

THE CHICAGO EUPHRATES ARCHAEOLOGICAL PROJECT 1980-1984 : AN INTERIM REPORT

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During the course of five seasons from 1980 to 1984, the Oriental Institute of the University of Chicago participated in the Lower Euphrates salvage program. The archaeological project undertaken by the Oriental Institute was centered around the excavation of a site in the Atatürk dam reservoir basin, Kurban Höyük. The site is located on the south (left) bank of the Euphrates river, in Urfa province, 2 kms west of the modern village of Cümçüme, and approximately 10 kms upstream of the proposed dam. It is roughly 15 kms northwest of the town of Bozova and 60 kms from Urfa in the same direction. In the preliminary survey carried out by Özdoğan (1977), it is designated as U50/7.

This report represents a summation and partial interpretation of the five seasons of fieldwork carried out at Kurban Höyük (1). Including the contributors to this report, the core field staff of the project consisted of :

G. Algaze (1980-84), K. Ataman (1983-84), M. Evins (1980-83), M. Ingraham (Asst. Director, 1980-84), M. McDonald (1981-84), T. McClellan (Assoc. Director, 1980), N. Miller (1982-84), C. Öztürk (1981-84), P. Wattenmaker (1981-84), J. Wilkinson (1981-84), T. Wilkinson (Asst. Director, 1980-84), A. Yener (1981-84). L. Marfoe was the director.

Other fulltime and parttime participants included : H. Potts (1981), M. Liverani (1981), M. Voigt (1981), T. Cross (1981-83), D. Rahimi (1981), J. Bacon (1982), M. Brandt (1982), R. Gorny (1982-83), G. Stein (1982-83), S. Aközlü (1982-83), H. Erdem (1982), S. Congar (1982), C. Bezmez (1983-84), G. Phillip (1983), G. Overton (1983), C. Verhaaren (1983), B. Tekkok (1983-84), G. Pulhan (1984), C. Kafescioğlu (1984), T. Rickards (1984), S. Ashley (1984), H. Karagöz (1984), S. Wineberg (1983), I. Finkel (1983), N. Illingworth (1983). The representatives from the Ministry of Culture and Tourism were : F. Özçatal, E. Yener, A. Eryilmaz, R. Ökçu, O. Severoğlu.

Funding was provided by matching research grants RO-1528-80 and RO-20556-83 from the National Endowment for the Humanities, private donors, and the Oriental Institute.

In a relatively brief report on an equally brief span of field seasons, it would

analysis of inclusions found copper, sulfur and iron.

The second pin (Fig. 36C) analyzed comes from Period VA in Area C01. The shaft has a vestigial, loop-like appendage on its side near the rounded head which may have served to fasten the pin by pulling a string through the loop and securing it to the garment. A 0.9 gm sample was taken from the shank of the pin, and at 10X magnification showed a cast and worked structure similar to the Late Chalcolithic pin. However, at 50X magnification, it was evident that the recrystallization after annealing had produced a larger grain size than the earlier sample, possibly indicating that the casting produced an object very close to the desired finished product and that less work was required to obtain the final shape of the pin. At 2000X magnification, analysis indicated that the metal was primarily copper with minor or trace amounts of lead, iron and possibly nickel. No arsenic or tin was detected, but inclusions, possibly impurities from smelting, contained copper, sulfur, iron and possibly lead.

The third pin (Fig. 36B) analyzed comes from Period IVB in Area F. This unique toggle pin has a squared shank twisted into a hook, stylistically close to the twisted section of an unperforated example from Amuq H (Braidwood and Braidwood 1960). The curious flattening out at the perforation may have had as much to do with stopping the pin from sliding through the fabric as with the method of manufacture. A 0.9 gm sample taken from the shank reveals a structure quite different from the first two examples, with a very small crystal size produced by substantial working and frequent annealing. This is scarcely surprising since if cast in the round, the pin would have received a great deal of work to obtain the squared shank and the twist of the hook. The metal is also more porous than the earlier examples, and at 2000X magnification, the metal was shown to be primarily copper with minor or trace amounts of iron, tin and possibly lead and nickel. No arsenic was detected, but again, copper, sulfur, iron and lead inclusions were present.

The final pin analyzed (Fig. 36A) was found in the Period III complex of Area D, and is very similar to an Amuq J pin with a rounded head and lines decorating the top of the pin (Braidwood and Braidwood, Fig. 351:3). A 0.11 gm sample once again displayed a structure different from the previous sample. The pin is nearly in its as-cast condition with only a minor working of the surface indicated by a deformation of the dendrites along the edge (Fig. 38). Similarly, at a higher magnification, the recrystallized grains characteristic of working and annealing are

absent. The cast pin was probably worked to give it its curved shape and to incise the lines near the top, but in general, this lack of working after casting may indicate a more sophisticated technique in moldmaking and casting. At 2000X magnification, two kinds of inclusions were found, lead and copper/sulfur/iron. The metal is copper with trace amounts of iron, nickel and lead, with arsenic and tin once again absent.

