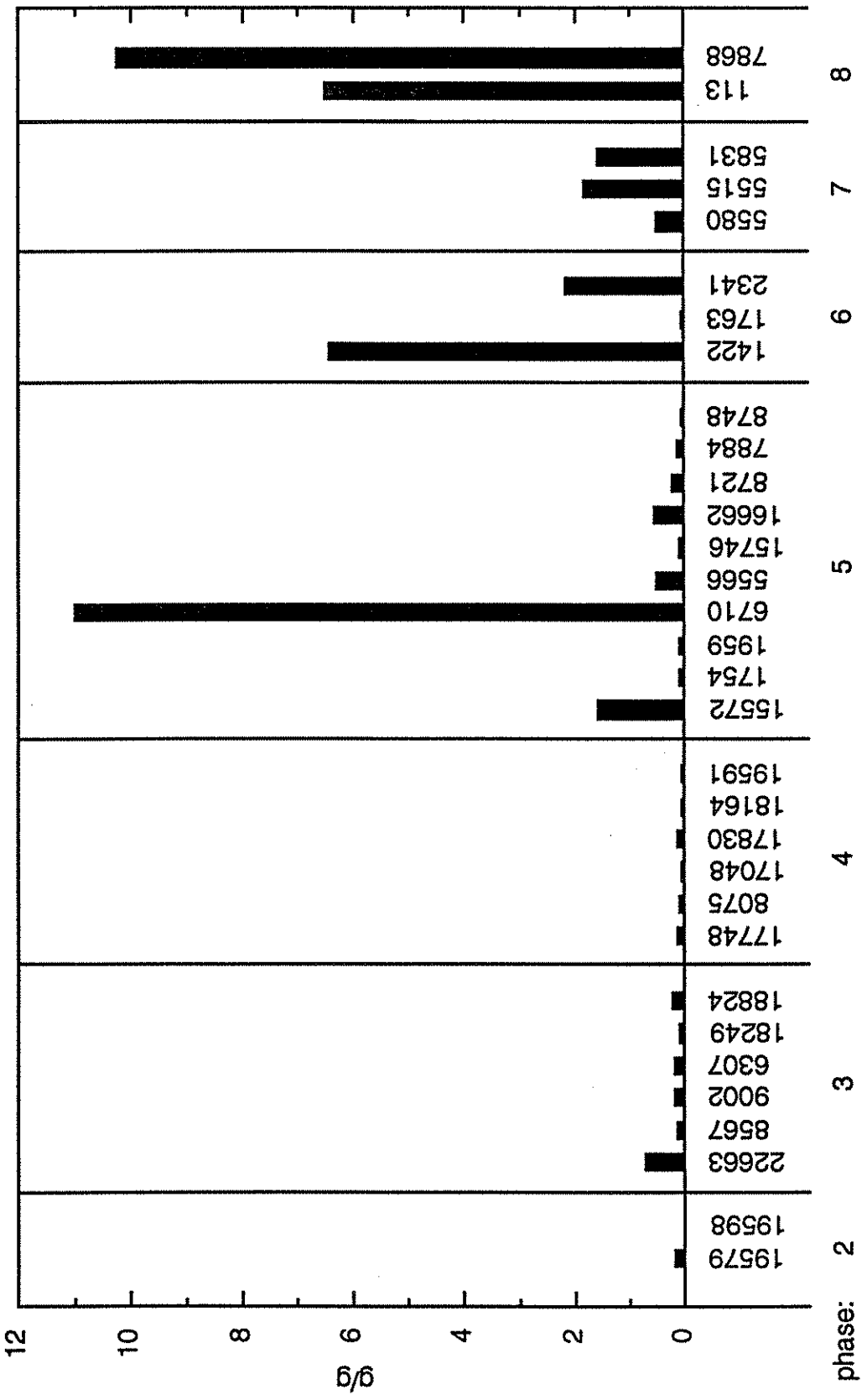

Figure 6.5. Ratios of seed to charcoal.

