ANALYSIS OF KOM EL-HISN (1988) ARCHAEOBOTANICAL REMAINS: A PRELIMINARY REPORT

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INTRODUCTION

This paper reports on the preliminary results of the archaeobotanical analysis of flotation samples collected from the site of Kom el-Hisn in the western delta, Egypt. At the time of writing, neither dates of strata nor any stratigraphic interpretations were available. A final report awaits this information and, where warranted, the analysis of additional samples from the site. The preliminary data discussed in this report is presented so as to be easily comparable with those of a previous archaeobotanical study carried out on the site by Moens et al. (n.d.).

SAMPLING PROCEDURES

The 1988 excavations at Kom el-Hisn focused on the excavation of individual rooms and other structures which may date to Old Kingdom times. The excavation of the rooms followed natural stratigraphy in order to allow the reconstruction of the depositional sequence of the observed strata. Each unit, referred to as a Sedimentary Unit (SU) is thought to correspond with a depositional event resulting from specific activities.

It was decided that as many SU's as possible be sampled for flotation to acquire a general picture of the remains over the entire site. Soil for flotation was randomly collected from most SU's in addition to extra samples being taken of units which appeared to be rich in charred organics. Most SU's appear to represent bricktall and room fill, but some such as SU 17 in Room 18 was clearly made up of blackened material, suggesting the possibility of localised organic deposition or burning. The weight of soil collected from each SU ranged from 1.8 to 25.1 kilograms (kg).

The sample reported on herein represents approximately one-third to one-half of the soil sampled for flotation from each of the 24 rooms excavated during the 1988 season at Kom el-Hisn.

FLOTATION METHODOLOGY AND LABORATORY PROCEDURES

Excavated soil was left to dry in an area protected from wind and other disturbances. Weight and volume measurements were taken for each sample of excavated soil. The soil was floated in a small device constructed from large plastic buckets with a capacity of 12.75 litres of water. Water was forced into an exterior bucket and a smaller screen-bottom bucket (1.6 mm mesh) was place inside the larger one into which excavated soil was gently poured. The residues captured in the interior screen-bottom bucket was the heavy fraction, with very fine sediments passing through. The organic materials, which floated to the surface, passed through a funnel that directed the overflowing water and flot outside the device into a series of nested sieves (2.00 mm and 250 micron mesh). The materials captured in these nested sieves are termed the

light fraction.

Both light and heavy fractions were set out to dry on newspapers in areas protected from the sun and wind. This report summarises the plant materials observed in the examination of the light fractions.

Light fraction samples from each room were sorted under a binocular microscope (range of magnification from 10X to 50X). All identifiable and unidentifiable 'seed' fragments were removed. (The term 'seed' in this report is used loosely and not in a strict botanical sense). The category Unidentifiable 'Seed' Fragments is a large one including charcoal remains which are clearly fragments of endosperm, achenes, seed coats, etc. The designation Unknown Seeds represent remains that are clearly identifiable but unknown at the present time. All materials were identified using various texts (e.g., Martin and Barkley, 1973; Berggren 1981) and reference collections, at the Department of Anthropology, University of Toronto and the Palaeoethnobotany Laboratory, Erindale College, University of Toronto.

RESULTS AND DISCUSSION

A total of 4525 seeds and other plant fragments were identified to the family level or below. The grand total, including Unknown 'Seeds', Cereal Fragments and Unidentifiable 'Seed' Fragments amounts to more than 12,694 individual determinations. The identifications are summarised in FIGURE 1. Scientific and common names of species mentioned in the text are listed in Appendix 1.

Since the access to appropriate reference specimens was limited, many identifications are awaiting finalisation. This is apparent in the Cyperaceae (sedges) where there is some confidence in family level identifications but less confidence at lower taxonomic levels, hence the designations, cf. Scirpus and cf. Cyperus sp. The cf. Trifolium sp. (clover) identification is uncertain because the seeds seem too small compared to available modern clover specimens. This problem was also encountered by Moens et al. (n.d.) who suggest that shrinkage due to charring has taken place or the seeds may represent immature specimens. The designation ?Brassicaceae sp. may be equivalent to Moens et al.'s (n.d.) Brassica sp., but further comparison is necessary. The cf. Linum sp. is also tenuous because the archaeobotanical specimens are very small compared to reference materials at hand. The designations of ?Stellaria sp. and ?Medicago sp. are uncertain again because of a lack of reference materials. The category Gramineae spp. represents the remains of wild grass caryopses that may be identifiable but are at present unknown. A few suggestions were made of ?Bromus sp. and ?Agropyron sp. The category Large Grasses may be the fragmentary remains of Lolium sp. and other large-seeded grasses and further examination of these specimens may lead to positive identifications. If these identification problems are worked out and if the Unknown Seeds (231) are clearly identified, it is unlikely that the general categories of plant identifications (except perhaps the grasses) will change significantly. The category Unknown Seeds is not dominated by one or two types so that their eventual identification will not alter the results significantly.

