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Tall Abū al-Kharaz: Occupation Throughout the Ages. The Faunal and Botanical Evidence

Introduction

Tall Abū al-Kharaz, "The Hill of the Father of the Beads", was occupied from the Chalcolithic period until Islamic times except for a break of ca. 1000 years which lasted from the beginning of the Early Bronze Age III until the end of the Middle Bronze Age period (state of excavation November 1994). Major occupations occur during Early Bronze Age II, Late Bronze Age I and II, and Iron Age I and II . However, in this study the higher order of chronological division, namely Early Bronze Age, Late Bronze Age and Iron Age, has been employed, since many shorter and more accurately defined chronological periods did not yield enough bone or charred plant remains samples of adequate size. The annual excavations of *The Swedish Jordan Expedition,* directed since 1989 by the author, have given quite reliable evidence that the city of the Early Bronze Age was the largest settlement, the Late Bronze Age town being the next in size, and the Iron Age citadel the smallest (see Fischer 1991, 1993-96).

The Site

Tall Abū al-Kharaz lies in the central part of the Jordan Valley, north of Wādī al-Yābis. The co-ordinates of its summit, 116 m below msl, are N 200623.07 and E 206196.54 using the Palestine co-ordinate system.

The position of the tall and its surroundings should briefly be discussed. Tall Abū al-Kharaz is located at a strategic point just 4 km east of the River Jordan and above the eastern border of the Jordan Valley north of the point where the perennial stream of Wādī al-Yābis emerges from the eastern hills into the Jordan Valley. Irrigation systems ancient as well as modern can be seen everywhere in the fertile surrounding land. Approximately 4 km to the north is Pella of the Decapolis, and Bayt Shān is approximately 20 km to the north-west. The isolated, huge mound of Tall Abū al-Kharaz lies about 300 m east-south-east of the smaller hillock of Tall al-Maqbarah. It rises about 60 m above its surroundings. The elevation of the valley floor, where the main road runs north/south, is approximately -200 m. A splendid view and an excellent military control over large areas are obtainable from the summit of Tall Abū al-Kharaz (summit elevation -116 m). These areas include Nazareth, Mount Tabor, Bayt Shān, Mount Gilboa, the Samarian mountains and a large part of the northern Jordan Valley.

The area occupied by the tall is approximately 300 m (north-south) x 400 m (east-west). The tall is quite easily defended: steep slopes to the west, north and east are natural obstacles to presumptive invaders. On the gently sloping lower part of the south side of the tall, the most vulnerable side, a number of defensive walls are still visible. The relatively flat summit of the hill is oriented approximately east-west. The "plateau" on the summit measures about 120 m in the east-west and about 90 m in the north-south direction. The upper part of the tall is surrounded by defensive walls of complicated pattern from all the periods found at the site.

The Occupational Pattern

General Reflections

The climatic situation is of great importance to human society. Roberts and Wright (1993:199) stated that the early Holocene in the Mediterranean region was marked by the expansion of trees into areas previously dominated by steppe. The first evidence of a Mediterranean-type of climate, with winter rains and summer draught, appeared about 11,000 years ago. Indicators of Mediterranean-type climates were olive, pistachio and evergreen oak, expanding westwards during the course of the Holocene (Huntley and Birks 1983). Several important pollen sites reveal essential information about the vegetational and climatic sequence. The most important pollen site in the Levant is in the Ghab depression, a long narrow marsh at the northern end of the Dead Sea–Jordan Rift Valley in north-west Syria (Roberts *et al.* 1993:201). By 6,000 BP the proportion of deciduous oak pollen decreased to 20% as the total tree-cover diminished steadily from its early Holocene maxima. It is likely that the climate was drier 6,000 than 9,000 years ago. Another well-dated pollen diagram from the Huleh marsh in the same Rift Valley in Israel shows that oak was reduced between 9,000 and 6,000 years ago about to its present level (Botema and van Zeist 1981).