The closest major copper producing area to Kurban Höyük is the Ergani group, approximately 150 kms away (de Jesus 1978: 99). The ores from this area include Chalcopyrite (cupric ferrous sulfide, CuFeS_2), covellite (cupric sulfide, CuS), and malachite (cupric carbonate, $\text{CH}_2\text{Cu}_2\text{O}_5$). It is very possible that these sulfide ores could have produced the metal for the Kurban pins especially in light of the composition of the inclusions in the samples, copper, sulfur and iron. Zwicker (1980), suggests that copper was smelted from oxide ores around 3500 BC and from sulfide ores around 2800 BC, at least in the Keban. With further chemical analysis, it should be possible to determine if the minor or trace elements were the result of deliberate alloys or impurities in the ore.

C.F.S. and A.Y.

VEGETATION AND LANDUSE

The vegetational landscape of the upper Euphrates basin is the product of a combination of natural forces and cultural practises. Climatic and phytogeographical constraints limit the possible vegetation of the region, but continuous modification by human settlement over millennia has irreversibly changed the natural plant cover. To consider how the ancient landscape differed from the present day, and how ancient populations utilized their environment, archaeobotanical evidence has been systematically recovered over five seasons of excavations (13).

Present-day Vegetation

A pollen core taken near Bozova, less than 20 km away, shows that the nearly treeless vegetation characteristic of the region today has been in place for at least 2500 years (van Zeist, Timmers and Bottema 1968). However, relict vegetation in inaccessible places can provide some evidence for the hypothetical climax vegetation. Zohary (1973) shows the region to be near the arid edge of the Kurdo-Zagrosian xerophilous deciduous steppe forest association,

whose dominant tree is oak. The presence of two large old oak trees on the limestone ridge bordering the modern day catchment of Cümçüme suggests that there is sufficient moisture to support substantial tree growth in the area. A few hawthorn trees (*Crataegus* sp.) grow on the upper (I) and lower terraces (III) and scarp slopes, and there is at least one Christ's thorn tree (*Paliurus spinachristi* Mill.) in this zone as well. These trees are all expected components of the steppe forest. In addition, hedgerows on the dry terraces are planted with a thorny oleaster (*Elaeagnus angustifolia* L.). Grape (*Vitis vinifera* L.), pistachio (*Pistacia vera* L.), and fig (*Ficus carica* L.) are planted in vineyards and orchards.

The greater availability of subsurface water and runoff permits a different set of trees to grow in gullies, by springs, and along the seeps of the steep scarp overlooking the Euphrates. Willow (*Salix* sp.), fig, Christ's Thorn and sumac (*Rhus coriaria* L.) grow wild, and oriental plane (*Platanus orientalis* L.) and various fruit trees are planted. Even in these moist zones, however, human interference allows the growth of only a few stands.

The Euphrates flood plain itself is a narrow stretch of land that provides timber and some firewood for the villagers. Willow, poplar (*Populus aegyriatica* L.), and tamarisk (*Tamarix* so.) are common. These three trees grow rapidly, but they too are cut as soon as they reach a useful size.

There are no large undisturbed stands of trees, so any firewood must come from the pruning of cultivated trees or the very limited wild vegetation. Ubiquitous piles of neatly stacked dung cakes in the village are a further sign that wood is scarce commodity. Dung, possibly the world's first alternative energy source, is still an important fuel.

Human activities in all the defined environmental zones, from the bluffs down to the river, affect the vegetation. Fields, gardens, and pasture are all disturbed habitats. Both crops and weeds grow in these man-made environments. Major crops today include wheat, barley, lentil and cotton, and gardens of eggplant, tomatoes, peppers and other vegetables are also maintained. Only some of these plants would have been available in the past. Pasture is provided by field stubble and the uncultivated hill-slopes. The most common perennial field weeds are mesquite (*Prosopis* sp.), licorice (*Glycyrrhiza glabra* L.), and camelthorn (*Alhagi* sp.), and there are also a number of forbs and grasses available for fodder.

Archaeobotanical Analysis

The plant remains consist of either larger charcoal pieces recovered by hand or smaller pieces and charred seeds recovered by flotation. Most of the former comes from Period V. All periods from VIII to III were sampled by flotation, with the bulk of the residue coming from VI-IV. Sediments from 320 deposits, including a wide variety of contexts such as hearths, pits, floors and fills, were sampled. Of these, 99 have been sorted, weighted and identified in a preliminary manner so far.

