CHAPITRE 21

SOME PLANT REMAINS FROM KHIROKITIA, CYPRUS : 1977 AND 1978 EXCAVATIONS

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Introduction

Khirokitia is an early agricultural site located about 5 km form the southern coast of Cyprus. The main occupation of the site dates to aceramic Neolithic times, the mid-sixth millennium b.c. (STANLEY-PRICE, 1977, LE BRUN p.c.). Although no ethnobotanical work was done for the original excavations by DIKAIOS (1953), some recent work at the site has been concerned with understanding ancient subsistence practices and environment through the analysis of plant remains (WAINES and STANLEY PRICE, 1977, LE BRUN p.c.).

During the 1977 and 1978 excavations at Khirokitia, Alain LE BRUN used flotation to extract a small series of archaeobotanical samples from the archaeological deposits. Soil samples were taken from wherever carbonized material was seen, from hearths, and from basins (LE BRUN p.c.). Some charcoal was removed for radiocarbon dating from the archaeological deposits prior to flotation and analysis.

The C.N.R.S. excavations yielded the remains of several taxa of cultivated and wild plants. In addition to the previously reported einkorn wheat, barley, and lentil (WAINES and STANLEY PRICE, 1977), olive has been identified. A few weed seeds and charcoal have also been found. The description and analysis of these plant materials follows (Tables 1 and 2).

The Taxa

Gramineae :

Triticum monococcum

The most common seed found was einkorn wheat. The dimensions of the grains are well within the range reported by WAINES and STANLEY PRICE (1977) for Khirokitia and by VAN ZEIST and BOTTEMA (1971) for Nea Nikomedeia, Greece (Table 3). They are somewhat thicker than the older Çayönü domesticated einkorn (VAN ZEIST, 1972).

Hordeum vulgare

The dimensions of the one measurable barley grain was well within the range of cultivated barley (Table 3). The grain has a twisted furrow, which suggests it represents the 6-row form.

Fouilles récentes à Khirokitia (Chypre) 1977-1981 (2 tomes).
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TABLE 1
Catalog of samples form Khirokitia

Area	Sample #	# buckets (5 litres)	wt. carb. material (g)	wt. carb. seeds (g)	wt. charcoal) (g)	Density carb. material (g/bucket)	seeds/ (seeds + charcoal)
Level I							
House 82	958	1	.11	.07	.04	.11	.64
House 89	913	1	.33	.10	.23	.33	.30
	920	2	1.29	.69	.60	.64	.53
House 94	955	1	.04	.01	.03	.04	.25
Outside houses	1073	1	.19	.12	.07	.19	.63
Level II							
House 84	719	?	+	0	+	—	—
	942	¾	.01	+	+	.01	—
	946	¾	.02	.01	.01	.03	.50
	953	1	.08	.05	.03	.08	.62
	1018	1	.03	.01	.02	.03	.33
House 85	997	1 ½	.70	.54	.16	.47	.77
	1041	1	.21	.15	.06	.21	.71
	1071	¾	.22	.17	.05	.29	.77
	1090	1	.47	.25	.22	.47	.53
	1104	1	.11	.09	.02	.11	.82
House 92	1066	1	.13	.11	.02	.13	.85
	1092	¾	.30	.18	.12	.40	.60
House 94	1010	1	.13	.07	.06	.13	.54
	1020	1	.09	.05	.04	.09	.56
	1034	1	.13	.09	.04	.13	.69
Outside houses	675/1	?	.03	+	.03	—	—
	675/2	?	.03	.01	.02	—	.33
	684	?	.40	.08	.32	—	.20
	990	1	.17	.05	.12	.17	.29
Level III							
House 87	624	?	.78	.78	0	—	1.00
	981	⅕	.01	+	+	.05	—
	1002	1	.15	.11	.04	.15	.73

Lolium sp.

Several probable ryegrass seeds were found. Most species of ryegrass are valuable pasture grasses (BOR, 1968: 92).

Gramineae, indeterminate. There were a number of cereal fragments, presumably einkorn and barley, which could not be positively identified. A few small weedy gramineae were also found.

Leguminosae :

Lens sp.

The average diameter of the 22 measurable lentils found in sample 920 is 3.16 mm (2.8-3.8 mm), which is equivalent to that of the small-seeded lentils recovered from Khirokitia by WAINES and STANLEY PRICE (1977); these measurements are within the range of various Neolithic sites from Greece and elsewhere (RENFREW, 1973: 115; VAN ZEIST and BOTTEMA, 1971; ZAITSCHEK, 1959).