The decrease in the dimensions of the different cities of Tall Abū al-Kharaz and the major break in occupation are unlikely to be due to one single factor, and there are a

number of plausible hypotheses. One is the increasing difficulty of exploiting available natural resources: the surrounding agricultural land may have been impoverished by overexploitation and lack of knowledge of fertilisers, water may have become scarcer and the amount of game declined.

Another possibility may be that there were an increasing number of smaller centres during the later periods compared with fewer, but larger, ones during the Early Bronze Age. Political circumstances must be considered, too. The important strategic position of the rich site must surely have aroused envy throughout the ages. Substantial ash layers at the end of each major period of occupation, and also within these periods, may be due to enemy attacks. Natural or other man-induced causes for conflagrations must of course also be considered. Epidemic diseases, often not traceable in the skeletal remains, cannot be ruled out as a factor contributing to a major break in occupation. All these and other factors not mentioned in this exposition would certainly have had a crucial influence on the diachronic occupational pattern of Tall Abū al-Kharaz. In this presentation, besides an evaluation of the remains of human activities unearthed by traditional excavation, an effort is made to understand the human occupation of Tall Abū al-Kharaz by diachronic consideration of the faunal and charred plant findings from the habitation area of the different cities.

The Faunal Remains (TABLES 1-4)

The osteological examination of the faunal remains from the 1991-93 excavations was performed by Paul Croft (final report forthcoming). The résumé of the examination presented below is provisional, however, "...the great majority of the identified mammalian specimens have been attributed to taxon with a high degree of confidence, whilst a small proportion of the identifications (chiefly of the rarer taxa) remain tentative at the present time, and require checking. Since the final determination of this very small proportion of the assemblage cannot make much difference to the overall picture, unconfirmed identifications have been taken as correct for the purposes of the present preliminary statement" (pers.com. P. Croft).

The three seasons of excavation yielded a total of 85.5 kg of non-human mammalian bone. The bone was generally well-preserved although rather brittle, no doubt due to the low collagen content reported by the Oxford Radiocarbon Accelerator Unit (Fischer 1995:93-119).

Some 54% by weight of the total bone sample proved identifiable, this fraction comprising 3255 individual identified fragments of non-human mammalian bone. The representation of the various animals in terms both of counts of identified fragments and of bone weights is presented in TABLE 1. Although a relatively broad range of mammals is represented, it is clear that the great majority of animal remains from Tall Abū al-Kharaz whether based on fragment counts or on bone weights represent caprines and cattle. The imbalance in fragment counts between these two main taxa reflects the numerical predominance of the much smaller caprines including significant proportions of both sheep and goats, whilst the slightly greater weight of cattle than of caprine bone emphasises the very great economic significance of cattle in the long-term economic history of the site.

The quantity of the remains of other food animals in the Tall Abū al-Kharaz assemblage is comparatively small, although pig, fallow deer and gazelle were clearly of some significance. Equid, dog, cat and fox remains attest the presence of animals whose importance to the human community may have lain in other attributes than their ability to provide meat. Bear may have been hunted for meat and furs. Hippopotamus may also have been hunted locally, although the few items attributable to this animal, pieces of ivory, may equally well have been acquired by trade. The few rodent remains probably include house mouse (*Mus musculus*) and mole rat (*Spalax leucodon*), and these may also be intrusive.

Table 1. Overall representation of mammalian taxa at Tall Abū al-Kharaz based on total numbers of identified fragments and on bone weights.

	Total ident. frags.	%	Weight (g)	%
Caprines	2250	69.1	18647	40.5
Cattle	679	20.9	21057	45.8
Pig	108	3.3	1444	3.1
Fallow deer	90	2.8	2625	5.7
Gazelle	67	2.1	547	1.2
Dog	18	0.6	588	1.3
Equid	15	0.5	901	2.0
Rodent	11	0.3	2	-
Cat	9	0.3	22	-
Fox	4	0.1	10	-
Brown Bear	2	0.1	148	0.3
Hippo	2	-	14	-
Total identified	3255	100.1	46005	99.9

Small quantities of human remains were also recovered from the habitation area of Tall Abū al-Kharaz and non-mammalian taxa were represented by small amounts of bird bone, and very small amounts of fish, (freshwater?) crab, frog and tortoise/terrapin.