The culligens encountered are, as expected barley (Hordeum sativum) and emmer wheat (Triticum dicoccum). Where direct observation was possible, all barley

grain was of the hulled variety however, as yet there has been no observation of asymmetrical grain in the samples. Emmer chaff (spikelet forks and glume bases) dominated the sample of the remains of cultivated plants with barley chaff being comparatively rare.

An examination of FIGURE I reveals that the spectra of seeds encountered in all sedimentary units appear very uniform. SU's producing large numbers of 'seeds' had similar species represented than did SU's presenting fewer 'seeds'. This may suggest that one is dealing with similar contexts of deposition and the explanation provided by Moens et al. (n.d.) that the archaeobotanical remains represent the remains of burned animal dung swept about the habitation site, appears plausible. At the very least, the spectra of plant remains examined thus far do not seem to reflect the carrying out of a variety of activities.

The average concentration of 'seeds' is approximately 50 per kg of excavated soil (or, approximately 1 'seed' per 20 cc). Twenty three SU's have 1-10 'seeds' per kg, 19 SU's have 11-100 'seeds' per kg and 8 SU's have more than 100 'seeds' per kg of excavated soil. The SU's having the largest concentration of charred organics are:

Room 17 SU 10	373	'seeds'/kg excavated soil
Room 13 SU 2	248	"
Room 4 SU 2	235	"
Room 18 SU 17	194	"
Room 1 SU 2	158	"
Room 12 SU 5	129	"
Room 1 SU 10	119	"
Room 17 SU 8	107	"

The significance of the units listed above is uncertain since, as is stated above, the spectra of species identified do not seem to differ substantially in any of the sampled SUs. Data on archaeological stratigraphy and other information, may shed light on the significance of these figures.

The amount of soil floated did not seem to have a bearing on the amount of charcoal recovered. For example, in Room 1, SU 4, over 11 kg of soil produced only 4 fragments while in Room 4 SU 2, 2.2 kg of soil produced 235 fragments of plant remains. Further investigation of this problem could incorporate the stratigraphic interpretations, which are now in progress.

A number of SU's produced dense accumulations of sedge leaf fragments and other plant remains that had been replaced by silica (phytoliths) in the light fractions. The SU's in question are as follows:

Room 1 SU 2, SU 4
Room 5 SU 3, SU 5
Room 6 SU 8, SU 10
Room 8, SU 5, PC
Room 9 SU 5, SU 6
Room 12 SU 1, SU 3
Room 13 SU 2, SU 6
Room 14 SU 2
Room 15 SU 3

Room 16 SU 1
Room 17 SU 10
Room 18 SU 17
Room 22 SU 4
Room 23 SU 3

The samples with the most dense concentrations of these tiny fragments are Room 1 SU 2, Room 6 SU 10, Room 8 SU 5 and Room 9 SU 6. In Room 1 SU 2, for example, the entire matrix of the flot consisted of these silicified plant remains.

The identifications of the charred plant materials are summarised in FIGURE I. The final two columns of this figure provide a gross percentage and a corrected percentage of materials identified. The corrected percentage, perhaps a more meaningful statistic, represents the percentage of 'seeds' identifiable to at least the family level, thereby excluding the large number of Unidentifiable 'Seed' Fragments, large Cereal Fragments and Unknown 'Seeds'. The corrected percentages are represented graphically in a histogram in FIGURE II. The most numerous species represented in the samples are the field weeds canary grass (Phalaris sp.) at 23.23%, darnel (Lolium temulentum) at 12.99% and the seeds of Large Grasses at 20.8% and Gramineae spp. at 10.2%.

The species identifiable to at least the family level were abstracted from FIGURE I and included in FIGURE III which is designed to compare the different classes of plant remains recovered from previous analysis of Kom el-Hisn plant remains (Moens et al. n.d.). The categories are identical to those used in the previous work and are: cereals, chaff, field weeds, reeds and sedges, fodder plants and other plants.

The final two columns in FIGURE III directly compare the percentages of different categories of plants identified in these 1988 samples with those reported in the previous work by Moens et al. (n.d.). In this earlier work, the authors suggest that the paucity of wild grass remains and the large number of seeds of fodder plants indicates that the cattle which produced the dung remains were penned and fed exclusively on forage plants (such as clover) grown specifically as animal feed. Conversely, animals left to graze in open pasture for some time would produce dung with more wild grass seeds.

In the samples recovered from the 1988 Kom el-Hisn excavations, however, the remains of wild grasses (that is, wild grasses other than known weeds of cultivated fields such as darnel and canary grass) are more numerous. In the 1988 samples, these unknown wild grass species amount to 10.2% of the total sample (corrected) compared to 0.8% reported by Moens et al. (n.d.). It is with some caution then, that the suggestion is made that some grazing did take place at Kom el-Hisn and this could explain the presence of wild grasses in the 1988 samples. However, a firm conclusion on this point awaits the positive identification of these wild grasses.

