PALAEOETHNOBOTANY OF THE WEST HOUSE

- AKROTIRI, THERA -

A CASE STUDY

PLATES

Pl.1 : The water-sieving machine used at Akrotiri.

Pl.2 : The milling installation of room 3A, West House.

Pl.3 : A bronze sickle from L.B.A. Akrotiri
(measurements in cms: length 21.8; breadth 2.1).

Pl.4 : Bulgur-type cracked barley (Hordeum sp.)(hulled).

Pl.5 : Scanning Electron Microscope photograph of the testa of Lathyrus clymenum. Modern charred material X 2000.

Pl.6 : S.E.M. photograph of the testa of cf.L.clymenum.
L.B.A. charred macrofossil from Akrotiri X 2500.

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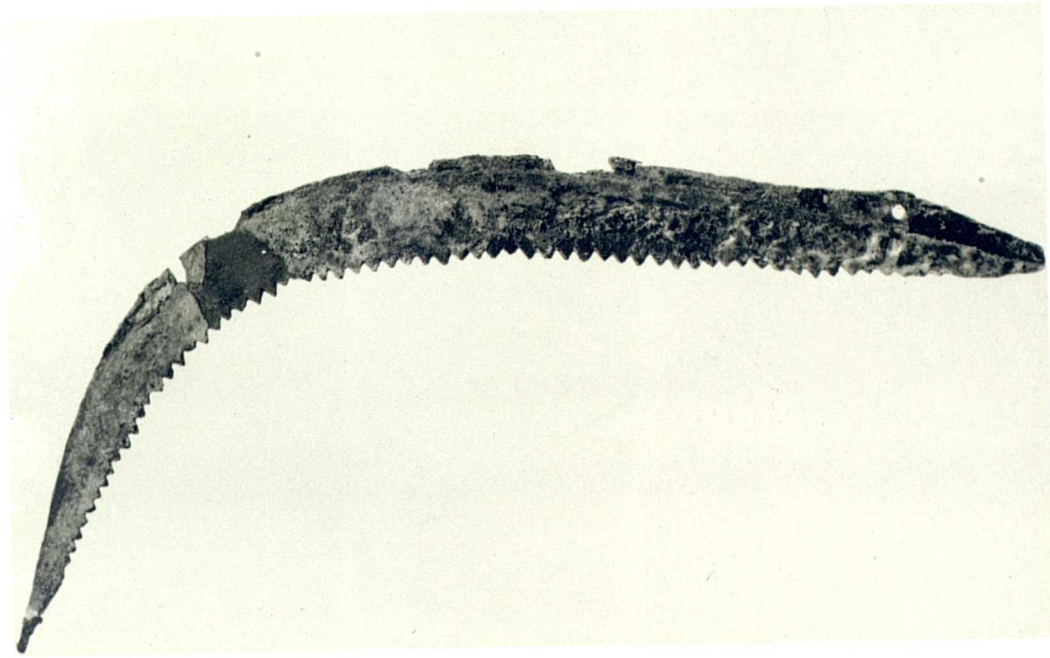

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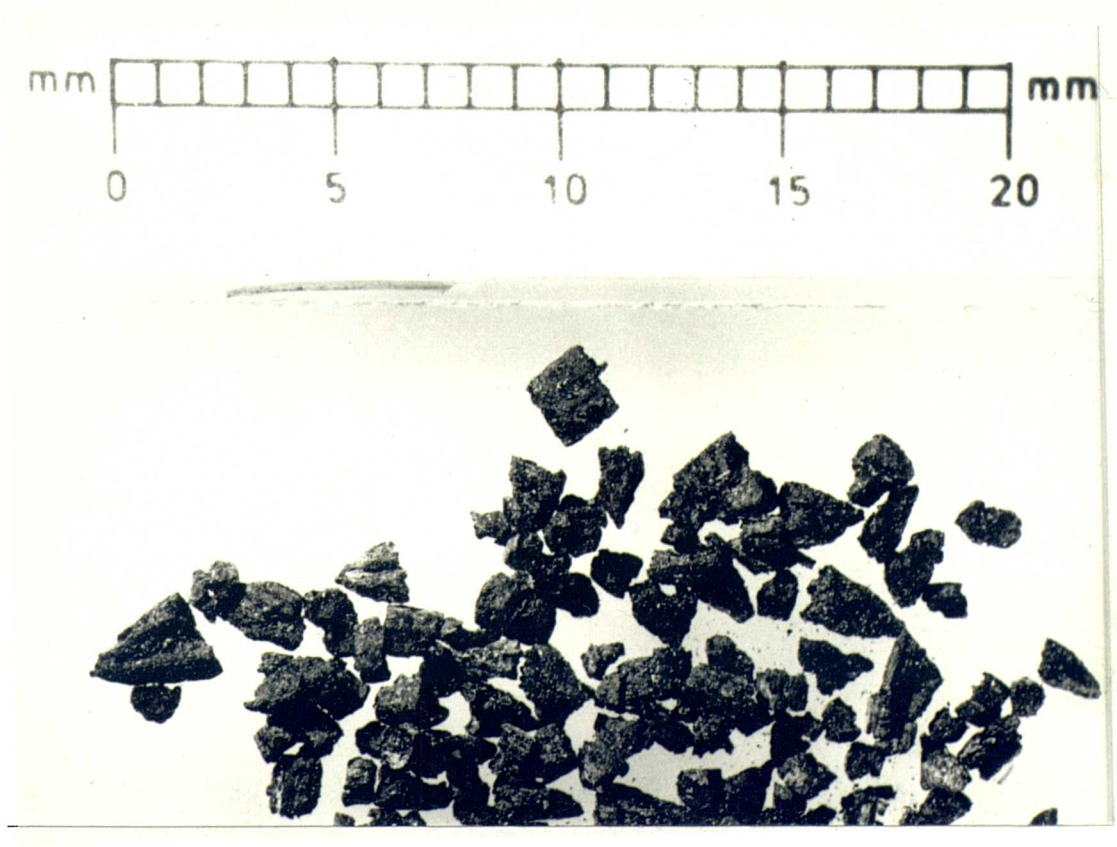