Early Bronze, Late Bronze and Iron Age: A Diachronic View

Counts and percentages of identified fragments of the three most abundant animal taxa at Tall Abū al-Kharaz (namely caprines, cattle and pig) for each of the three major periods represented are shown in TABLE 2. There is a high degree of similarity between the figures for the Early and Late Bronze Age samples, but those for the Iron Age sample suggest that caprines (although still numerically overwhelmingly predominant) were significantly less important and cattle much more important than formerly. In the two Bronze Age periods identified, caprine remains outnumber those of cattle by almost 5:1, whilst in

Table 2. Numbers and percentages of identified bone fragments of caprines, cattle and pig in the Early and Late Bronze Ages and the Iron Age.

	Early Bronze Age		Late Bronze Age		Iron Age	
	n=	%	n=	%	n=	%
Caprines	854	80.1	254	81.2	719	65.8
Cattle	180	16.9	53	16.9	318	29.1
Pig	34	3.0	6	1.9	56	5.1
Total	1068	100.0	313	100.0	1093	100.0

the Iron Age this ratio has fallen to not quite 2:1.

Consideration of weights of identified bone fragments for the three animal taxa for the Early and Late Bronze Ages and for the Iron Age yields a comparable result (TABLE 3). For the Bronze Age periods caprine remains somewhat outweigh those of cattle, whereas in the Iron Age, by contrast, those of cattle considerably outweigh those of caprines.

A further contrast between the Bronze and Iron Ages seems evident from the data on reliable findings of the

Table 3. Weights and percentages of identified bone fragments of caprines, cattle and pig in the Early and Late Bronze Ages and the Iron Age.

	Early Bronze Age		Late Bronze Age		Iron Age	
	g=	%	g=	%	g=	%
Caprines	6493	52.2	1809	55.0	6522	38.1
Cattle	5515	44.3	1396	42.5	9923	57.9
Pig	431	3.5	83	2.5	695	4.1
Total	12439	100.0	3288	100.0	17140	100.1

remains of fallow deer. Deer are considerably more abundant in the Iron Age sub-sample, and this development may probably run concurrently with a decrease in the relative abundance of gazelle (TABLE 4). The reality of this latter trend remains to be properly established, as a number of uncertain identifications of gazelle bones have still to be checked against adequate reference material.

Few of the bird remains have yet been identified, but it is clear that they derive from a wide diversity of species.

Table 4. Relative abundance of fallow deer and gazelle remains relative to those of the three most abundant taxa. Abundance of identified fragments and weights of identified fallow deer and gazelle are expressed as a percentage of the combined total of identified fragments/combined weights of caprines, cattle and pig for each period sub-sample.

	Fallow deer		Gazelle	
	Fragments	Weight	Fragments	Weight
Early Bronze Age	1.2	1.6	2.4	1.8
Late Bronze Age	2.2	3.0	4.2	3.0
Iron Age	5.4	11.0	1.2	0.7

Apart from deer and gazelle, bird is the only minor taxon to be represented by sufficiently numerous specimens for comparison of their relative abundance in the various periods to be potentially interpretable.

In the case of birds, where there is a wide diversity of species, no trend through time is discernible. The small number of bird and fish remains suggests that the hunting of birds and fishing persisted throughout as a minor economic activity.

The Charred Plant Remains (FIGS. 1-13)

The charred plant remains from Tall Abū al-Kharaz have been recovered by bulk flotation of approximately 770 litres of soil from 22 soil samples (approximately 35 litres each), and were analysed by Tim Holden, *AOC (Scotland) Ltd.* The following presentation is a synopsis of the final report (forthcoming).