A plausible explanation for the nature of the 1988 Kom el-Hisn plant remains is that they represent the by-products of various stages of the processing of crops. This is in general agreement with Moens et al. (n.d.). The most abundant elements are emmer wheat glume bases and spikelet forks, and smaller weeds seeds such as canary grass, darnel and wild grasses. All of these elements could be present in the by-products of crop processing.

The processing of various crops by modern-day peoples has been described in detail by Hillman (1981, 1984). In the processing of the glume wheats, such as emmer, threshing tends to break down the ear into its constituent spikelets (consisting of lemma, paleas, glumes and rachis segments). [FIGURE IV taken from Charles (1984) is a diagram illustrating the structure of emmer.] To free the grain from this chaff, the spikelets are normally parched to make the chaff brittle (though this may be unnecessary in areas with a dry climate) and then pounded. Pounding acts to break down the spikelets forks into glume bases and smaller fragments and releases the grain. This heavy chaff could then be separated from the grain by sieving. The small-seeded weed species (such as canary grass) could be removed at an earlier stage by winnowing. Larger weed seeds, which approximate the size of prime grain (such as Lolium temulentum), are often removed by hand in the final stages of crop processing. This description is a simplification of the processes detailed in crop processing studies of modern-day populations. However, the spectrum of Kom el-Hisn remains do roughly correspond to the stage of 'fine sievings' outlined in Hillman (1981). It must be pointed out, however, that the detailed statistical analyses carried out in the latter study were not applied to the Kom el-Hisn samples. Alternatively, in the absence of straw waste, the Kom el-Hisn samples could represent a combination of by-products from the later stages of crop processing.

CONCLUSION

This paper summarises some preliminary observations on archaeobotanical samples collected from 24 rooms excavated at the site of Kom el-Hisn. The origin of these remains as dung burned as fuel as suggested by Moens et al. (n.d.) seems to be supported by this new data. Many of these remains appear to have originated as the cleanings of crops which are commonly used as fodder for livestock. Moens et al. (n.d.) concluded, on the basis of large numbers of seeds of forage plants and few grass seeds recovered that cattle were penned and fed on clover and other plants grown specifically as animal fodder. The 1988 samples have revealed the presence of higher frequencies of wild grass seeds, suggesting that grazing in pastures may have taken place in addition to the feeding of penned animals.

Avenues for further research on the Kom el-Hisn plant remains include: first the refinement of identifications already made and their finalisation (especially the grasses) and secondly, the correlation of these data and, where necessary, additional archaeobotanical data with results of stratigraphic analyses which may shed further light on the nature and origins of these sedimentary units.

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Kom el Hisn (1988)	R1				RN1			R2	R3	R4			
Archaeobotanical Remains	SU1	SU2	SU4	SU10	SU2	SU4	SU7	SU3	SU1	SU2	SU3	SU9	SU?
H. sativum grain	0	4	1	6	2	0	0	0	0	0	0	0	0
rachis	0	1	0	0	0	1	0	0	0	0	0	0	0
T. dicoccum grain	0	1	0	16	0	0	0	0	0	1	0	0	0
spikelet forks	0	16	1	12	0	0	0	1	0	2	0	0	0
glume bases	0	33	1	48	0	0	0	1	1	3	0	0	0
Cereal Frags	1	18	4	23	1	0	2	0	3	3	0	3	0
Polygonum spp.	1	0	1	0	0	0	0	0	0	0	0	0	0
Rumex spp.	3	29	3	17	0	0	0	1	0	3	0	1	0
?Stellaria sp.	0	1	0	1	0	0	0	0	0	0	0	0	0
Chenopodium sp.	0	1	0	0	0	0	0	0	0	0	0	0	0
Amaranthus sp.	0	0	0	0	1	0	0	0	0	0	0	0	0
?Brassicaceae sp.	1	1	0	14	3	1	0	0	0	5	0	0	0
cf. Trifolium sp.	1	9	3	35	4	0	0	0	0	27	0	1	0
Vicia sp.	0	0	4	1	0	0	0	0	0	0	0	1	0
f. Medicago sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Fabaceae spp.	0	7	0	2	0	0	0	0	0	0	0	0	0
cf. Linum sp.	0	0	0	1	0	1	0	0	0	0	0	0	0
Malvaceae sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
L. temulentum	0	28	1	94	3	3	0	1	0	11	0	5	0
Phalaris spp.	1	13	1	57	8	0	0	2	4	31	0	13	1
Large Grasses	9	63	1	140	14	5	0	0	5	27	2	0	0
Paniceae spp.	0	0	0	1	0	0	0	0	0	0	0	0	0
Gramineae spp.	0	1	6	0	1	0	0	0	0	0	0	8	0
cf. Cyperus sp.	0	1	1	0	0	0	0	0	1	0	0	0	0
cf. Scirpus sp.	0	2	1	0	0	0	0	0	0	0	0	0	0
Cyperaceae spp.	0	13	4	2	1	1	0	0	3	2	0	2	0
Unknown 'Seeds'	0	11	2	4	3	0	1	0	0	46	1	0	1
Unident'Seed'Frags	20	523	14	966	45	18	9	7	16	357	9	40	6
Totals	37	776	49	1440	86	30	12	13	33	518	12	74	8
Room Totals				2302			128	13	33				612
Soil Wt.(Kg)	3.2	4.9	11.3	12.1	5.3	5.2	3.4	NA	4.7	2.2	NA	4.4	2.9
No.'seeds'/Kg	12	158	4	119	16	6	4	NA	7	235	NA	17	3