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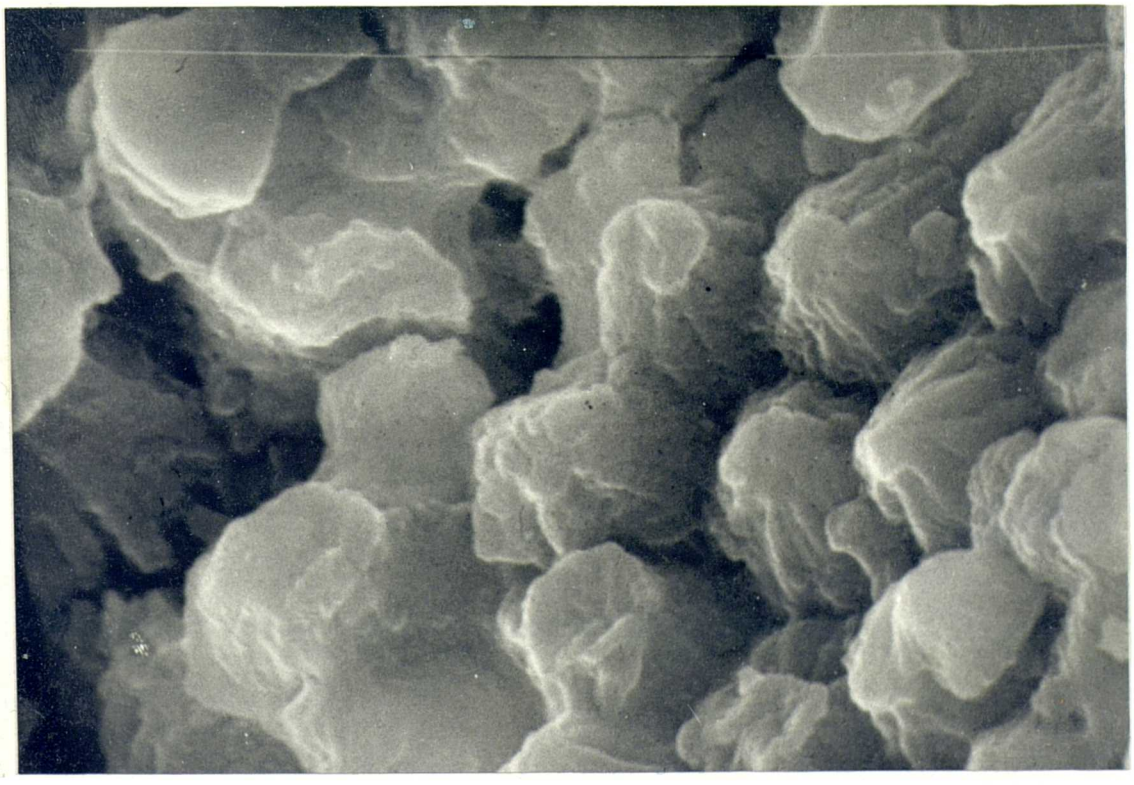

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THE PALAEOETHNOBOTANY OF THE WEST HOUSE

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TABLES

Table 1.1: Meteorological stations of Greece up to 1970
(after E.Biel 1944; World Weather Records 1961-70, Vol.2:486; Alt 1932).

STATIONS	ELEVATIONS (metres)	ELEMENTS CALCULATED
1) Herakleion (Crete) *	27	A,B,D,E,J.
2) Santorini (Thera)	229	A,B,D,E,F,K,I,G.
3) Naxos island	6	A,B,D,E,F,K,I,J.
4) Andros	35	A,B,D,E,F,K,L.
5) Chalkis (Euboea)	11	
6) Kythira	163	A,B,D,E,F,K,I,G,H.
7) Kalamata *	31	
8) Sparta	215	A,B,D,E,F,I.
9) Tripoli	660	A,B,D,E,F,K,I.
10) Nafplion	12	A,B,D,E,F,K,I.
11) Athens (Helliniko) *	107	A,B,C,D,E,F,I,J,G,L,H.
12) Athens (observatory) *	---	
13) Patra *	43	A,B,D,E,F,K,I.
14) Zakynthos *	7	A,B,D,E,F,K,I,G,H.
15) Samos *	---	
16) Trikala	114	A,B,D,E,F,K,I,G.
17) Corfu *	30	A,B,D,E,F,K,I,J,G,H.
18) Larissa *	76	A,B,D,E,I,J,H.
19) Salonika (Sedes) *	2	A,B,D,E,F,I.
20) Kavala	12	A,B,D,E.
21) Drama	100	
22) Araxos *	---	
23) Lemnos *	---	
24) Methoni *	---	
25) Lamia	73	A,B,D,E,F,K,I.
26) Cephalonia (Argostoli)	17	A,B,D,E,F,K,I.

* = have records over 10 years.

KEYS:

A	Temperature and precipitation	B	Relative moisture
C	Daily temperature	D	Overcast sky
E	Number of days of precipitation	F	Number of storms
G	Sunshine	H	Days with sunshine
I	Frost	J	Atmospheric pressure
K	Number of days with hail.		

Table 1.2: Mean monthly temperatures (after Biel 1944; Alt 1938 for yrs.1894-1915)

Station	J	F	M	A	M	J	J	A	S	O	N	D
Corfu.....	10.4	11.0	12.9	15.9	19.9	23.6	26.4	26.4	23.7	19.7	15.5	12.5
Zakynthos...	11.8	12.2	13.8	16.4	20.2	24.0	26.9	27.1	24.7	21.2	16.6	13.7
Kalamata....	10.9	12.0	13.1	16.3	20.0	24.1	27.1	27.1	25.0	21.2	16.1	12.6
Kavala.....	5.3	6.9	9.2	13.9	19.9	23.6	25.6	26.3	21.9	16.9	11.6	8.8
Salonika....	5.4	7.1	10.1	14.0	19.4	23.5	26.6	25.8	22.0	17.5	11.3	7.8
Athens.....	8.8	9.7	11.4	14.6	19.1	23.4	26.5	26.4	22.9	19.0	13.9	11.0
Nafplion....	10.0	10.8	12.6	15.7	20.0	24.4	27.6	27.4	24.3	20.2	15.1	11.8
Trikala.....	4.9	7.3	11.0	15.2	20.6	24.6	28.1	27.8	23.0	17.4	11.0	7.5
Sparta.....	8.8	10.0	12.1	14.9	20.1	24.6	28.0	27.6	24.9	19.6	14.0	10.5
Andros.....	10.3	11.2	12.7	16.0	20.3	24.4	26.6	26.4	23.7	20.0	15.1	12.3
Naxos.....	12.1	12.7	13.9	16.5	20.0	23.5	25.2	25.3	23.5	20.6	16.6	14.0
Kythera.....	11.5	12.0	13.5	16.0	18.8	23.5	27.1	27.6	25.5	21.2	16.4	13.3
Crete.....	11.8	11.6	13.7	16.3	19.4	23.7	26.0	26.0	23.6	20.0	16.3	13.2
Santorini...	10.4	10.8	12.2	14.6	18.4	22.1	24.6	24.7	22.3	19.2	15.0	12.3

Table 1.3: Mean monthly minima C^{o} (after Biel 1944)

Station	J	F	M	A	M	J	J	A	S	O	N	D
Corfu.....	1.1	1.7	3.9	6.1	10.0	14.4	16.7	17.8	14.4	11.1	6.1	2.8
Zakynthos...	3.9	3.9	6.7	8.9	12.2	16.1	18.9	18.9	16.7	13.3	8.3	5.6
Kalamata....	3.3	3.9	5.0	7.2	12.2	16.1	18.3	18.3	16.1	12.2	7.8	5.0
Kavala.....-5.0	-1.7	1.7	5.0	11.1	15.6	17.8	17.8	11.7	8.9	2.2	0.6	
Salonika....	4.4	-2.8	0.6	4.4	10.0	15.0	18.3	16.7	12.8	7.2	0.0	-3.3
Chalkis.....	0.0	0.6	1.7	4.4	10.6	14.4	17.2	17.2	12.8	10.0	3.9	1.1
Athens.....	0.0	0.6	2.2	6.7	10.6	15.0	18.3	18.3	13.9	11.1	5.6	1.7
Nafplion....	0.0	1.1	2.2	5.6	10.0	14.4	18.9	18.3	14.4	11.7	4.4	1.7
Trikala.....-6.7	-2.2	0.0	2.2	7.8	12.2	14.4	14.4	10.6	5.6	0.0	-2.8	
Sparta.....-1.7	0.6	1.1	3.9	8.3	13.3	16.7	16.7	12.2	8.3	2.8	0.0	
Andros.....	1.7	2.8	3.9	7.8	11.1	15.0	18.9	18.9	15.6	12.2	5.6	3.3
Naxos.....	4.4	5.6	6.7	8.9	12.8	16.7	19.4	20.6	16.7	14.4	8.9	6.7
Kythera.....	2.8	3.3	5.6	7.8	11.7	15.0	18.3	18.3	15.6	12.8	7.8	4.4
Crete.....	4.4	4.4	6.1	8.3	11.7	16.1	18.9	20.0	16.1	12.2	9.4	7.2