The 22 samples derive from Early and Late Bronze Age, and Iron Age contexts. They comprise approximately 10.5 litres floated volume. The samples were sorted using a low-powered binocular microscope and carbonised plant remains of economic or environmental relevance were removed. In some cases, where the volume of charred material was great, a fraction of the total was sorted following separation using a standard geological sample splitter. All identifications were made using the reference collections of *AOC (Scotland) Ltd* and the Department of Archaeology and Prehistory, University of Sheffield. Botanical nomenclature for non-cereal species generally follows the Flora Europaea (Tutin *et al.* 1964-80).

Early Bronze Age

The species present are dominated by the grains of einkorn/emmer wheat with the majority of the grain being morphologically similar to two-grained einkorn. Some of the grains were, however, more closely identified with emmer. In contrast, the chaff was clearly dominated by emmer although einkorn was also present in small amounts. These chaff elements are more reliable in distinguishing between emmer and einkorn than are the grains themselves. In view of this many of the grains put into an emmer/einkorn category (above) were probably also emmer. Lesser quantities of two-rowed hulled barley were present. Rare twisted grains and apparently naked ones give the impression that rare six-rowed hulled barley and naked barley could also have been present but in very low numbers.

In all cases the chaff remains were much fewer in number than the grains themselves. This together with the absence of many of the small-seeded weed species could be taken to indicate that the crop had been well-cleaned of all but the larger contaminants represented by spikelet forks and seeds such as those of *Lolium* sp (rye grass). Following the scheme of crop processing presented by Hillman (1984) this would be consistent with a prime

grain fraction during the final stages of crop cleaning. Such an assemblage could have been burnt while in storage or during food preparation. It is, however, also possible that the grain and chaff represent a mixing of different cereal fractions, one consisting of clean grain and a second consisting of a waste fraction containing the more dense cereal chaff elements and larger weed seeds. If this mixing had occurred then this could, to some extent, explain the differing ratios of einkorn/emmer-like features in the chaff and grain.

Other cultivated species recovered in much smaller numbers include broad bean *(Vicia faba)* and lentil (*Lens culinaris*) which would have been important protein-rich food resources. Flax *(Linum usitatissimum)* and olive *(Olea europaea)* were recovered from different samples and might have been cultivated as a source of oil or for their fibre or edible fruits respectively. The remains of fig are present. Finally, evidence for grape *(Vitis vinifera)* in the form of the whole dried fruits and the pips was recovered from three samples. The pips could have derived from eating either the fresh fruits or from wine making but it would seem most likely that fruits, which must have been burnt while in a dry condition, represent the remains of a dried grape product such as raisins. The presence of these non-cereal cultivars, particularly grape pips and olive stones which could have been disposed of into the fire once the fruits had been consumed, might suggest that some of the carbonised debris derived from domestic waste. It would, however, seem more likely that the larger quantities of cereal grain were the product of the burning of grain while being bulk-processed or while in storage.

Non-crop species were dominated by members of the grass family but, with the exception of the grains of *Lolium* sp (rye grass) and *Bromus* sp., are not abundant. This genus contains a number of species which are common components of the weed flora of cultivated fields, such as *Chenopodium* sp, *Amaranthus* sp. and *Malva* sp. They are all typical weeds of cultivation which were probably brought to the site with the crops. It is therefore likely to represent a contaminant of the cereal crops. One further identification of note is that of small-fruited (4-5 mm) species of *Pistacia* sp. which could have been used economically for its oil, or its flavouring or as a food (Hedrick 1972; Rivera and de Castro 1991).

The legume *Scorpiurus muricatus* L. is present in large numbers. This species is a common component of agricultural fields (Townsend 1974) and is common in the Jordan Valley (Zohary 1972). One explanation for its presence could be that the crop with which it probably arrived, originated from a different area from the others. It is, for example, interesting to note that this species was very common in Bronze Age contexts from the site of Tall ash-Shūna located only few a kilometres to the north of Tall Abū al-Kharaz but in an area where there is more alluvial valley bottom suitable for cultivation.