Kom el Hisn (1988) Archaeobotanical Remains	R5 SU2	SU3	SU5	R6 SU8	SU9	SU10	R7 SU3	R8 SU5	PC	R9 SU5	SU6	SU7	SU9	R10 SU?
H. sativum grain	1	2	4	1	0	2	2	0	1	0	0	0	0	0
rachis	0	0	1	0	0	0	0	0	0	0	0	0	0	0
T. dicoccum grain	0	0	0	0	0	3	0	1	0	1	0	0	0	0
spikelet forks	0	1	4	4	0	0	0	0	0	0	0	0	0	1
glume bases	0	1	10	14	3	1	0	7	5	0	0	0	0	0
Cereal Frags	0	0	3	2	3	0	2	8	0	0	0	2	0	1
Polygonum spp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Rumex spp.	0	0	3	5	0	3	3	6	0	0	0	0	0	0
?Stellaria sp.	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Chennpodium sp.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Amaranthus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
?Brassicaceae sp.	0	0	0	7	0	6	1	0	4	0	0	0	0	0
cf. Trifolium sp.	0	1	7	12	0	27	5	1	10	2	3	2	0	0
Vicia sp.	0	0	1	0	0	0	0	2	1	0	2	0	0	0
cf. Medicago sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
baceae spp.	0	0	1	2	0	0	0	4	0	0	2	0	0	0
cf. Linum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malvaceae sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
L. temulentum	4	2	2	28	1	25	5	28	6	6	0	1	0	0
Phalaris spp.	0	2	11	24	9	75	12	7	3	48	14	4	0	3
Large Grasses	2	0	13	25	8	16	10	36	1	0	3	0	0	1
Paniceae spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gramineae spp.	4	0	10	0	0	17	0	0	1	25	0	1	2	0
cf. Cyperus sp.	0	0	0	0	0	0	0	0	1	0	0	0	0	0
cf. Scirpus sp.	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Cyperaceae spp.	0	2	4	0	0	6	1	0	2	2	0	0	0	0
Unknown 'Seeds'	0	1	7	1	0	5	1	2	1	10	4	0	0	0
Unident'Seed'Frags	10	19	62	77	21	143	30	96	93	154	36	13	3	10
Totals	22	31	146	202	45	329	72	199	129	248	64	24	5	16
Room Totals			199			576	72		328				341	16
Soil Wt.(Kg)	8.8	5.3	25.1	6.7	5.6	5.8	7.0	6.6	NA	3.1	3.6	3.6	3.4	5.4
No.'seeds'/Kg	3	6	6	30	8	57	10	30	NA	80	18	7	1	3