Table 1.4: Mean monthly maxima C^{o} (after Biel 1944)

Station	J	F	M	A	M	J	J	A	S	O	N	D
Corfu.....	16.7	17.8	21.1	24.4	28.9	32.2	35.0	35.0	32.8	28.3	23.3	18.9
Zakynthos...	16.7	17.8	20.0	23.3	28.3	31.1	33.9	34.4	30.6	27.8	23.9	18.9
Kalamata....	18.9	20.0	21.7	26.7	30.0	33.9	36.7	36.7	34.4	30.0	25.6	20.6
Kavala.....	14.4	14.4	16.7	22.8	27.2	31.1	33.3	34.4	30.6	25.0	20.0	16.1
Salonika....	15.6	17.2	20.0	25.6	30.6	34.4	36.7	37.2	33.3	27.8	21.1	17.2
Chalkis.....	17.2	20.0	22.2	27.2	32.2	36.1	38.9	38.9	35.0	30.0	23.9	20.0
Athens.....	17.2	18.3	21.1	25.0	31.1	34.4	37.2	36.7	33.3	28.9	23.3	18.9
Nafplion....	18.9	20.6	22.2	24.4	30.0	34.4	36.7	37.2	33.9	31.7	25.6	20.6
Trikala.....	16.7	18.9	22.2	28.3	33.3	36.7	40.0	40.6	36.1	30.6	22.8	17.8
Sparta.....	18.9	21.1	22.2	27.2	32.2	35.6	39.4	40.0	36.7	32.8	25.6	20.0
Andros.....	17.8	19.4	21.1	25.0	30.6	33.3	34.4	36.1	32.2	31.1	23.3	20.0
Naxos.....	18.3	19.4	21.7	25.0	28.9	31.7	31.7	32.2	30.6	27.8	23.9	20.0
Kythera.....	16.1	17.2	18.9	23.3	28.3	31.1	34.4	35.0	31.7	27.8	22.2	18.9

Table 1.5: Mean temperature in Co (mean degrees over a period of 10 years, 1961-70) (after WORLD WEATHER RECORDS 1961-70, VOL.II).

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Araxos.....	10.3	10.6	12.5	15.7	20.0	24.1	26.9	27.1	23.9	19.4	15.5	11.9
Athens..... (Helliniko)..	10.4	11.1	12.7	16.6	20.8	25.3	28.1	28.2	24.5	19.6	16.6	12.6
Athens..... (observatory)	9.3	10.2	11.9	15.9	20.5	25.0	27.6	27.5	23.6	18.6	15.7	11.6
Crete..... (Heraklion)..	12.1	12.5	13.9	16.8	20.5	24.7	26.4	26.4	23.5	20.0	17.3	14.4
Kalamata.....	11.2	11.7	13.4	16.4	20.3	24.4	27.2	27.2	24.2	20.2	16.6	13.1
Corfu.....	9.3	10.0	12.0	15.3	19.6	24.0	26.6	26.5	23.0	18.5	15.1	11.4
Larissa.....	4.7	6.9	9.7	14.3	19.8	24.7	27.3	26.8	22.4	16.6	12.0	6.8
Lemnos.....	8.4	9.3	10.7	14.7	19.2	23.4	25.6	25.6	22.2	17.6	14.8	11.0
Methoni.....	11.5	11.8	13.3	15.8	19.3	22.9	25.0	26.0	23.9	20.0	17.0	13.6
Patras.....	9.7	10.2	12.5	16.2	20.4	24.0	26.5	26.9	23.8	19.3	15.2	11.7
Samos.....	10.5	11.0	12.7	16.0	20.0	24.0	25.5	25.5	22.9	19.3	16.5	13.0
Salonika..... (Sedes).....	4.9	7.1	9.8	14.8	19.8	24.2	26.7	26.5	22.4	17.1	12.8	7.3
Zakynthos....	11.9	11.8	13.4	16.1	19.8	24.3	26.8	27.0	24.2	20.0	16.9	13.6

Table 1.6: Highest and lowest temperature in C°

	J	F	M	A	M	J	J	A	S	O	N	D
Lowest	4.7	7.1	9.7	14.3	19.2	22.9	25.0	25.5	22.2	16.6	12.0	7.3
Highest	11.9	12.5	13.9	16.8	20.8	25.3	28.1	28.2	24.5	20.2	17.3	14.4
Difference	7.2	5.4	4.2	2.5	1.6	2.4	3.1	2.7	2.3	3.6	5.3	7.1

Highest and lowest temperature in Santorini

Santorini	(after Alt 1932:180)
Lowest	0.9
Highest	34.2

Table 1.7: Wind direction statistics for Kythera:
percent frequency (after Biel 1944: Table 18)

MONTH	N	NE	E	SE	S	SW	W	NW	C
J	30	9	2	5	8	13	21	10	2
F	24	8	4	6	7	15	29	6	1
M	21	9	6	6	8	10	30	9	1
A	30	10	2	2	6	10	30	10	0
M	26	8	2	2	3	7	43	8	1
J	25	3	1	1	1	4	58	4	3
J	43	8	0	0	0	2	45	1	1
A	42	11	0	0	0	2	42	2	1
S	50	7	1	2	1	6	31	2	0
O	49	8	2	2	3	8	24	4	0
N	48	12	4	5	7	9	12	3	0
D	36	10	3	7	10	14	15	5	0

Table 1.8: Wind direction statistics at Athens:
percent frequency (after Biel 1944:Table 18)

MONTH	N	NE	E	SE	S	SW	W	NW	C
J	14	21	6	5	15	8	5	9	17
F	11	21	6	6	21	9	6	7	13
M	11	19	5	5	17	14	8	6	16
A	9	18	5	4	17	17	10	4	16
M	7	13	4	3	19	18	8	4	24
J	8	12	5	3	17	20	8	4	23
J	17	26	4	2	10	12	5	5	19
A	19	30	3	1	9	10	4	6	18
S	14	30	4	2	10	9	3	4	24
O	11	23	6	5	14	11	5	4	21
N	13	32	7	5	12	7	3	4	17
D	12	20	8	5	15	10	6	7	17

Table 1.9: Wind direction statistics at Samos:
percent frequency (after Biel 1944:Table 18)

MONTH	N	NE	E	SE	S	SW	W	NW	C
J	8	11	14	11	9	2	2	17	26
F	3	5	15	17	12	4	2	18	24
M	4	4	6	10	11	2	4	36	23
A	5	1	5	7	16	3	4	34	25
M	6	1	3	6	11	2	4	41	26
J	5	0	3	6	9	1	3	58	15
J	5	0	2	1	0	0	2	83	7
A	15	1	4	1	0	1	4	70	4
S	15	1	3	1	4	1	3	62	10
O	7	1	5	7	11	2	2	43	22
N	6	3	10	9	14	1	3	23	31
D	6	7	11	12	12	3	3	16	30