The macroscopic plant remains are charred. This circumstance of preservation means that the kinds of plants and plant products regularly exposed to fire will occur in disproportionately larger quantities. Thus, the remnants of incompletely burned fuel, of which wood charcoal is probably the most obvious example, makes a significant contribution to the record. Although charcoal analysis does not yield the entire range of plant-life in the area, the major wood types are likely to be present in the samples. With that caveat, the types that have been distinguished for the early EBA (Period V) include: oak, poplar or willow, juniper (*Juniperus* sp.), members of the elm (*Ulmaceae*) and buckthorn (*Rhamnaceae*) families, oriental plane, ash (*Fraxinus* sp.), pistachio, grape, possibly almond (*Amygdalus* sp.) and a few unknowns. Several of these types (elm family, juniper and almond) are not found locally today, but are not wholly unexpected from the steppe forest of this region. Hawthorn, the most common dry land tree today, is conspicuously absent from the deposits.

Oak is by far the most common wood in the early EBA (Period V) samples by weight, count and ubiquity of identified pieces (Table 5). Poplar/willow is next in importance, and the remaining identified types are not very common. The high proportion of oak suggests that there was more of it in the past, although short-haul transport of timber cannot be discounted. The early EBA charcoal is similar to that of the EBA levels at Aşvan (Willcox 1974), where oak, elm and poplar/willow are important types. At Aşvan, oak and the elm family are somewhat more common than at Kurban, and poplar/willow is somewhat less important. Juniper, oriental plane and ash are found in both areas at this time.

Charcoal from periods other than the early EBA is sparse, and is insufficient to provide a picture of the forest and wood use. However, even without much identifiable charcoal, a consideration of alternate fuel sources can shed light on the arboreal vegetation. Ethnoarchaeological refuse studies elsewhere in the

Near East suggest that many charred seeds recovered archaeologically originated in dung fuel (Miller and Smart 1984). This is most likely for weed seeds, but even crops such as wheat, barley, vetch and vetchling may have been used for fodder at least part of the year. One sample characteristic that is indicative of the use of dung fuel is high proportions of seeds relative to charcoal. The Kurban Höyük samples fit this description (Table 6). In summary, the environment around the site was not virtually treeless as it is today, yet wood fuel was sufficiently scarce so as to be heavily supplemented by dung.

In addition of charcoal, there is evidence for a number of crops and other useful plants. Food or fodder include wheats (*Triticum monococcum*, *T. dicoccum*, *T. aestivum/durum*), barleys (*Hordeum distichum*, *H. vulgare*), lentil (*Lens*), vetch (*Vicia*), pea (*Pisum*), chickpea (*Cicer*), vetchling (*Lathyrus*); an industrial crop, flax (*Linum*), which could have provided oil or fiber; at least one fruit, grape; and several wild nuts, with pistachio, almond, and acorn being tentatively identified (Table 7).

There are no unequivocal trends in crop choice discernible at present. The differences between each period are most parsimoniously attributed to chance given the inadequate numbers of samples analyzed. Tentatively, it would appear that the quantity of wheat relative to barley shows an apparent decline between early EBA and Mid/Late EBA. However, this may change when more samples are analyzed and identifications of specific species are completed, since both wheat and barley occur in nearly all the samples.

Eventually, it may be possible to address important questions about the Bronze Age agricultural economy and landuse. For example, the main subsistence crops were annuals, planted and harvested every year. Fruit crops, such as grape, require a relatively heavy investment of labor for several years before any crop is realized. Stager (1982) has suggested that political and economic stability and the presence of a reliable market for the fruit were prerequisites for the adoption of viticulture on a large scale in the Mediterranean basin during the 3rd millennium.

At Kurban Höyük, grape occurs as early as the Late Chalcolithic period, yet does not seem to become common until the Mid/Late EBA levels, when the site attained its maximum size.

The question of specialized horticultural production can also be approached by an analysis of fruit and nut processing. In a Mid/Late EBA pit in Area A, un-

usually high densities of both charred nut shell and grape pips and fragments were found in a sample containing virtually no charcoal and very few of the seeds of weeds that are likely to be from dung. It is unlikely to have been the remains of fuel. In addition to the usual grape pips and pip fragments, the grape peduncle (or stem) and pressed fragments of the fruit itself are preserved. The nutshell fragments are also atypical in that the almonds are frequently still attached to the outer fruit rind. One possible explanation is that the sample represents the burned debris of two manufacturing processes - grape pressing for juice, wine or vinegar, and nut grinding for oil or meal (14). Several grinding stones were indeed recovered near to and above the pit, an association that might support this interpretation.