TABLE 2
Seeds from Khirokitia

Area	Sample #	*Triticum monococcum*	*T. monococcum glume bases* (#)	*Hordeum* sp.	*Hordeum* internodes (#)	*Lolium* sp. (#)	Other weedy Gramineae (#)	Gramineae, indet	*Lens* sp.	*Olea europaea*	*Malva* (cf.) (#)	Other seed fragments
Level I												
House 82	958	+(½)	1					.04	+ (½)		1	.01
House 89	913/II	.03	12 ½					.07	+			
		.10 (2)	16	+				.21 (3)	.23 (22)	+		.14
House 94	955		2 ½					+				
Outside houses	1073	+	2					.11	.01 (1)			
Level II												
House 84	719											
	942		2		1			+				
	946							.01				
	953		9									
								.04				
	1018							+	.01 (1)			
House 85	997	.05 (2)	37 ½					.32		.13 (1)		
	1041	.03	12	+					.11			
	1071	.05 (2)	5			1			.11 (1)			+
	1090	.04	70 ½				1	.15	.01 (cf.)		1	+
	1104	.03	2					.06				
House 92	1066			.01 (1)				.10				
	1092	.02	40	+ (1)	1			.08	.01 (1)			.06
House 94	1010		8 ½	.01 (1)		1		.04	+ (1)			+
	1020		2					.04				+
	1034	.01 (1)	7 ½					.07				
Outside houses	675/1							+				
	675/2							.01 (1)		+		+
	684	.02	1 ?	+		1+	1	.02				.02
	990	.01 (1)	9									
								+	+ (1)			+
Level III												
House 87	624							.01		.77		
	981							+				+
	1002	+	6 ½			1		.10 (1)	+ (1)			+

Note : Numbers without parentheses represent weight in g.
Numbers in parenthese represent number of whole seeds which are included in the total weight.
"+" indicates presence; less than .01 g.
* Probably a mixture of Gramineae and Leguminosae fragments.

Oleaceae :

Olea europaea

One measurable olive stone was 8.8 mm long and 6.0 mm thick, which is somewhat shorter than Bronze Age and later specimens (RENFREW, 1973: 133; ZAITSCHEK, 1955). ZOHARY and SPIEGEL-ROY note that in modern specimens there is a tendency for the cultivated olive to have

TABLE 3

Dimensions of Einkorn and Barley from Khirokitia

	L (mm)	B (mm)	T (mm)	L:B	T:B
Einkorn (*Triticum monococcum*), N = 4	5.3	1.8	2.7	2.92	1.48
Barley (*Hordeum vulgare*), N = 1	6.3	2.3	1.9	2.74	.83

larger seeds than wild olive, but that "the stones of wild and domesticated oil olive forms overlap considerably in size" (1975: 320). Thus, it cannot be determined on morphological grounds alone whether these specimens represent wild or domesticated olives.

It is generally thought that olive was domesticated in the eastern Mediterranean, and natural occurrence of the presumed wild ancestor of the domesticated olive, *Olea europaea* var. *oleaster* are found today in Cyprus *(Ibid.)*. VAN ZEIST (1981) has reported olive stones from the preceramic site of Cape Andreas-Kastros, on the north coast of Cyprus. The earliest clear evidence for cultivated olive occurs fairly late in the Levant, during the fourth millennium (ZOHARY and SPIEGEL-ROY, 1975).

Although we cannot determine whether the olives from the sixth millennium represent the cultivated variety, the Khirokitia specimens provide additional early evidence for the harvest and utilization of olive within the probable area of its ultimate domestication.

Malvaceae :

Cf. *Malva*

A few seeds of cf. *Malva* (mallow) were found. Mallow is a herbaceous plant of fields and open ground.

Other seeds (unidentifiable) :

Due to limited comparative material, two seed types were not identifiable.

Charcoal (Table 4) :

There was very little charcoal in the samples, and there were no pieces larger than 2 mm on a side. A coniferous wood (probably pine, *Pinus*) was identified. Oak *(Quercus)* was seen as well. Carob *(Ceratonia siliqua)* and olive *(Olea europaea)* are tentatively identified. There were two or three other kinds of charcoal, but the combination of an inadequate comparative collection for Cyprus and pieces that were less than 2 mm made even tentative identification impossible.

All of the above-mentioned taxa grow within a 10 km radius of Khirokitia today (CHRISTODOULOU 1959: 229).

TABLE 4

Charcoal from Khirokitia (# identifiable pieces)

House 89 (Level I), sample 920 :	1 *Quercus* sp. 2 conifer, cf. *Pinus* 1 cf. *Olea europaea*
Outside houses (Level II), sample 684 :	1 cf. *Olea europaea* 1 cf. *Ceratonia siliqua*

The Deposits

Excavations at Khirokitia have uncovered deposits which are radiocarbon dated to about 5800-5400 b.c. (LE BRUN p.c.). Most of the archaeobotanical samples come from level II, although

there are a few from the older level III and the more recent level I. In aggregate, the deposits are fairly homogeneous. Due to low densities of carbonized material, the differences between samples are not significant. In particular, there are no consistent differences between the different structures, nor do there appear to be changes through time.

The soil samples are characterized by very small amounts of carbonized material and a low proportion of charcoal relative to seeds (Table 1). If dung fuel were in use, low proportions of charcoal would be expected (*cf.* MILLER, 1982). Without a broader sampling from the site, it is premature to draw any conclusions about the use of wood compared to other materials as fuel. However, the limited charcoal remains are probably the incompletely burned remains of fuel.