Table 1.10: Wind direction statistics of Meltemi winds: percent frequency in July (after Biel 1944:Table 5)

N	NE	E	SE	S	SW	W	NW	C	Stations
62	23	0	1	5	1	0	1	7	Naxos
9	3	0	0	1	1	3	51	32	Herakleion
5	0	2	0	0	0	2	84	7	Samos
4	2	1	6	12	5	6	61	3	Kephalinia

Table 1.11: Average number of days with high wind and wind of gale force (Beaufort 7-12). (after Biel 1944:Table 18)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Patra.....	0.3	1.0	0.4	0.3	0.0	0.0	0.1	0.1	0.0	0.2	0.2	0.3	2.7
Zakynthos...	0.1	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.2	1.3
Kalamata....	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.6
Sparta.....	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Nafplion....	*0.0*	*0.0*	*0.0*	*0.3*	*0.1*	*0.0*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.5*
Athens.....	1.4	1.5	0.8	1.0	1.2	1.3	1.2	1.3	1.5	1.2	3.0	3.8	19.2
Chalkis.....	0.1	0.4	0.3	0.0	0.0	0.1	0.1	0.1	0.3	0.0	0.0	0.0	1.4
Larissa.....	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trikala.....	0.0	1.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.3	0.0	1.6

Table 1.12: Monthly means of precipitation in mm.
(after Biel 1944 & Alt 1932 for the years 1894-1914)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Corfu.....	150	170	87	85	58	32	9	23	74	148	159	211	1217
Zakynthos...	166	132	80	52	37	11	2	9	34	108	213	255	1112
Kavala.....	69	92	67	49	50	42	17	53	34	21	69	79	650
Salonika....	36	38	40	48	58	44	24	30	40	51	69	59	545
Athens.....	54	46	33	23	20	14	8	14	18	36	73	64	406
Nafplion....	54	53	42	23	26	18	8	17	28	60	80	88	503
Trikala.....	85	72	67	50	64	42	19	22	26	76	108	91	735
Sparta.....	107	84	64	48	49	38	17	21	36	77	119	145	818
Andros.....	129	108	71	27	27	14	3	5	21	43	84	127	665
Naxos.....	69	65	34	22	19	3	2	3	14	27	57	71	386
Kythera.....	103	88	49	24	15	19	13	19	22	71	131	129	688
Crete.....	88	96	44	26	19	2	1	4	16	45	87	105	535
Santorini...	62	46	32	20	16	2	2	2	15	21	68	73	362

Table 1.13: Mean precipitation in mm. (percentages over 10 years, 1961-70)
(after WORLD WEATHER RECORDS 1961-70, VOL.II)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Araxos.....	97.7	86.1	51.7	29.9	24.0	15.8	1.1	8.3	14.4	78.4	108.5	176.6
Athens (Helliniko)..	52.8	40.5	36.5	13.0	17.7	6.2	1.4	1.1	14.5	49.1	46.3	78.3
Athens..... (observatory)	57.8	43.5	37.6	14.9	23.7	12.0	2.5	0.8	18.5	48.3	47.5	75.4
Crete..... (Herakleio)..	109.1	97.3	64.0	30.8	15.2	1.4	---	0.1	27.1	106.1	34.3	75.8
Kalamata.....	126.1	93.6	75.9	30.0	26.9	8.3	2.6	11.7	33.8	97.5	127.2	183.8
Corfu.....	158.4	135.7	87.5	67.2	38.5	11.4	4.6	15.5	80.0	133.8	190.2	238.1
Larissa.....	32.8	30.6	36.9	16.3	37.8	24.9	14.5	5.7	35.2	36.5	46.1	62.8
Lemnos.....	95.0	69.2	42.8	15.6	31.1	10.1	11.0	3.6	29.2	35.8	43.2	104.4
Methoni.....	122.6	80.2	66.6	23.5	13.0	6.1	0.4	4.8	25.3	123.8	94.0	163.4
Patras.....	116.4	102.4	59.7	38.1	32.9	11.3	2.8	2.8	21.4	68.9	100.2	182.2
Samos.....	191.5	142.2	84.7	52.4	32.9	0.8	---	0.4	14.2	48.9	103.6	219.2
Salonika..... (Sedes).....	39.1	34.8	43.8	23.8	50.3	34.4	26.7	17.4	26.7	27.4	43.8	57.0
Zakynthos....	166.7	112.6	91.5	26.9	17.2	9.0	2.6	9.8	32.4	196.4	148.7	253.3

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Lowest.....	32.8	30.6	36.5	13.0	13.0	0.8	---	0.1	14.2	27.4	34.3	57.0
Highest.....	191.5	142.2	91.5	67.2	38.5	34.4	26.7	17.4	80.0	196.4	190.2	253.3
Difference...	158.7	111.6	55.o	54.2	25.5	33.6	26.7	17.3	65.8	169.0	155.9	196.3

Table 1.14: Frequency of days with precipitation

Station	J	F	M	A	M	J	J	A	S	O	N	D	Year
Corfu.....	13	13	9	9	7	4	2	2	6	10	11	12	96
Zakynthos...	13	14	10	7	6	3	1	2	5	8	13	15	96
Kalamata....	12	12	9	8	7	5	1	2	5	8	10	13	92
Kavala.....	6	11	8	6	6	7	4	4	5	3	8	9	76
Salonika....	6	6	7	7	6	6	4	3	4	6	7	8	70
Chalkis.....	13	12	11	7	6	5	2	3	5	8	11	12	95
Athens.....	12	11	10	8	7	5	2	3	4	8	12	12	93
Nafplion....	9	10	8	6	6	3	2	2	3	7	9	10	72
Trikala.....	12	13	11	11	9	8	5	3	7	9	11	11	108
Sparta.....	11	10	9	6	8	4	2	2	5	6	10	11	82
Andros.....	12	12	9	5	4	2	1	2	3	5	10	12	75
Naxos.....	12	11	6	6	5	2	0	1	2	4	8	10	64
Kythera.....	7	7	5	2	2	1	0	0	1	4	8	9	46
Crete.....	15	13	10	6	4	1	0	1	2	6	11	12	80

Table 1.15: Number of days with snow (after Biel 1944; Alt 1932)

STATION	J	F	M	A	M	J	J	A	S	O	N	D	YEAR
Corfu.....	0.3	0.3	...	...	...	...	...	...	...	...	...	0.1	0.7
Zakynthos...	0.2	0.7	0.1	...	...	...	...	...	...	...	...	0.2	1.2
Salonika....	1.4	0.7	0.4	0.1	...	...	...	...	...	0.1	0.3	0.7	3.7
Athens.....	1.7	1.2	0.6	0.1	...	...	...	...	...	...	0.3	0.7	4.6
Tripolis....	4.4	3.4	2.0	0.6	...	...	...	...	...	0.1	0.5	1.0	12.0
Naxos.....	0.8	0.9	0.3	...	...	...	...	...	...	...	...	0.4	2.4
Kythera.....	0.0	0.4	0.0	...	...	...	...	...	...	...	...	0.1	0.5
Santorini...	0.6	1.0	0.3	...	...	...	...	...	...	...	...	0.2	2.1
Andros.....	2.0	2.3	0.4	...	...	...	...	...	...	...	...	0.6	5.3

Table 1.16: Duration of sunshine (hours) (after Biel 1944)

STATION	J	F	M	A	M	J	J	A	S	O	N	D	YEAR
Athens.....	149	156	190	215	232	292	364	340	272	210	129	108	2655

Table 1.17: The statistics published in 1964 (Economic and Social Atlas of Greece) give some figures for the present-day agriculture on Thera. A list of the agricultural produce on Thera and the area occupied.