To summarize, these preliminary results are encouraging. Wood fuel was probably available in greater quantities for most of the life of the site than at present. Oak from the terraces or dry slopes and poplar/willow from the moister zones were exploited. The traditional Near Eastern crop complex involving wheat, barley and legumes was grown. Viticulture may have appeared as early as the Late Chalcolithic period, but became more prominent in the Mid/Late EBA. As more detailed studies progress, finer distinctions in agricultural strategies may be discernible.

However, one significant shift suggested by Wilkinson may be discussed here. The Ghab pollen analysis (northern Syria) shows deforestation occurring between 3500 and 4500 BC (van Zeist and Bottema 1982: 283). This is supported by the wood charcoal analysis. If, as suggested, the shift from wood charcoal to charred seeds in the EBA is an indication of the replacement of wood fuel by the burning of animal dung, this may be a reflection of a greater scarcity of wood in general. When combined with the evidence for gully erosion and alluvial aggradation at the end of the EBA mentioned earlier, these convergent lines of data indicate that the expansion of settlement and agriculture in the 3rd millennium may have led to a diminution of woodland reserves, which in turn led to the increased runoff, erosion and sedimentation.

N.F.M.

Table 3
Distribution of Wares by Weight*
Within Ten Architectural Units of Area D Building Phase II

Unit	Plain Simple	Cooking Pot	Other	Weight(kg)
07	72%	27%	1%	22.73
08	94%	4%	2%	43.42
27	95%	5%	-	124.92
28	85%	15%	-	91.95
29	83%	16%	1%	15.08
33	88%	10%	2%	14.79
34	92%	7%	1%	20.79
35	68%	19%	13%	27.83
38	92%	7%	1%	207.65
66	91%	8%	1%	33.77

*Percentages are rounded to the nearest whole percent.

Table 4
Distribution of Pottery Vessel Categories by Count*
Within Ten Architectural Units of Area D Building Phase II

Unit	Barrels	Bowls	Cooking Pots	Jars	Pithoi	Cups	n
07	6%	16%	22%	45%	5%	6%	64
08	14%	8%	22%	40%	16%	0%	189
27	12%(30%)	15%	20%	42%(2%)	3%(50%)	8%	144
28	7%(45%)	26%	17%	39%(8%)	1%(50%)	8%	152
29	8%	27%	23%	36%	0%	6%	52
33	34%	16%	16%	25%	7%	2%	56
34	0%	21%	15%	51%(4%)	8%	4%	47
35	0%	21%(25%)	40%	37%(28%)	0%	3%	38
38	16%	21%	14%	32%(1%)	10%(2%)	5%	452
66	9%	27%(4%)	13%	42%	2%	6%	84

*The figures in parentheses indicate the proportion of the preceding figure which is composed of complete vessels.

Table 5. Charcoal from Area C01, Early EBA
(N deposits sampled = 18)

Type	Count		Weight		Ubiquity of occurrence (per deposit)	
	N	%	N	%	N	%
Juniper	3	1	.40	1	1	6
Pistachio	3	1	.72	1	1	6
Oak	105	45	25.07	48	12	67
Ash	3	1	.90	2	2	11
Oriental Plane	5	2	1.20	2	2	11
Buckthorn Family	11	5	.73	1	3	17
Almond	11	5	1.93	4	3	17
Willow/Poplar	43	18	4.13	8	10	56
Elm Family	11	5	2.96	6	4	22
Grape	3	1	.26	1	2	11
Unknown (3 types)	36	15	13.46	26	8	44
Unidentifiable (not included in total)	(8)	-	(2.65)	-	7	39
Totals	234	99	51.76	100	-	-

Table 6. Some Characteristics of the Flotation Samples

Period	Deposit Type	Density		Seed Proportion		Weed/Charcoal Ratio
		N	g/liter	N	S/(S+C)*+	
Halaf	Surface	4	.50	4	.33	2
	Fill	6	.60	6	.52	12
Middle Chalco	Fill	-	-	2	.75	301
Late Chalco	Hearth	2	2.08	2	.47	41
	Pit	8	1.35	9	.39	12
	Surface	5	1.86	5	.35	7
Early EBA	Fill	3	2.25	4	.40	85
	Hearth	2	1.17	2	.49	38
	Pit	6	8.84	7	.35	12
Mid/Late EBA	Surface	7	2.16	11	.41	21
	Fill	6	4.06	10	.37	11
	Hearth	1	.41	5	.74	180
Early/Mid Bronze	Pit	4	4.37	9	.47	53
	Surface	5	1.52	5	.59	151
	Fill	9	4.20	10	.58	327
Early/Mid Bronze	Pit	8	.96	8	.47	14

* S/(S+C) = seed weight / weight of all charred material.
+ For comparison, average S/(S+C) ratios at Malyan, a site located in the southern Zagros oak forest, range from .007 in the late fourth/early third millennia to .080 in the late third millennium (Miller 1982).