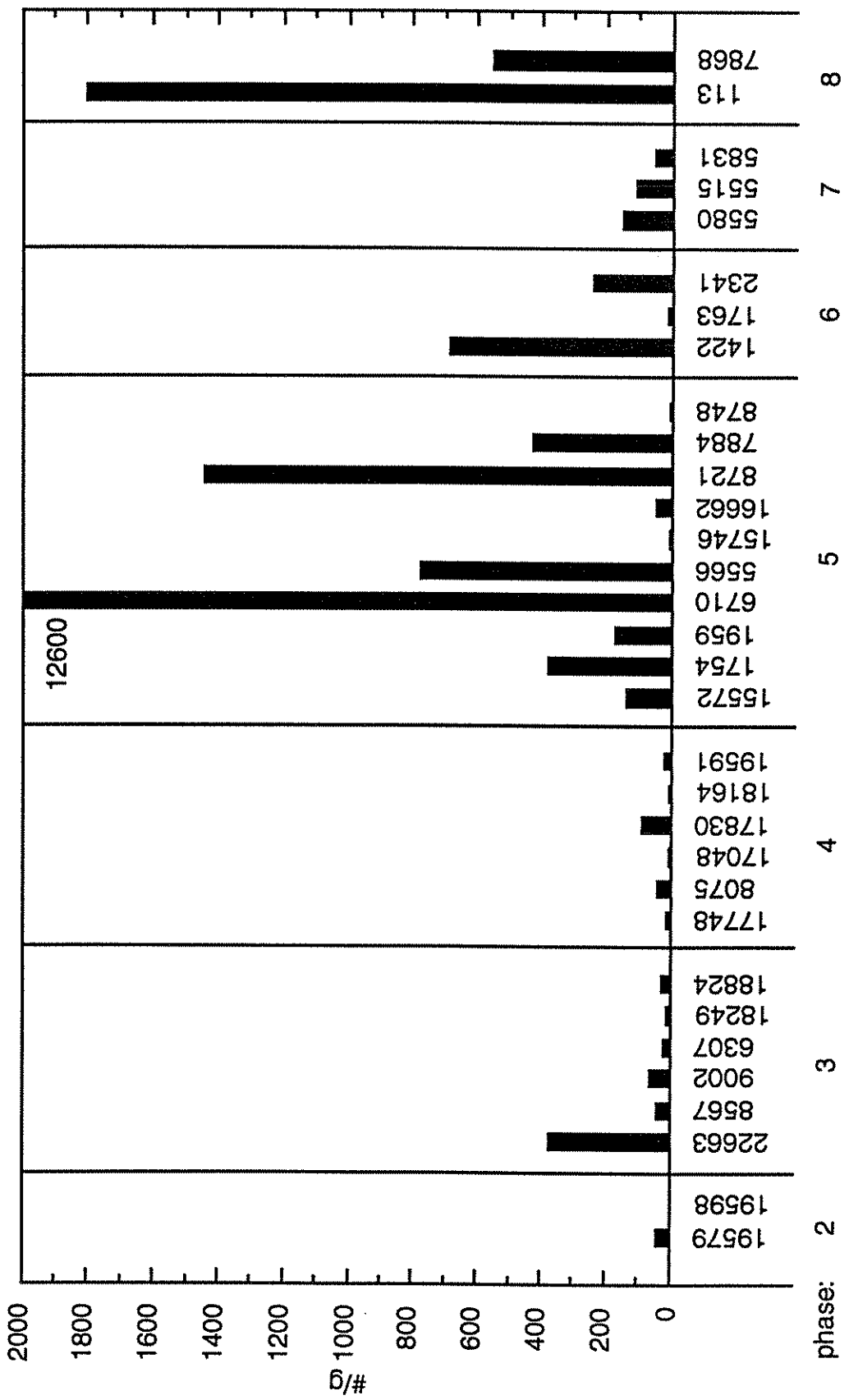

Figure 6:6. Ratio of wild and weedy seeds to charcoal.