CROPS	Area cultivated (stremmata)
wheat	2774
barley	13925
maslin	5249
sesame	329
legumes	2056
fodder crops	2895
wine grapes	20857
olive trees (1)	58862

Note: Total cultivated area of Thera 69800 stremmata; and 6.72-4.92 stremmata per head.

(1) refers to trees and not area; c.3920 stremmata if 15 trees per stremma.

Table 1.18: Greece (500 mm. rainfall, clay soil): Effect of Rotation and Fertilizers on the yield of wheat.

Treatment	Mean yield over 4 years
	Quintals per ha.
Fertilized continuous wheat (50 units N, 50 units P per ha.)	13.15
Unfertilized green manure/wheat	10.85
Unfertilized fallow/wheat	9.80
Unfertilized fallow/wheat/wheat	9.50
Unfertilized Vicia ervilia/wheat	9.40

Notes: Quintals are equal to 100 Kgs.
The difference in yield between wheat/green manure and wheat/fallow did not pay for the cost of growing the green manure.
The yield of grain from Vicia ervilia must also be considered as well as the extra forage.

Table 1.19: Larissa, Greece: Average yields in two-year rotations, 1937-51 (after Oram 1956:19)

Crops in rotation		Kilograms per ha.			
1st year	2nd year	First crop		Second crop	
		Grain	Straw	Grain	Straw
Wheat	Wheat	993	2096	988	1984
Fallow	Wheat	0	1000 (hay)	1350	2782
Fallow	Wheat	0	450 (hay)	1425	3009
Peas	Wheat	610	1280	1471	2936
Broad Beans	Wheat	1095	1294	1566	3144
Crimson Clover	Wheat	0	2337 (hay)	1559	3067
V.sativa	Wheat	947	2104	1559	3093
Peas(Gr. manure)	Wheat	0	0	1770	3614
L.cicera	Wheat	1344	1741	1727	3127
Lens sp.	Wheat	1028	2014	1728	3308

Table 1.20: Greece:order of economic return from rotation (after Oram 1956:21)

Order	Rotation	Comments
1	Chickpea/wheat	Grain leg.;2 yr.rotation
2	Broad beans/wheat/wheat	Grain leg.;3 yr.rotation
3	Wheat/vetch/wheat or maize	Maize yields very low
4	Continuous wheat	Yields fell > 3-4 yrs.
5	Fallow/wheat	Income 2/3 of any other

Table 1.21: Labour requirements in a mountainous district of northern Greece (after Clark & Haswell 1967:155) (All calculated in hours \ man equivalent-women 0.75 man units \ month)

Month	Available Labour(a)	Domestic Labour	Family Labour(b) on farm	Family Labour not on farm	Unused Family Labour %	Non-Family Labour; Hired
Jan	216	70	35	111	42	--
Feb	221	64	54	103	35	--
Mar	250	67	78	105	31	5
April	275	73	90	112	32	6
May	320	63	132	125	33	18
June	341	56	193	92	21	26
July	347	51	246	50	10	25
Aug	382	55	240	57	12	20
Sept	319	59	168	92	23	11
Oct	275	66	113	96	24	10
Nov	250	68	49	113	37	1
Dec	216	73	38	105	35	--
	3380	716	1438	1226	28%	124

(a) Sundays and public holidays are excluded from the calculations.
(b) Child labour is included in figures for summer months-maximum assumed for man is 300 hours per month.

Table 1.22: Estimates about labour requirements on specified land use categories from Messenia (after van Wersch 1969:75)

LAND USE CATEGORIES	LABOUR REQUIREMENTS IN MAN-DAYS per 0.1 ha.(stremma) per year
Dry field crops	2
Irrigated field crops	17
Dry tree crops	5
Irrigated tree crops	18
Vine crops	10
	53

Table 1.23: Estimates of labour needed for oil and vine cultures, as well wine production (after Aschenbrenner 1972:55 & 1976:163).

Olive culture:	
Ploughing area around trees	1 man /day / 4 stremmata
Harvesting fruit	1 man /day / 20 kg.oil / c.80-120 kg. of fruit
Pressing	1 man / day / 70 kg. oil (animal and human power only)
Vine culture and wine production:	
Hoeing	1 man / 2 days / stremma
Pruning & collecting cuttings	1 man / 1 day / stremma
Fertilizing	1 man / 1 day / stremma
Harvest & transport	1 man / 6 days / stremma
Total	1 man /10 days / stremma
Wine making	1 man / 2 days / stremma

Table 1.24: Calendar of crop activities on Santorini before the use of weed-killers.

Preparing fields	Ploughing	Manuring	Planting	Harvesting	Inter-cropping	Eating parts
Vines	3 times a)January a November c b)February a & c March c c)April- May a & c	--------	---------	September		grapes & wine
Panicum sp.	----------		March a	May a	in vineyards a1,b,c	eaten as rice
L.clymenum	December b	no manure a & b	Oct-Jan a & b	May-Jun b	in fields b	seeds & greens e
Hordeum sp. (2 species)	October a	manure a (15-30 August)	October a	June c	in vineyards a	flour & 'bulgur' a
?Vicia articulata	February c overturned with ard when green manure	---------	November c	May-Jun		
L.cicera	----------	---------	---------	--------		
P.sativum	----------	---------	---------	April c		

Note: For information on informants seeing the next page

Notes: Letters after comment refer to informers

a) Epiphanis Alifrangis (Akrotiri village) (2-4-1982)
The best 'arakas' grows in vineyards but is only planted once and not in successive years, otherwise it can destroy the vineyard.

b) Spyros Arvanitis (Akrotiri village) (4-8-1983)
Ard is used to plough the vineyards so that roots will not be destroyed.

c) Stathis Arvanitis (Akrotiri village) (4-8-1983)
30 years ago they used green manure.

d) Michalis Alifrangis (Akrotiri village) (8-8-1983)
In the old days ?Vicia articulata was eaten together with L.clymenum.

e) Maroussi Baika (Akrotiri village) (7-8-1983)
The tips of L.clymenum were collected around the 15th March and were eaten boiled as greens.

Table 1.25: Quantities planted and harvested, data from present-day Santorini.

PLANT	SEED QUANTITIES	AREA PLANTED	HARVEST	YIELDS	VOLUME INCREASE
'arakas'**	c.15 Kg. c.10 Kg.if in hot position	1 'Zevgaria'= 3 stremmata	40 Denekedes*d 20 " " b (good yield) 10 Denekedes b (bad yield)	600-300 Kg. 100 kg.	20-40 times
'faki'	same	same	same	same	
barley	c.40 Kg.	1 'Zevgaria'	60 Denekedes b (good yield) 20 Denekedes (bad yield) b	260-780 Kg.	6.5-19.5 times

* 1 deneke of legume = c.15 kg.of seed
1 deneke of cereal = c.13 kg.of seed
** 13-14 okades in vineyards,and 12-10 okades in fields
*** In the 2nd year in a field it grows 30-40% less without manure and c. 15-20% less with manure
**** Lentils yield 30-120 Kgs./stremma; peas yield 40-200 Kgs./stremma (after Arnon 1972,II:240, 235).
**** Letters under harvest refer to informers (cf. Table 1.24)

Table 1.26: Crop processing at Santorini

CROPS	THRESHING	SIEVING
'Arakas'	on threshing floor	firstly sieved with large mesh (sieve of arakas) followed by fine mesh (sieve of sand),thirdly, what is left is again sieved with large mesh.(a)
Barley	on threshing floor (in old days, when harvested they pulled the crop,but now,for speeding threshing,they cut it with sickles)(b)	?