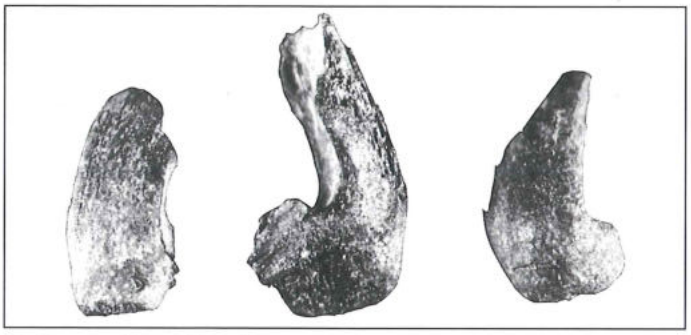
Late Bronze Age

The dominant cereal remains are the grains of hulled two-rowed barley although there are also large numbers of grains of emmer/einkorn grain accompanied by a much smaller quantity of emmer chaff and caryopses of *Lolium* sp. This assemblage indicates the charring of a cleaned prime crop. The number of grains present suggests the destruction of stored contexts rather than a casual build-up of debris. The presence of both barley and wheat indicates that different stored products which were possibly being stored side by side have become intermixed during the burning of the store room.

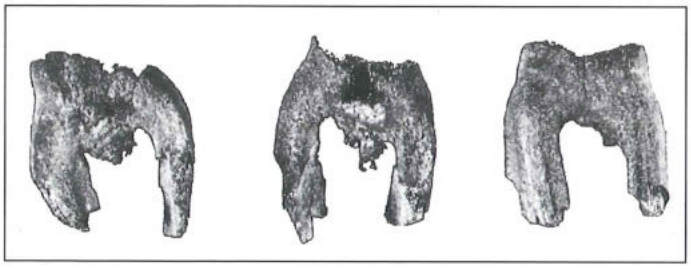
Iron Age

The charred plant assemblage is dominated by hulled two-rowed barley with only minor amounts of wheat.

The non-crop seed element from this last sample would be consistent with the common weeds of cultivation although in view of the small quantities of grain recovered they may have been brought to the site by some other means. Most are readily adapted to high levels of soil disturbance and so could have been growing over many of the less intensively used parts of the site.