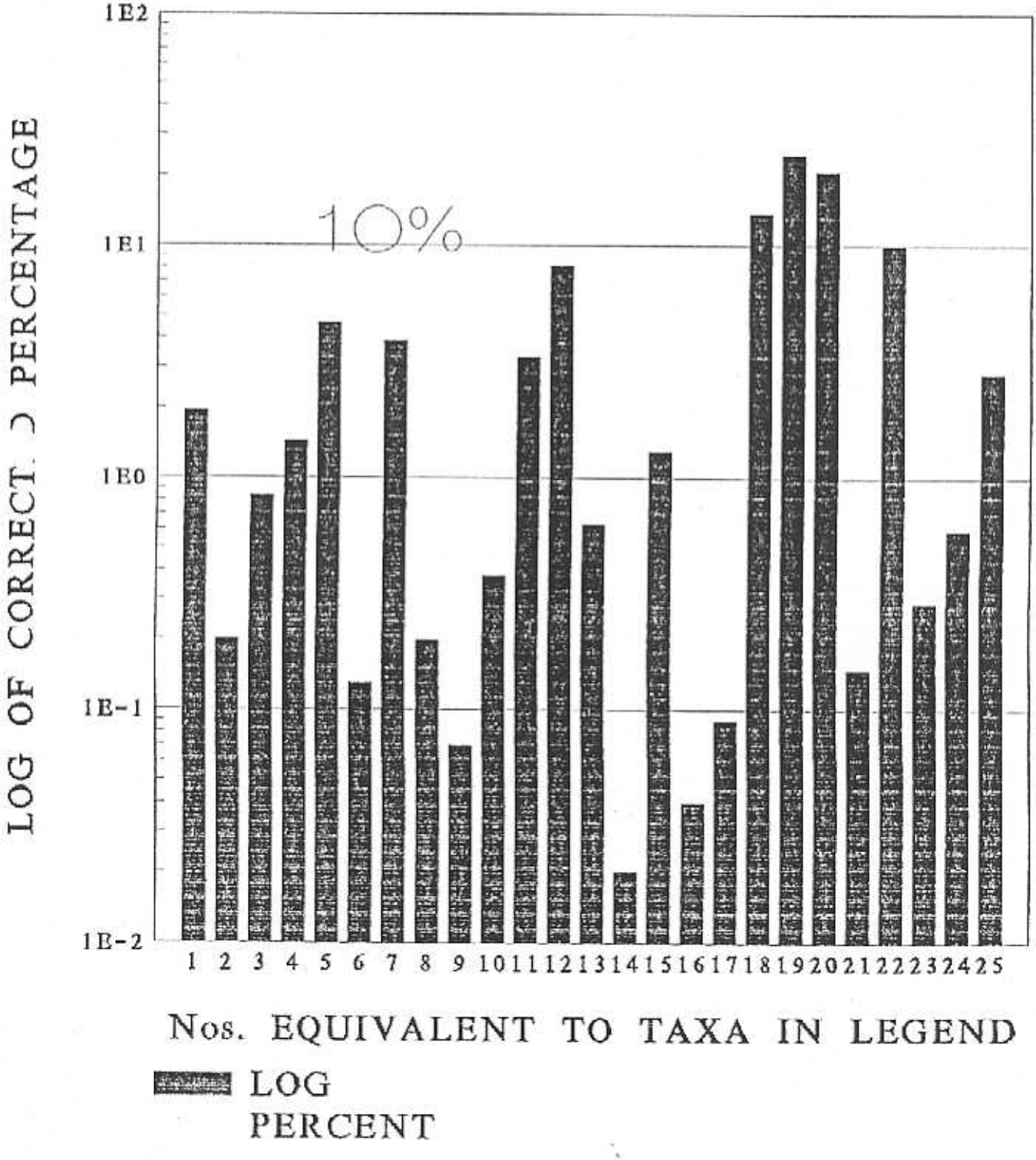
Kom el Hisn (1988) Archaeobotanical Remains	R12 SU1	SU2	SU3	SU5	R13 SU2	SU5	SU6	SU7	R14 SU2	SU10	R15 SU3	R16 SU1	SU2
H. sativum grain	0	0	0	6	9	0	2	2	2	0	3	2	2
rachis	0	0	0	2	0	0	0	0	1	0	0	3	0
T. dicoccum grain	0	0	0	0	8	0	2	0	0	0	0	0	0
spikelet forks	0	0	0	2	10	0	2	2	0	0	0	1	0
glume bases	0	0	1	10	24	0	15	0	1	0	0	6	0
Cereal Frags	0	0	0	10	16	0	15	3	5	2	1	5	11
Polygonum spp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Rumex spp.	1	0	0	57	4	0	3	0	5	0	1	6	8
?Stellaria sp.	0	0	0	2	0	0	0	0	0	0	0	0	0
Chenopodium sp.	0	0	0	0	1	0	0	0	0	0	0	0	0
Amaranthus sp.	0	0	0	2	0	0	0	0	0	1	1	0	0
?Brassicaceae sp.	0	0	0	21	0	0	7	3	6	1	2	8	11
cf. Trifolium sp.	2	0	0	36	37	3	10	9	10	2	0	22	28
Vicia sp.	0	0	1	2	1	0	0	1	2	0	0	0	0
f. Medicago sp.	0	0	0	1	0	0	0	0	0	0	0	0	0
Fabaceae spp.	0	0	0	0	20	0	0	0	1	2	1	0	0
cf. Linum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Malvaceae sp.	0	0	0	2	0	0	0	0	0	0	0	0	0
L. temulentum	1	0	3	49	37	3	8	8	15	3	0	15	33
Phalaris spp.	1	0	9	75	249	6	16	14	10	3	3	13	127
Large Grasses	0	0	7	110	6	3	17	22	21	5	10	26	47
Paniceae spp.	0	0	0	0	1	0	0	0	1	0	0	0	0
Gramineae spp.	0	0	0	1	174	5	1	0	2	0	0	0	4
cf. Cyperus sp.	0	0	0	1	1	0	0	0	0	0	0	2	1
cf. Scirpus sp.	0	0	0	10	0	0	0	0	0	0	0	1	0
Cyperaceae spp.	1	0	2	18	19	1	1	1	0	0	0	3	5
Unknown 'Seeds'	1	0	3	41	22	0	0	0	2	0	3	7	8
Unident'Seed'Frags	13	5	36	703	898	31	129	58	139	14	14	93	432
Totals	20	5	62	1161	1537	52	228	123	223	33	39	213	717
Room Totals				1248				1940		256	39		930
Soil Wt.(Kg)	NA	NA	6.3	9.0	6.2	8.5	8.6	6.8	3.6	4.5	4.5	11.7	8.5
No.'seeds'/Kg	NA	NA	10	129	248	6	27	18	62	7	9	18	84