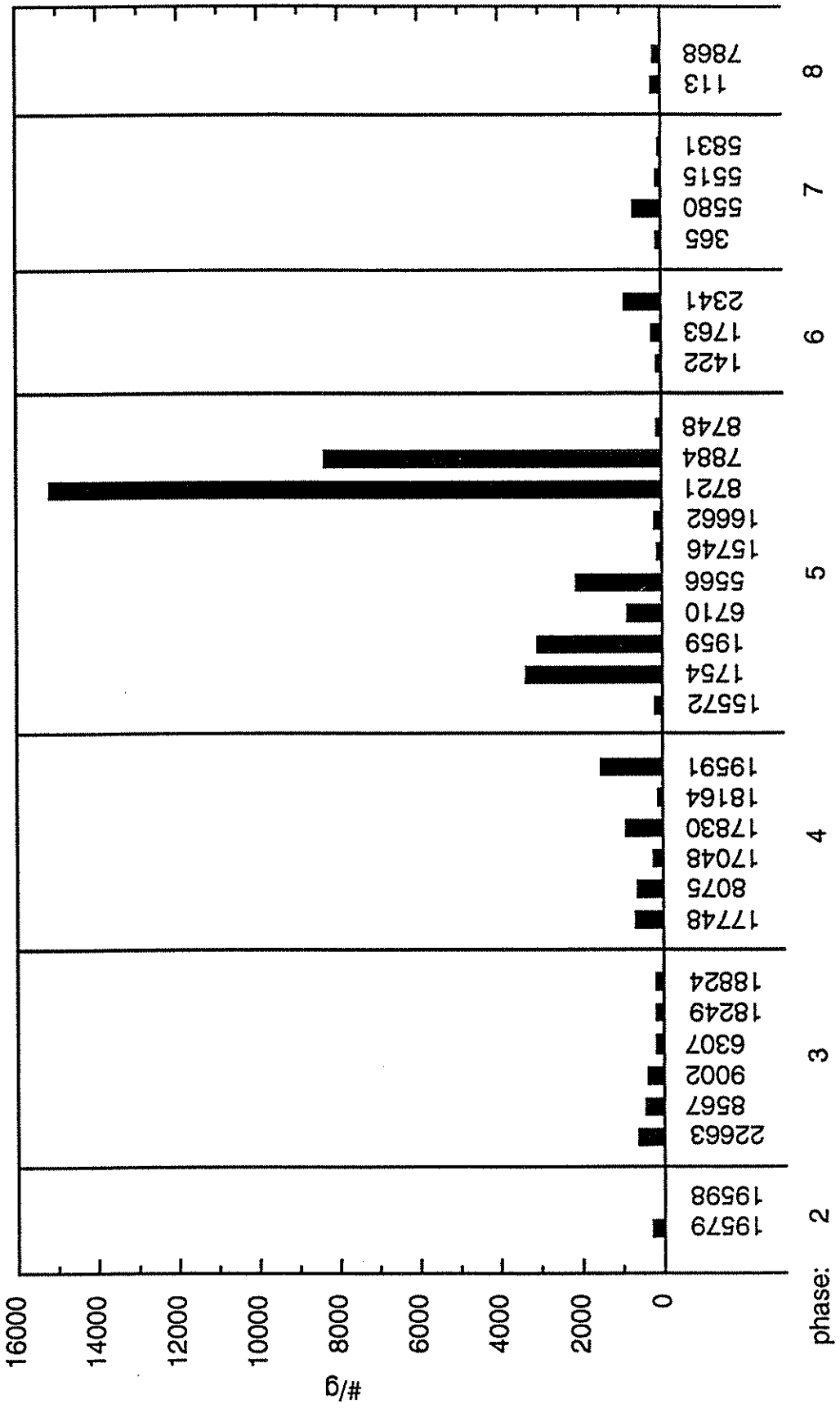

Figure 6:7. Ratio of wild and weedy seeds to cereal.

pastoralism would have prevailed, this ratio is particularly high.[46] At Kurban Höyük, I have noted a general correspondence between high proportions of wild seeds and high sheep/goat relative to pig and cattle.[47] Periods in which cultigens constitute relatively high proportions of fodder seem associated with high pig and/or cattle proportions.

It is therefore of some interest that exactly in the phase characterized by impermanent settlement on the Gritille mound, and relatively unsettled conditions in the region, this evidence for nonintensive land use is highest. As at Bronze Age Kurban, the faunal remains show a corresponding maximum of sheep/goat relative to cattle and pig in Phases 5/6 (Table 6:11).[48] (The modern Samsat district figure suggests that sheep/goat have simply replaced pig for the local Muslims.)

PERCENT WHEAT

In archaeobotanical assemblages from Chalcolithic and Bronze Age sites along the Euphrates, the importance of wheat relative to barley tends to follow rainfall: wheat is preferred for food, but it has a higher moisture requirement.[49] Where precipitation is limited, wheat is a riskier crop. Gritille is relatively well watered compared with the sites downstream, so one would expect wheat to be relatively more popular there than it is at sites to the south. For comparison, at Kurban, wheat generally comprises one-quarter to one-half of the identified cereal. At Gritille, similar calculations give figures that run between 33 and 68 percent.

It is likely that the livestock were primarily fed straw rather than grain, and that most of the wheat and some of the barley is from grain heads incidentally left with the straw. If the wheat and barley were ingested by animals, it would seem that high proportions of wheat represent a relatively intense land use pattern, with an emphasis on wheat cultivation. One might expect this situation to be more current in times of prosperous security because: (1) the labor situation would be stable; and (2) perhaps greater integration into a market economy permits the high risk/high gain strategy represented by wheat farming (i.e., you can sell your wheat in town if you have a good harvest, but if the crops fail, the regional distribution system will let you buy wheat in town if you need to).

It is therefore somewhat unexpected that the phase with the evidence for an extensive pastoral strategy (high wild-to-cereal ratio, Phase 5) also shows the highest wheat proportions. Possible explanations include (1) small sample size; (2) the wheat mixed in the ordinary trash samples did not come from dung fuel; and (3) intensive cropping around the site concentrated on the highly valued wheat, and very little land was devoted to fodder[50]—wheat would constitute a relatively large proportion of what little grain the animals ate.