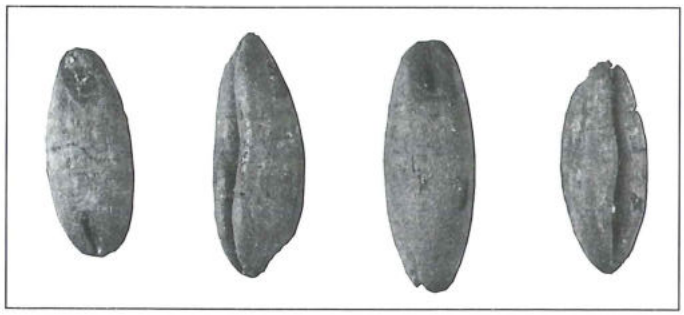


1. Emmer wheat, glume base.

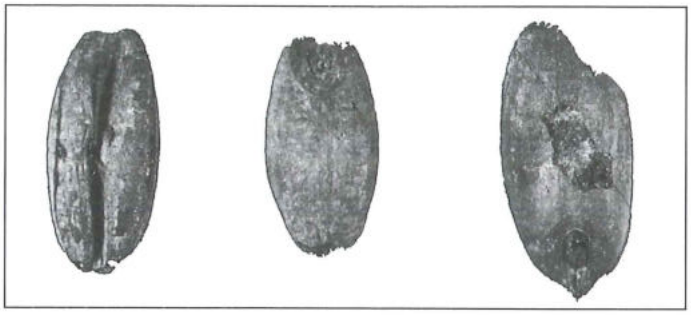


2. Emmer wheat, spikelet fork.

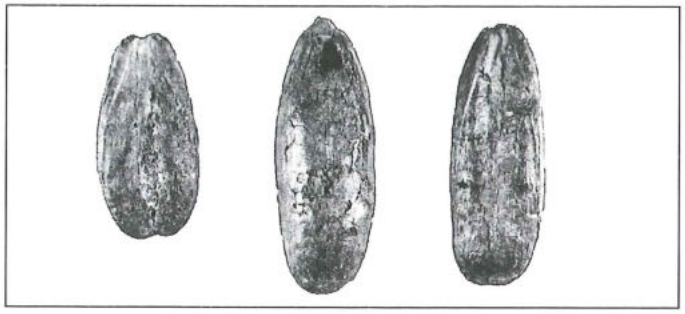
3. Emmer wheat, caryopsis.



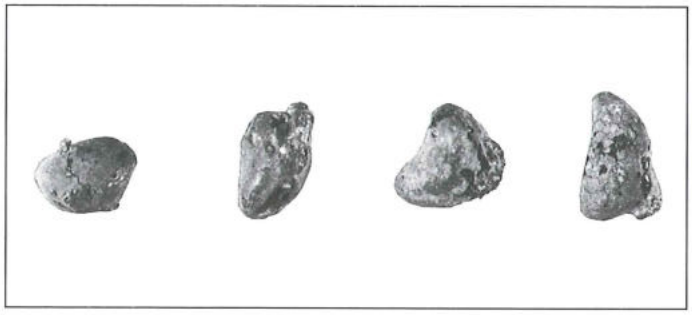
4. Einkorn wheat, caryopsis.



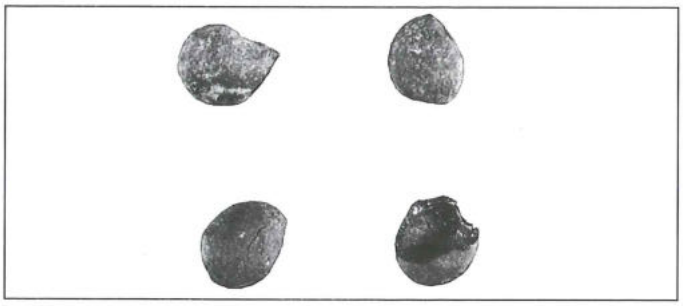
5. Hulled barley, two-row,cary opsis.



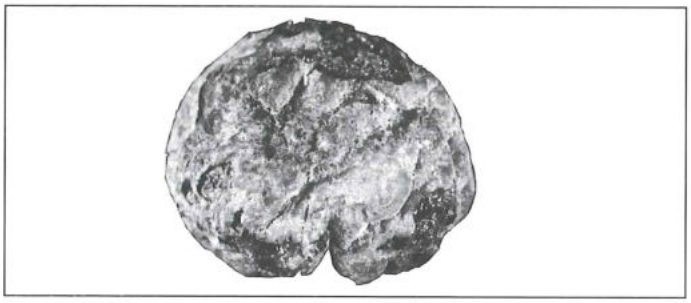
6. Rye-grass, caryopsis.



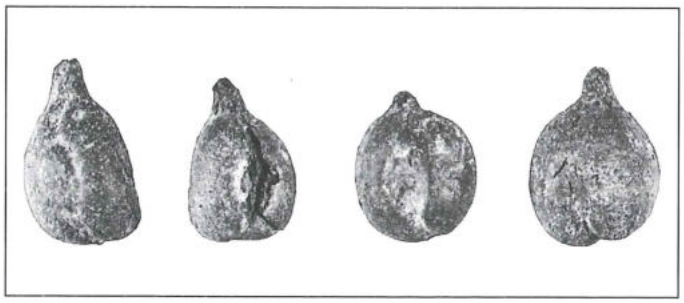
7. Seed, Scorpiurus muricatus L.