* Letters at the end of comments refer to informers (cf. Table 1.24)

Table 1.27: Labour/production at Santorini

THRESHING FLOOR	TIME NEEDED FOR THRESHING	QUANTITIES PRODUCED
1 'zevgari' barley =60 'denekedes'= 80 'dematia'	3 days with 7-8 animals(b)	780 kg.
1 'zevgari' araka =20 'denekedes'= 40 'dematia'	1 day with 7-8 animals(b)	300 kg.

NOTES: 1 'demati' = 3 'angalies'
2 'dematia' = transport capabilities of one donkey
3 'dematia' = transport capabilities of one mule
Letters at end of comments refer to informers
(cf. Table 1.25)

Table 2.1: Pollen analysis from a rodent coprolite found in sample 77, Akrotiri. Prelimary results from Hunt, C.O. (Unpublished)

SPECIES	PERCENTAGES
Cereal	60.8
Gramineae	13.7
Linum	0.8
Juniperus	0.8
Pinus	0.8
Glaux	0.8

Table 3.1: Oven regimes (after G.Wilson 1984:203)

Run		Treatment	Batch/Regime
1	16 hr.	Dry, solo	1
		Dry in soil	2
	250 °C	Wet, solo	3
		Wet in soil	4
2	30 min.	Dry, solo	5
		Dry in soil	6
	350 °C	Wet, solo	7
		Wet in soil	8
3	30 min.	Dry, solo	9
		Dry in soil	10
	550 °C	Wet, solo	11
		Wet in soil	12

Table 3.2: Twelve oven regimes: charred (C), Retrievable (R), Identifiable (I) (after G.Wilson 1984:205)

	1	2	3	4	5	6	7	8	9	10	11	12
Allium	CRI	CRI	CRI		CRI	CRI	CRI				CRI	
Pastinaca			CRI									
Petroselinum		CRI										CRI
Portulaca			CRI									
Atriplex	CRI		CRI	CRI								
Thymus		CRI										
Salvia				CRI								
Lens		CRI	CRI			CRI						
Pisum			CRI		CRI	CRI						
Linum	CRI											
Plantago				CRI								
Brassica						CRI						
No. of survivors per regime	3	4	6	3	2	4	1	0	0	0	1	1

Note : Refer to table 3.1 for the description of the different temperature regimes.

Table 4.1: L.B.A. sites on the island of Thera

Key:

▲ Building ● Open Settlement

□ Burial ✳ Trace

Site name	Excavated or not	Known periods of occupation	Symbol used	References
Akrotiri	Exc.1867 by Mamet 1967-74 by Marinatos 1975- by Doumas	Neolithic (?)-E.C.II & III; M.C. - L.C.I (L.M.IA)	●	Marinatos 1968-1974; Doumas 1983; Doumas 1975-85
Kamaras	Exc.1899 by Zahn not exc.; maybe E.of Akrotiri	L.M.IA	▲	Gaertringen 1904:39; Fouque 1879; Sperling 1973
Kokkino Vouno		L.M.IA	▲	Sperling 1973
Katsades		L.M.IA	✳	Sperling 1973; Doumas 1983
Archangelos	Visited by Doumas 1978	E.C. L.M.IA	▲	Doumas 1983; Sperling 1973
Balos	Exc. by Gorceix & Mamet;	L.M.IA	▲	Fouque 1879:107, 118-120; Mamet 1874; Doumas 1983
Megalochori		L.M.IA	□	Sperling 1973
North of Profitis Ilias		L.M.IA	▲	Sperling 1973
Phira Quarry	Rescue during removal of volcanic ash	E.C.II	□ ✳	Sperling 1973
Therasia Alaphouzos Quarry	Excavated by Fouque	L.C.	●	Fouque 1879; Sperling 1973; Doumas 1983
Mavromatis Quarry		L.C.	▲	Doumas 1983:45
Megalochori Quarry		L.C.	●	Doumas 1983
Karageorghis Quarry	Not excavated Items found by J.C.B.	M.C. L.C.	□	Doumas 1983
Ftellos	Excavated	L.C.I	●	Doumas 1983; Arch.Eph. 1973:161
Oia Quarry		L.C.	●	Doumas 1983:129
Akrotiri Koloumbo	Not excavated (Vases reported found)	L.C.I	□	Hope Simpson & Dickinson 1979; BSA 1956:13
Exomiti	Not excavated	L.C.I	●	Gaertringen 1904, Vol.III, p.42; Simpson & Dickinson 1979

Table 4.2: Estimated approximate population densities, expressed in number of persons per square kilometre (after Renfrew 1972b:394, Table 3)

	NEOLITHIC	E.B.A.	M.B.A.	L.B.A.
Cyclades	1.20	13.8	8.1	11.6
Crete	1.53	9.8	26.1	31.3
Euboea	1.35	10.3	10.7	12.4

Population estimate for Thera in the L.B.A.
if it was c.100 sq.kms, based on the table above.

THERA	120	1380	810	1160

Table 4.3: Comparison of the number of L.B.A. sites as detected through surveys, with the number of communities recorded in the census of A.D. 1916 (after Renfrew 1972b:396, Table 4)

	L.B.A.SITES	COMMUNITIES IN 1916
Cyclades	32	119
Crete	284	581
Euboea	49	159

Table 4.4: Period by period comparison of observed settlement densities in selected regions in Greece. Figures exclude locations known only through cemeteries. The figures in brackets include such cemeteries (after Renfrew 1972b:385, Table 1)

	NUMBER OF SITES PER 1000 SQUARE KMS				
	NEOLITHIC	E.B.A.	M.B.A.	L.B.A.	TOTAL
Cyclades	4.0	20.5 (50.9)	7.2	12.9	33.0 (63.8)
Crete	5.1	13.6	23.2	34.7	46.2
Euboea	4.5	15.2	9.5	13.8	23.0

Settlement estimates for Thera if it was c.100 sq.kms.

Thera	0.4	2.0	0.7	1.2

Note: according to these estimates Thera should have had only one site in the L.B.A.

Table 4.5: Crop yields for the Cyclades in 1916, and Thera before the days of mechanical agriculture in Greece (after Wagstaff & Gamble 1982:174, and my own data for Thera, see Chapter 1)

	CYCLADES		THERA	
	SEED	YIELD	SEED	YIELD
Wheat	17.5	46.08	-	-
Barley	17.5	71.68	13.0	260-86
Vegetables	17.0	51.00	-	-

Note: Yields and seeds are in Kg. per stremma.