Although the first two explanations cannot be ruled out at this point, the third is preferred by the author.

ASSESSING THE ARCHAEOBOTANICAL EVIDENCE FROM GRITILLE AGAINST THE HISTORICAL RECORD FOR THE REGION

One might expect, based on the modern vegetation distribution and comments by the Arab geographers, that the region between Malatya and Samsat was a producer of fruits, nuts, and other forest products.[51] Considering how close Gritille was to the uplands, the paucity of wild fruits and nuts and orchard products is a little surprising. This suggests that Gritille itself did not have direct access to forest products.

Some questions shall remain unanswered, as they depend on a knowledge of pre-Muslim medieval conditions for comparison. For example, since the new rulers treated non-Muslims

[46] Miller, "Farming and Herding."

[47] Ibid. Faunal data from Wattenmaker, *Social Context of Household Production*.

[48] Stein, *Pastoral Production in Complex Societies*; idem, Chapter 5, this volume.

[49] Miller, "Farming and Herding."

[50] Phase 5 has the only evidence for rice in the form of two tiny glume fragments; like wheat and cotton, rice would be an indicator of a more intensive agriculture or of trade.

[51] al-Idrīsī, *Géographie d'Édrisi*, 138. Travel time between Samsat and Malatya was about two and a half days (ibid.).

TABLE 6:11. COMPARISON OF MEDIEVAL ANIMAL BONE REMAINS WITH RECENT CENSUS DATA.

	Phase 5/6* % Bone count (N = 2866)	Phase 7/8* % Bone count (N = 2407)	Samsat district‡ % Livestock (N = 9533)
Sheep/goat	35	23	75
Cattle	20	25	25
Pig	45	52	-
	100	100	100

*Stein, *Pastoral Production in Complex Societies*, Table 8.2.
‡ Ibid., Table 2.1; from recent census data.

differently from Muslims for tax purposes, did this affect peasant villager strategies?[52] If land rather than animals were taxed, would Christians have been more likely to emphasize pastoral production at the expense of field crop production? The meager evidence from Phases 3 and 4 is not really enough to establish a baseline.

Redford has asked whether the influx of Turkish-speaking nomads generated change in the settled Christian community. For example, by filling the pastoral niche, did local nomads change the optimal combinations of food and fodder crops of the villagers? This question, too, cannot be answered at the present time.

There is one aspect of the data that does fit reasonably well the sociopolitical conditions posited by Redford. The Crusader-period settlement seems to have been a participant in a fairly intensive land use system, as evidenced by the presence of fava bean, apparently grown as a fodder crop, and cotton, an irrigated one. The Phase 5 settlement exhibits the most pastoral economy based on the wild and weedy-to-cereal ratio, although the presence of cotton and rice and a high proportion of wheat point to a system that requires irrigation. In Phases 6, 7, and 8, the emphasis on agriculture over pastoralism as indicated by a low wild and weedy-to-cereal ratio points to a subsequent return to pre-Islamic land use practices. This might be explained if the imposition of Islamic rule initially caused some disruption to agriculture and commerce during Phase 5, when the site may not even have been occupied, but later on political stability permitted the traditional mode of agricultural production to return. One cannot, however, exclude the possibility that the evidence reflects site-specific rather than regional history.

THE MEDIEVAL LANDSCAPE AS INFERRED FROM THE ARCHAEOBOTANICAL ASSEMBLAGE

During the medieval period the village of Gritille participated in an agricultural system whose staple crops were wheat and barley supplemented by pulses (lentil and pea for food, bitter vetch, vetchling and fava bean for fodder). Evidence of other useful plants occurs in small quantities. Grape, fig, cotton, and flax were cultivated; pistachio, almond, and walnut may have provided the occasional treat. The presence of cotton and a tiny amount of millet and rice hints at some summer irrigation; the emphasis on wheat may have encouraged irrigation of at least some of that crop.

Around the village there was probably a patchwork of cultivated and fallow fields and vineyards. Near the village, trees would have grown along the Euphrates, in natural or cultivated groves. Pasture land would have extended farther away and, as is the case today, open oak woodland would have covered some of the

[52] In the absence of actual tax records for Gritille, it might be noted that in lands under Muslim rule, non-Muslims were subject to the *kharaj*, or land tax on productive real property, "whether or not the owner cultivated the land" (Aghnides, *Mohammedan Theories of Finance*, 385); animals belonging to non-Muslims do not seem to have been taxed (see also Ismail, *Das islamische Steuersystem*).

slopes nearby. Over time, however, the woodland would have thinned out or receded from the village.

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