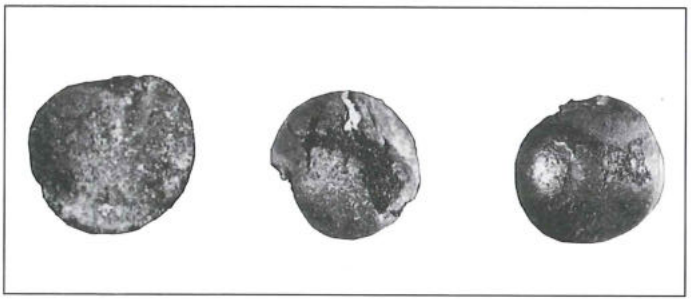
8. Fig, pip.



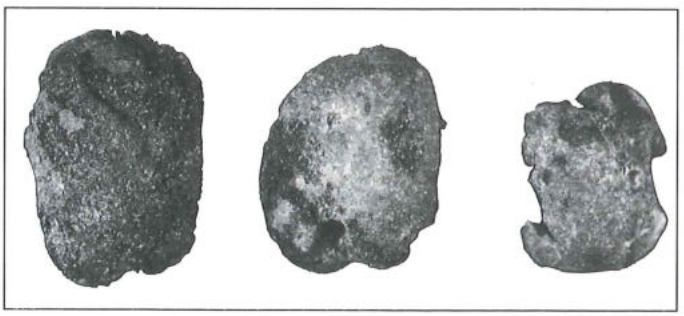
9. Grape, fruit.



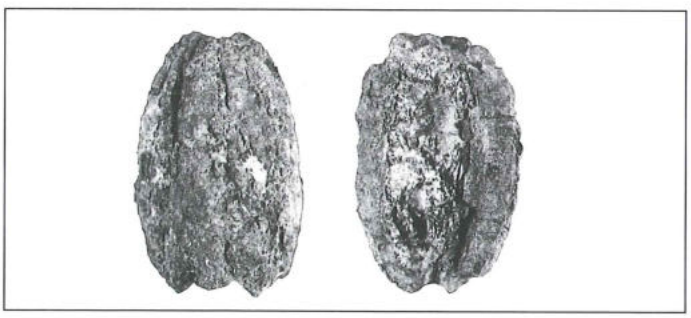
10. Grape, seed.



11. Lentil, seed.



12. Broad bean, seed.



13. Olive, stone.

Discussion

During the five seasons of excavation it was generally observed that the great majority of findings of stored cereals, both in number and in amount were in the Early Bronze Age strata; findings in the Late Bronze Age strata were much less frequent and those in the Iron Age strata were sparse. Cereals from the Early Bronze Age were usually stored in large jars, but wooden containers were also used (Fischer 1993: 285) together with circular stone silos (report forthcoming). In Area 2, for example, several cubic metres of grain were found in such containers during the 1989, 91 and 93 excavations.

The considerable amount of stored grain from the Early Bronze Age suggests that the area from which it derives was a centrally administrated grain storage area: the excavated amount of grain is far too much to be used by a single household. The grain was no doubt distributed by a central administration within the city, but was certainly also of economic significance as a medium of exchange for coveted goods, for example copper. Grain accumulations from Late Bronze Age strata were found in storage jars, in one case close to a plastered room forming a sort of basin which was used as a silo. The amount of grain found in this room might possibly belong to a single household. Large containers for grain have not yet been found in Iron Age strata.

The charred plant remains analysed are dominated by the cereals, primarily the grains but also lesser quantities of the more resistant chaff fragments. In many of the samples a high proportion of the total carbonised material is made up of grains, giving rise to the supposition that it was the result of the burning of storage contexts. In some cases the charred debris would appear to have accumulated *in situ,* but in others it is possible that it represents secondary deposits of dumped charred grain. The actual composition of most of the samples supports the suggestion that they were from storage contexts. They consist of clean grain with few chaff or seed contaminants and therefore represent the prime grain product in the final stages of processing. The crop was probably stored in this condition and any further cleaning would have been undertaken piecemeal, possibly by hand picking, for example as a prelude to food production or packing. The dominant components recovered from these burnt storage deposits are either two-rowed hulled barley or einkorn/emmer wheat (see above) with some samples showing high numbers of both wheat and barley. These cereals were clearly being stored in considerable quantities, sometimes separately and sometimes side by side.