Table 7. Ubiquity of Occurrence of Seeds

	Halaf	Middle Chalco	Late Chalco	Early EBA	Mid/ Late EBA	Early/ Middle BA
	%	%	%	%	%	%
Cultivated Plants						
<i>Triticum</i>	20	50	75	87	59	50
<i>Hordeum</i>	20	50	80	93	52	75
Cereal indet.	30	100	85	100	72	75
<i>Triticum</i> spikelet froks	90	100	80	100	72	87
<i>Lens</i>	10	50	25	70	31	50
<i>Vicia</i>	10	0	0	13	7	12
<i>Lathyrus</i>	10	50	10	7	14	37
<i>Pisum</i>	20	50	10	7	7	0
<i>Cicer</i>	0	0	0	10	0	0
Large Legum. indet.	30	0	35	40	38	37
<i>Linum</i>	20	0	20	3	0	0
Fruit & Nut						
<i>Vitis</i>	0	0	5	10	66	37
Nut (1)	0	0	5	13	7	25
Weedy Plants						
<i>Aegilops</i>	10	50	25	37	17	25
<i>Lolium</i>	0	50	35	30	55	25
Weedy Gram. other (2)	20	100	60	87	66	37
<i>Astragalus</i>	10	100	15	37	17	37
<i>Coronilla</i>	0	0	5	50	31	37
<i>Medicago</i>	0	50	25	30	21	25
Weedy Legum. other (3)	0	50	30	57	41	50
Sedge (4)	0	0	5	30	10	25
<i>Galium</i>	0	50	70	83	72	37
Weeds other (5)	40	100	90	100	90	100
N deposits sampled:	10	2	20	30	29	8

1) includes fragments of *Pistacia*, *Amygdalus*, *Quercus*2) includes *Bromus*, *Hordeum*, *Koeleria*, *Triticum*3) includes cf. *Trifolium*, cf. *Trigonella*4) includes *Carex*5) includes *Boraginaceae*, *Silene*, *Vaccaria*, *Chenopodiaceae*, *Centaurea*, cf. *Matricaria*, *Neslia*, *Cephalaria*, *Ajuga*, *Malvaceae*, *Papaver*, *Plantago*, *Polygonum*, *Rumex*, *Androsace*, *Adonis*, *Thymelaea*, *Umbelliferae*, cf. *Valerianella*, cf. *Verbena*

TABLE 8. SUMMARY CHART: IDENTIFIED MAMMALS AT KURBAN HOYUK & GRITILLE

Taxon	Halaf		Mid Chalco-		Late Chalco-		Early		Mid ERA		Mid EBA		EBA-MBA		Mid EBA	
	unsc	sc	unsc	sc	lithic	unsc	E.B.A.	unsc	sc	(K.H.IVb)	unsc	(K.H.IV)	unsc	(K.H.III)	sc	unsc
Sus	8	3	9	3	35	3	1	3	22	98	3	3	4	63	4	137
Bos	-	1	2	-	16	-	6	12	7	62	5	5	2	42	2	85
Ovis	-	-	-	-	-	-	3	8	5	42	4	4	-	2	-	44
Capra	-	-	1	1	-	1	1	11	1	13	-	-	-	2	-	25
Ovis-Capra	3	5	8	3	17	3	30	43	24	454	28	28	7	27	7	475
Ovis-Capra-Gazella	-	-	-	-	-	-	-	8	-	6	2	2	-	-	-	-
Gazella	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-
Cervidae	-	-	-	-	-	-	-	7	-	-	-	-	-	10	-	-
Equus	-	-	-	-	-	-	-	1	-	-	-	-	-	3	-	-
Canidae	-	-	-	-	-	-	-	15	-	6	-	-	-	-	-	-
Vulpes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carnivore	-	1	-	-	-	-	-	-	-	3	1	1	-	5	-	-
Lepus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rodentia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	11	31	76	154	744	48	167	766								

Notes: Counts represent total number of bones. Abbreviations: sc=bone recovered in dry screen; unsc= not screened
K.H.= Kurban H5yUk Period; ERA= Early Bronze Age; MBA= Middle Bronze Age.