Kom el Hisn (1988) Archaeobotanical Remains	R17 SU5	SU8	SU10	R18 SU4	SU8	SU11	SU13	SU15	SU17	R17 SU4	RN19 SU2	SU4	R20 SU1
H. sativum grain	0	0	1	1	0	3	1	0	22	0	0	0	0
rachis	0	0	0	0	0	0	0	0	0	0	0	0	0
T. dicoccum grain	0	0	1	0	0	0	1	0	2	0	0	0	1
spikelet forks	0	0	2	0	0	0	0	0	2	0	0	0	0
glume bases	0	0	5	2	0	3	4	0	4	0	0	1	0
Cereal Frags	0	0	16	2	0	0	0	0	71	0	0	0	0
Polygonum spp.	0	1	0	0	0	0	0	0	0	0	0	0	0
Rumex spp.	0	0	0	1	0	1	0	1	1	0	0	0	1
?Stellaria sp.	0	1	0	0	0	0	0	0	0	0	0	0	0
Chenopodium sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Amaranthus sp.	0	0	0	0	0	0	0	0	10	1	0	0	0
?Brassicaceae sp.	0	9	5	4	0	9	2	1	6	1	2	2	2
T. Trifolium sp.	0	1	7	1	1	15	6	3	7	0	2	1	6
Vicia sp.	0	1	1	1	0	0	1	0	2	0	1	0	1
cf. Medicago sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Fabaceae spp.	0	1	2	0	0	0	3	0	5	0	0	0	6
cf. Linum sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Malvaceae sp.	0	0	0	0	0	0	0	0	2	0	0	0	0
L. lemulentum	0	9	80	3	1	7	2	2	29	1	0	3	2
Phalaris spp.	0	10	18	12	2	37	5	7	108	0	3	3	5
Large Grasses	2	13	91	8	2	32	7	12	4	3	13	3	13
Paniceae spp.	0	0	0	0	0	0	0	0	0	0	1	0	0
Gramineae spp.	1	1	5	0	0	0	0	0	168	1	0	15	0
cf. Cyperus sp.	0	0	0	0	0	0	0	0	0	0	2	1	1
cf. Scirpus sp.	0	0	11	1	0	0	0	0	0	0	0	0	0
Cyperaceae spp.	0	1	2	2	2	0	0	0	9	0	0	4	0
Unknown 'Seeds'	0	0	21	1	1	0	0	0	4	2	3	0	3
Unident'Seed'Frags	0	145	664	27	9	143	64	32	709	1	26	39	59
Totals	3	193	932	66	18	250	96	58	1165	10	53	72	107
Room Totals			1128						1653	10		125	107
Soil Wt.(Kg)	2.1	1.8	2.5	8.8	5.4	5.9	6.8	7.0	6.0	3.1	3.7	NA	5.7
No.'seeds'/Kg	1	107	373	7	3	42	14	8	194	3	14	NA	19

Kom el Hisn (1988) Archaeobotanical Remains	R22 SU4	R23 SU3	RN23 SU2	COUNT TOTALS	% GROSS	% CORR
H. sativum grain	1	4	1	88	0.69	1.94
rachis	0	0	0	9	0.07	0.20
T. dicoccum grain	0	0	0	38	0.30	0.84
spikelet forks	2	0	0	65	0.51	1.44
glume bases	7	0	0	211	1.66	4.66
Cereal Frags	2	6	4	248	1.95	
Polygonum spp.	0	2	0	6	0.05	0.13
Rumex spp.	5	0	3	175	1.38	3.87
?Stellaria sp.	0	0	2	9	0.07	0.20
Chenopodium sp.	0	0	0	3	0.02	0.07
Amaranthus sp.	0	0	0	17	0.13	0.38
?Brassicaceae sp.	4	0	1	150	1.18	3.31
cf. Trifolium sp.	5	3	0	367	2.89	8.11
Vicia sp.	1	1	0	29	0.23	0.64
cf. Medicago sp.	0	0	0	1	0.01	0.02
Fabaceae spp.	0	0	0	59	0.46	1.30
cf. Linum sp.	0	0	0	2	0.02	0.04
Malvaceae sp.	0	0	0	4	0.03	0.09
L. temulentum	5	37	1	618	4.87	13.66
Phalaris spp.	14	5	7	1105	8.70	24.42
Large Grasses	18	51	14	941	7.41	20.80
Paniceae spp.	3	0	0	7	0.06	0.15
Gramineae spp.	0	0	0	454	3.58	10.03
cf. Cyperus sp.	0	0	0	13	0.10	0.29
cf. Scirpus sp.	0	0	0	27	0.21	0.60
Cyperaceae spp.	0	6	5	127	1.00	2.81
Unknown 'Seeds'	6	0	2	231	1.82	
Unident'Seed'Frags	211	177	22	7690	60.58	
Totals	284	292	62	12694		4525
Room Totals	284	292	62	12694		
Soil Wt.(Kg)	5.8	5.1	6.5	17328 Kilo		
No.'seeds'/Kg	49	57	10			