Legumes such as lentil and broad bean are also present in some samples but they are never recovered in such high concentrations as the cereals. This can be interpreted in a number of ways. Perhaps, the legumes were being stored but not, as it happens, in any of the contexts that have been excavated, or perhaps they were not stored in the same way or the same places as the cereals. Possibly the most likely explanation is that they were only a minor part of the site economy. At present we are not in a position to answer these questions but it is perplexing that when legumes are recovered they appear to be in those loci which also contain other non-cereal cultivars such as olive and grape. If, as seems likely, these deposits represent accumulations of domestic waste rather than burnt storage deposits, it shows that legumes were being used but not, apparently, stored in large quantities.

In addition to the legumes other cultivated plants include flax, fig, olive and grape (including dried fruits). There is no reason why these could not have been growing in the vicinity of the site since all have been demonstrated for earlier periods. The wood of olive and grape from, for example, the Early Bronze Age II period at Jericho (Hopf 1983) adds weight to the evidence of their being cultivated locally, probably using irrigation, rather than being imports from elsewhere. There is little evidence to suggest that these resources were being stored on the site and they seem to be more common in the putative domestic refuse deposits.

The element of weed seed is small compared to the quantity of grain recovered. In those samples dominated by barley the non-cereal element is particularly sparse. The results also seem to show that taxa such as rye grass (*Lolium* sp) are more closely associated with wheat than barley at this site. One explanation for this might lie in the sieve sizes used in the cleaning of the different crops. The sieves used for barley might well tend to remove the grains of rye grass whereas the wheat ones would not. Alternatively the rye grass might be a reflection of the field ecology of the two cereals or the value that the population placed upon them. Is it possible that the rye grass was more prevalent in irrigated fields or on richer alluvial soils and that it does not grow on poorer saline soils where barley might be expected to compete preferentially?

Summarizing the analyses of the charred plant remains it can be stated that a clear diachronic pattern cannot be observed. However, a preliminary conclusion is that cereals were of much greater importance to the site economy during the Early Bronze Age than during the Iron Age. It is clear that a better knowledge of the field ecology would help our interpretation and that if these suppositions are correct it could have important implications for our understanding of the site economy.

A clear diachronic pattern can be discerned in the results of the osteological investigation. It has already been pointed out that the figures in TABLES 2 and 3 imply a high degree of similarity between the Early and Late Bronze Age samples, but suggest a different situation during the Iron Age: the still predominant caprines were significantly less important and cattle much more important than formerly. No clear contrast can be seen in the case of pigs. They are at their most abundant during the Iron Age, but they never exceed 5.1% by numbers, and 4.1% by weight. They were obviously of subordinate economic value.

A further contrast emerges from the data on relative abundance of fallow deer (TABLE 4): deer are more abundant in the Iron Age sub-sample and this may run concurrently with the decrease in the relative abundance of gazelle. If the two trends (the increase in deer and the decrease in gazelle) do prove to be concurrent this could indicate either an environmental shift from more steppe-like, open conditions to a somewhat more vegetated landscape affording increased cover for deer. Alternatively it may simply indicate a shift away from the exploitation of the resources of the steppe biotope towards a greater emphasis upon hunting in less arid areas. Another possibility might be that deer became a (semi-domestic?) animal and was therefore of greater economic importance than gazelle.

In conclusion, it may be stated that there is evidence that einkorn/emmer wheat together with sheep and goats, was the backbone of the Bronze Age economy of Tall Abū al-Kharaz, whereas during the Iron Age, cattle were of greater and cereal products of lesser economic importance than in the earlier periods.

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