Table 4.6: Amount of land required to support 1 person at the consumption levels found in Crete, 1948 (after Wagstaff & Gamble 1982: 174)

	AVAILABLE FOR CONSUMPTION (Kg)	CONSUMPTION/PERSON/ YEAR (Kg)	AREA REQUIRED/ PERSON / ha
Wheat	285.8	107.0	0.37
Barley	541.8	29.2	0.54
Vegetables	340.0	108.5	0.32
Total			1.23

Table 4.7: Annual consumption of major food groups in Crete and Greece (after Allbaugh 1953:107)

	CRETE 1948 Kg./capita/year	GREECE 1948-49 Kg./capita/year
Cereals	128	158
Pulses & nuts	23	15
Veg./fruit/olives	132	120
Meat/fish/eggs	28	23
Oils/fats	31	15
Milk/cheese	35	35
Other	84	78
TOTAL	458	443
Calories/day	2,554	2,443

Table 4.8: Protein scores for wheat and barley
(after FAO/WHO 1973)

	PROTEIN SCORE
Wheat flour	49
Wheat bread	47
Barley flour	63
Barley bread	62

Table 4.9: Protein scores for wheat and barley
(after Gottschalk & Muller 1983:502-3)

	TRUE PROTEIN DIGESTIBILITY (%)	NET PROTEIN UTILIZATION (%)	NET DIETARY PROTEIN CAL.(%)
Wheat flour	96.0	53.0	5.7
Wheat bread	95.0	53.0	5.9
Barley flour	88.0	62.0	8.3
Barley bread	85.0	58.0	7.9

Table 4.10: Estimate of inhabited area in square metres, based upon sampling by the author

AREA SAMPLED in sq. m.	BUILT AREA (a)	OPEN SPACES	MULTIPLY X 2 IF 2 STOREY
1725 (b)	813 (b)	912 (b)	1626
10,000	4713	5287	9426
200,000 (1)	94,260	105,743	188,520
1,720,000 (2)	810,643	909,357	1,621,286
2,740,000 (3)	1,291,373	1,448,627	2,582,746

Notes:

(a) = built area where wall widths are included in these estimates.
(b) = calculations are approximate to 1 sq.m. and accuracy decreases for larger denominations, sampling carried out by author
(1) = estimate by Ch.Doumas for the extent of the site
(2) = catchment area A of assumed extent of site (Fig 4.3)
(3) = catchment area A+B of assumed extent of site (Fig 4.3)

Table 4.11: Population estimate based on respective (Table 4.10) inhabited area.

NARROLL'S MODEL			MODEL			SUMNER'S ESTIMATE
10m/person			16m/person			100-200 people per settlement ha (2)
1 storey/2 storey			1 storey/2 storey			1 storey/2 storey
81	162		----	----		----
471	942		294	589		100-200
9426	18852	(1)	5891	11782	(1)	2000-4000
81064	162128		50665	101330		17200-34400
129137	258274		80711	161422		27400-54800

Notes:

(1) = if we take the population of c.28000 of Thera before World War II as indicative of what might have happened in the L.B.A., these estimates seem sensible.
(2) = these calculations seem less likely (i.e. 50-100 sq.m./person) as public places must have been included within this estimate whereas we substracted them.

Table 4.12: Population estimate of the West House based on the the area of the house.

	NARROLL'S ESTIMATE	16M/PERSON	SUMNER'S ESTIMATE (1)
First floor (83.3 sq.m.)	8	5 (2)	c.1
Ground & First (146.95 sq.m.)	14	9	c.2

Notes:

(1) = another reason why Sumner's model could not be applied at Akrotiri
(2) = most probable (see text)

Table 4.13: Possible land use in L.B.A. Akrotiri site catchment area

	AREA (ha)	(Stremmata)	% OF TOTAL AREA
Akrotiri city (Area A)	172	1720	2.9
Akrotiri city (Area A+B)	274	2740	4.6
Sea & Harbours	1963	19630	33.3
Grazing	225	2250	3.8
Arable (if city only A)	3531	35310	59.9
Arable (if city A+B)	3257	32570	55.3
Total	5891	58910	99.8

Table 4.14: Amount of land to supply the subsistence needs and the labour requirements to work that land based upon the population estimates for an estimated settlement area of 200,000 sq.m.

	POPULATION ESTIMATE	LAND REQUIRED (ha)	LABOUR REQUIRED man-power (1)
Narroll's	9426-18852	18852-37704	5386-10772
16 sq.m Model	5891-11782	11782-23564	3366-6732
Sumner's	2000-4000	4000-8000	1142-2285

Notes:

Note that Thera covered an area c.10.000 ha before the collapse (1600 B.C.) but as the population before World War II was c.28.000 we could say that the needs per person were 0.2 ha (2 stremmata).

(1) calculated at 3.5 ha per person (Clark & Haswell 1967:145)

Table 4.15: Amount of land required for each population estimate

(a) Area A

	POPULATION ESTIMATE	LAND REQUIRED (ha)	LABOUR REQUIRED man-power
Narroll's	81064-162128	162128-324256	46322-92644
16 sq.m. Model	50665-101330	101330-202660	28951-57902
Sumner's	17200- 34400	34400-68800 (1)	9828-19657

(1) The only possible estimates as all of the others need a larger area than the island could provide.

(b) Area A+B

	POPULATION ESTIMATE	LAND REQUIRED (ha)	LABOUR REQUIRED man-power
Narroll's	129137-258274	258274-516548	73792-147585
16 sq.m. Model	80711-161422	161422-322844	46120-92241
Sumner's	27400-54800	54800-109600	15657-31314

Table 4.16: Population estimate, amount of land, labour required, and storage required for the West House (after Narroll and the 16m/person model)

POPULATION ESTIMATE	LAND REQUIRED ha	stremma	LABOUR REQUIRED man-power (1)	STORAGE REQUIRED Kg./annum (2)
5 PEOPLE	10	100	3 PEOPLE	2290
8 PEOPLE	16	160	5 PEOPLE	3664

Notes:

(1) = Clark & Haswell 1967:145 refer to 3.5 ha per man per year including a small amount of pasture.
(2) = storage calculated on figures from Crete (Table 4.7) where 458 Kg./annum/adult.

Table 4.17: Pay allocation for Mycenean manual work (after Was 1975:7).

CLASS OF WORKER	PER DAY
WORKER	2 khoinikes barley or 1 khoinix wheat/millet/figs plus 3 kyathoi of olive oil
SUPERVISOR (worker in palace administration)	2 khoinikes barley plus 1 1/3 khoinikes of wheat or equivalent 4 kyathoi of olive oil

Table 4.18: Resources available from domestic animals. (after C. Gamble 1982:162)

RECURRENT	NON-CURRENT
Wool,hair	Hides
Manure	Furs
Traction/transport	Bone
Protection	Horn
Hunting/herding aids	Meat
Prestige	
Use in social transactions	
Entertainment	
Milk	
Surplus young stock	
Dairy products	

Table 4.19: Identified species from Akrotiri (after Gamble 1978:746).

ECONOMIC CLASS	BONES	TEETH	TOTAL
PRIMARY			
Sheep/goat	1202	850	2052
Pig	319	221	540
Cattle	181	72	253
			2845
SECONDARY			
Dog	10	7	17
Red deer	3		3
Small equid	1		1
SUPPLEMENTARY RESOURCES			
Fish			35
Birds			24
Hare	23		23
MISCELLANEOUS			
Homo sp.	1	1	2

Table 4.20: Estimates for the sheep/goat ratio (after Gamble 1978:750).