R= Room
SU=Sedimentary Unit
PC=Pot Vessel Contents

KOM EL-HISN 1988
CORRECTED % OF TAXA



LEGEND: FIGURE 11
[TAXA NUMBER CORRESPONDS
TO HISTOGRAM NUMBER]

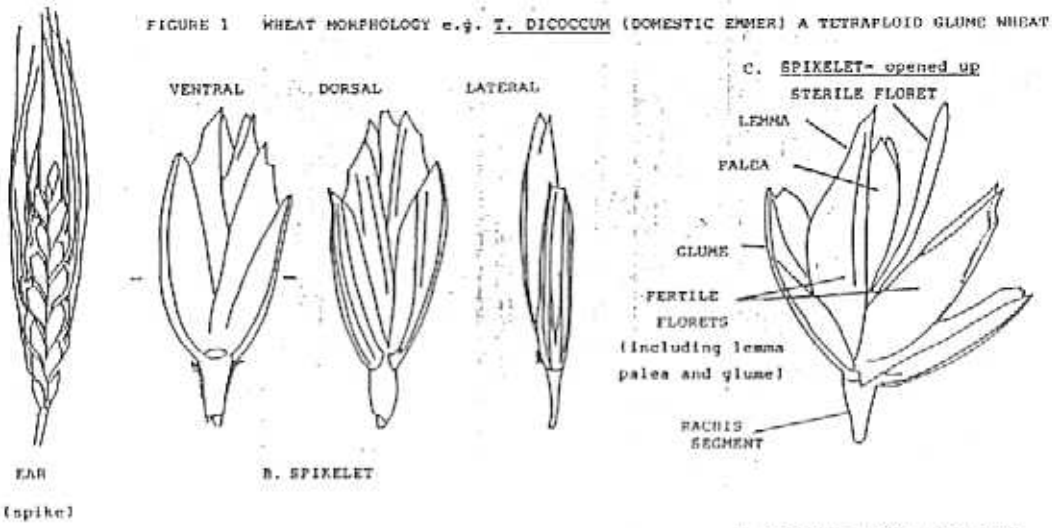
1 H. sativum grain
2 rachis
3 T. dicoccum grain
4 spikelet forks
5 glume bases
6 Polygonum spp.
7 Rumex spp.
8 ?Stellaria sp.
9 Chenopodium sp.
10 Amaranthus sp.
11 Cruciferae sp.
12 cf. Trifolium sp.
13 Vicia sp.
14 cf. Medicago sp.
15 Fabaceae spp.
16 cf. Linum sp.
17 Malvaceae sp.
18 L. temulentum
19 Phalaris spp.
20 Large Grasses
21 Paniceae spp.
22 Gramineae spp.
23 cf. Cyperus sp.
24 cf. Scirpus sp.
25 Cyperaceae spp.