Discussion

Most of the seeds represent domesticated plants. A number have already been reported for Khirokitia; einkorn, barley, and lentil (WAINES and STANLEY PRICE, 1977). The presence of olive at this early date is not surprising, as Cyprus is well within the range of its natural distribution (ZOHARY and SPIEGEL-ROY, 1975). However, its presence here is significantly earlier than most other finds reported to date (*cf.* VAN ZEIST, 1981). The presence of field weeds (ryegrass and mallow) is unremarkable as well. The carbonized seeds reported here are consistent with previously reported finds from Khirokitia, and suggest an economy characterized by reliance on domesticated plants as well as the use of fruit trees.

Khirokitia lies within the region of carob-pistachio forest (CHRISTODOULOU, 1959) [1]. At present, carob and olive groves are common on the hillslopes near Khirokitia. Aleppo pine (*Pinus halepensis* subsp. *brutia*) is "the principal forest tree" of Cyprus (CHAPMAN, 1967: 27), and could have grown within several kilometers of the site. Oak, though not a major component of the forest immediately around Khirokitia today, might have occurred in the same areas as pine (CHRISTODOULOU, 1959). The charcoal from Khirokitia is most probably the remains of fuel, collected within several kilometers of the site.

Carbonized material found in structures at Khirokitia is presumed to have been burned in controlled fires, since the site does not show evidence of general burning. There are several explanations which would account for the presence of carbonized remains. For example, as mentioned above, the charcoal is likely to have been fuel. The seeds, which are mostly einkorn, may have originated in straw used as fuel, or as grains parched indoors. Accidental inclusion of plant materials in heating or cooking fires also cannot be ruled out as possible circumstances of carbonization. Elsewhere I have suggested that carbonized weed seeds as well as some grains might represent dung fuel in areas where herbivores are of great economic importance and wood is not readily available due to aridity, deforestation, or both (MILLER, 1982). Whether there was a wood shortage in the immediate vicinity of Khirokitia in Neolithic times cannot be determined with the available evidence. In this connection, however, it is noteworthy that burnt dung has been reported at another early agricultural site, Can Hasan in southern Turkey (HILLMAN, 1972: 186). If further work continues to yield the small quantities of charcoal reported here, we might be able to infer that fires were fueled primarily by dung or herbaceous plants, rather than wood.

References

BOR, N.
1968 Gramineae. *Flora of Iraq,* vol. 4, ed. C.C. Townsend, E. Guest, Ali Al-rawi. Baghdad: Ministry of Agriculture.

CHAPMAN, E.F.
1967 (Second ed.) *Cyprus Trees and Shrubs.* Nicosia: Public Information Office.

1. The southern coastal region of Cyprus is characterized by "maquis or forest of *Ceratonia siliqua* L. and *Pistacia lentiscus* L."; just to the north is a small region of "forest of *Pinus brutia* Ten. with *Quercus calliprinos* Webb and *Olea europaea* L." (CHRISTODOULOU, 1959: 229).

CHRISTODOULOU, D.
1959 *The Evolution of the Rural Land Use Pattern in Cyprus.* The World Land Use Survey Regional Monograph 2. Bude, Cornwall, England: Geographical Publications, Ltd.

DIKAIOS, P.
1953 *Khirokitia.* Oxford.

HILLMAN, G.
1972 Plant remains. In *Excavations at Can Hasan III 1969-1970,* by D. French. *Papers in Economic Prehistory,* E.S. Higgs (ed.). : 182-188. Cambridge: University Press.

MILLER, N.F.
1982 *Economy and Environment of Malyan, a Third Millennium B.C. Urban Center in Southern Iran: A Paleoetobotanical Study.* Ph. D. thesis, The University of Michigan, Ann Arbor.

RENFREW, J.
1973 *Paleoethnobotany.* New York: Columbia University Press.

STANLEY PRICE, N.P.
1977 Khirokitia and the initial settlement of Cyprus. *Levant,* 7: 66-89.

VAN ZEIST, W.
1972 Paleoethnobotanical results of the 1970 season at Çayönü, Turkey. *Helinium* 12: 1-19.
1981 Plant remains from Cape Andreas-Kastros (Cyprus). In *Un site néolithique précéramique en Chypre : Cap Andreas-Kastros,* by A. Le Brun. pp. 95-99. Recherche sur les grandes civilisations, Mémoires 5. Paris : Editions ADPF.

VAN ZEIST, W., and BOTTEMA, S.
1971 Plant husbandry in early Nea Nikomedeia, Greece. *Acta Botanica Neerlandica,* 20: 524-538.

WAINES, J.G., and N.P. STANLEY PRICE
1977 Plant remains from Khirokitia in Cyprus. *Paléorient,* 3: 281-284.

ZAITSCHEK, D.V.
1955 Remains of cultivated plants from Afula. *'Atiqot,* 1: 71-74.
1959 Remains of cultivated plants from Horvat Beter (Beersheba). *'Atiqot,* 2: 48-52.

ZOHARY, D., and SPIEGEL-ROY, P.
1975 Beginnings of fruit growing in the Old World. *Science,* 187: 319-327.