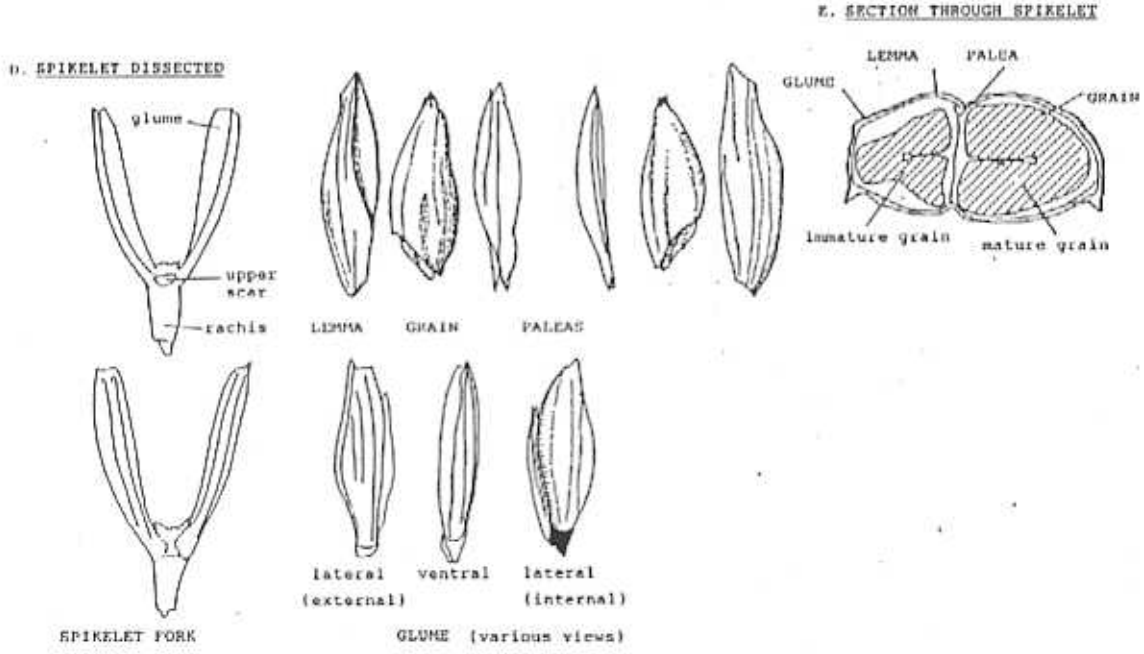
FIGURE III PLANT REMAINS
IDENTIFIED TO FAMILY

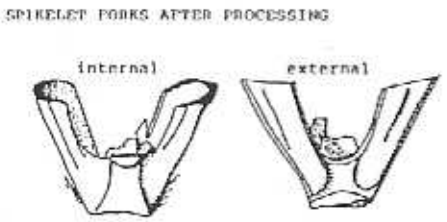
	No.	%	Class %	Moens et al. %
CEREALS			2.8	2.0
Barley grain	88.0	1.9		
Emmer wheat grain	38.0	0.8		
CHAFF			6.3	10.5
Wheat spikelet forks	65.0	1.4		
glume bases	211.0	4.7		
Barley rachis	9.0	0.2		
FIELD WEEDS			38.1	24.6
Canary grass	1105.0	24.4		
Darnel	618.0	13.7		
RUSHES AND SEDGES			3.7	23.9
cf. Nutgrass	13.0	0.3		
cf. Bulrush	27.0	0.6		
Sedge spp.	127.0	2.8		
FODDER PLANTS			16.0	26.6
cf. Clover	367.0	8.1		
Cruciferae spp.	150.0	3.3		
Dock	175.0	3.9		
Vetch	29.0	0.6		
cf. Medick	1.0	0.0		
OTHER PLANTS			33.2	3.4
Wild Grasses	4641.0	10.2		0.8
Large Grasses	941.0	20.8		
Goosefoot	3.0	0.1		
cf. Pigweed	17.0	0.4		
Mallow family	4.0	0.1		
cf. Chickweed	9.0	0.2		
Knotweed	6.0	0.1		
cf. Flax	2.0	0.0		
Pea family	59.0	1.3		
TOTAL	4525.0			

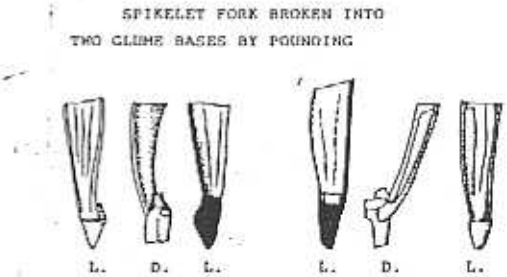
FIGURE 1

FIGURE 1 WHEAT MORPHOLOGY e.g. T. DICOCCUM (DOMESTIC EMMER) A TETRAPLOID GLUME WHEAT









FROM: CHARLES 1984: 18.

Hordeum sativum	barley
Triticum dicoccum	emmer wheat
Polygonum spp.	knotweed
Rumex spp.	dock
?Stellaria sp.	chickweed
Chenopodium sp.	goosefoot
Amaranthus sp.	pigweed
?Brassicaceae sp.	mustard family
cf. Trifolium sp.	clover
Vicia sp.	vetch
cf. Medicago sp.	medick
Fabaceae spp.	pea family
cf. Linum sp.	flax
Malvaceae sp.	mallow family
Lolium temulentum	darnel
Phalaris spp.	canary grass
Paniceae spp.	grass (millet)
Gramineae spp.	grasses
cf. Cyperus sp.	nutgrass
cf. Scirpus sp.	bulrush
Cyperaceae spp.	sedge family
Bromus sp.	brome
Agropyron sp.	wheat grass