ELEMENT	SHEEP	GOAT	METHOD
Horn cores	13	24	Inspection
Scapula	11	11	Inspection
Distal humerus	21	10	Inspection
Meta carpal	14	1	Measurement
Meta tarsal	12	3	Measurement

Table 4.21: C14 dates of samples from Thera, not associated with destruction level at Akrotiri.

LAB. No.	MATERIAL	5568 HALF-LIFE B.C.	MASCA CORRECTION FACTOR B.C.	PROVENIENCE
P-1401	Wood	1456±43	1870-1770±40	Phira quarries
P-1697	Beans	1122±57	1450-1400±60	Between Akrotiri & Megalochori
L- 362	Wood	1420±100	1750-1710±100	Phira quarries
P-1601	Olive	1408±57	1730-1690±60	
P-1602	Pine	1446±42	1870-1720±40	
P-1891	Shrubs	1526±67	2000±70	
K-3227	Charcoal		1450 B.C. C14 1770 B.C. CAL.	
P-1697	Beans		1450-1400±60	

Sources: H.N.Michael 1978; G.A.Weinstein & P.P.Betancourt 1978; B.Fishman et al.,1977; A.Meulengracht et al.,1981; B.Fishman & B.Lawn 1978; Weinstein & Michael 1978

Table 4.22: C14 dates from the destruction level of Akrotiri

LAB. No.	MATERIAL	5568 HALF-LIFE B.C.	MASCA CORRECTION FACTOR B.C.		COMMENT
LONG-LIVED SAMPLES					
P-1599 a	Conifer	1144±150	1460±160		
P-1619 a	Wood	1022±71	1300-1270±70		Sample undersized
P-1601	Olive		1730-1690±60		
P-1602	Pine		1870-1720±40		
P-1888	Shrubs?		1490±50		
P-1889	Shrubs	1348±52	1680-1660±50		
P-1892	Shrubs	1381±52	1690±50		
P-1894	Shrubs	1357±65	1680±70		
P-1895	Shrubs	1374±51	1690±50		
P-1890	Pine		1710-1690±60		
P-1893	Pine		2600±70		
P-1891	Shrubs?		2000-1960±70		
P-1619	Charcoal		1300-1270±70		
P-2792	Organic		3670±180		
P-2793	Organic		3300±140		
SHORT-LIVED SAMPLES					
P-1885	Seeds	1296±48	1630-1600±50		
P-2560 a	Legumes	2040±70	2590±70	5/10	41.0 gms
P-2791 a	Legumes		3340±60	5/10	
P-2561 a	Legumes	1860±60	2290-2190±60	16	37.8 gms
P-2562 a	Legumes	940±190	1180-1160±200	16	31.8 gms
P-2564 a	Cereals	1100±190	1390-1370±200	22	23.6 gms
P-2566 a	Cereals	886±180	1100-1030±190	22	22.8 gms
P-2795 a	Cereals		3380±170	22	
P-2565	Legumes	1370±60	1680-1660±70	?14	36.58 gms
P-2794	Legumes		3180±50	1	
K-3228	Legumes		1390 B.C. C14 1700 B.C. CAL.	1	
P-2559	Legumes	1430±70	1750-1710±70	1	41.5 gms

Sources: H.N.Michael 1980; H.N.Michael 1978; G.A.Weinstein & P.P.Betancourt 1978; B.Fishman et al.,1977; A.Meulengracht et al.,1981; B.Fishman & B.Lawn 1978; Weinstein & Michael 1978.

a = Sample undersized

KEY TO TABLES

All the seeds in the following tables are charred except when marked otherwise.

S	=	SEED
E	=	EMBRYO
0.0	=	WEIGHT IN GRAMS
F	=	FRAGMENT
FK	=	FORK
FS	=	FRAGMENTS
M	=	MINERALIZED
L(S)	=	LEAF(LEAVES)
+	=	PRESENT (NOT QUANTIFIED)

Table 5.1: Macrofossil plant material collected from the L.B.A. site of Akrotiri by the late Professor Marinatos and Prof. Ch.Doumas

AREA	NO. OF SAMPLES	PROCESSED
Sector Delta (Xeste 1)	72	5
Sector Alpha (Arvaniti)	15	1
Sector Beta	1	-
Sector Gamma	--	-
House of the ladies	2	-
Xeste 3	24	3
Xeste 5	1	-
Xeste 4	--	-
West House	62	62
TOTAL	172	71

Note: Under the heading 'processed' are the samples from other areas than the W.House which have been included in this thesis.

Table 5.2: Xeste 3, rooms 7 and 10, sampled and water-floated in 1981, with respective context and volume of earth processed

SAMPLE NO.	AREA	CONTEXT	VOLUME OF EARTH (ZEMBELIA) (1)	VOLUME OF EARTH IN LITRES (2)
1	Xeste 3, Room 7	Soil between 1st floor & Ground floor	8.00	272.0
2	Xeste 3, Room 7	2.58 m.from Stable point	4.50	153.0
3	Xeste 3, Room 7	2.68-2.58 m.	3.00	102.0
4	Xeste 3, Room 7	2.78-2.68 m.	5.75	193.0
5	Xeste 3, Room 7	2.90 m.	11.00	374.0
6	Xeste 3, Room 7	3.00 m.	10.00	340.0
7	Xeste 3, Room 10	3.00 m.	9.50	323.0
8	Xeste 3, Room 7	3.05-3.10 m.	11.75	397.0
9	Xeste 3, Room 7	Between pots 4 & 6	0.50	17.0
10	Xeste 3, Room 10	Contents of Pot 2	0.25	8.5
11	West House	Soil from Drainage pipes	0.20	6.8
12	Xeste 3, Room 10	Near delta 1	0.20	6.8
13	West House	Drainage pit	1.75	57.0

(1) 1 zembeli = a large bucket-like container holds soil which weighs c.34 Kg.

(2) 1 kilogram of soil = 6.50 cubic cm or 1.53 litres

Table 5.3: Mean processing time for the various types of samples and including time for sorting under the microscope. Work on site and identification is not included.

TYPE OF SAMPLE	MEAN TIME NEEDED Min/Gram
Crops	30
Chaff	15
'Bulgur type'	25
Legume frags	20
Other	5

Note: In samples which do not have seeds a time was not recorded.

Table 5.4: Crops of cf.Lathyrus clymenum from the West House

	SAMPLE Nos.							
	1	5/10	9	14	16	20/29	65	TOTAL
No.of seed crop	5710	2103	431	787	717	3004	114	12866
Weight in grams	220.68	77.24	12.62	28.43	81.29	105.78	06.36	532.4
CONTAMINANTS								
Lathyrus cicera/sativus	1313	343	9	17	96	432	16	2226
L.cicera/sativus(end of pod)	366	78	4	4	30	125	11	618
L.cicera/sativus(infested)	42	8			2	13		65
Lens esculenta	333	110	5	2	23	98	1	572
L.esculenta(infested)						1		1
Pisum sativum	2	2		2	5		1	12
Legume fragments		(7.36)	(0.72)	(2.65)	(03.02)	(8.7)	(0.53)	(22.98)
Triticum sp.			1 F					1 F
T. cf.monococcum			1+F					1+F
Hordeum hulled grain	11+E	37+E	7+E		3E	14+E	2E	74+E
hulled assymmetric		15	1	6				22
hulled symmetric		14						14
sp.(bulgur-type)	9FS	(3.2)	(0.02)	(0.18)	(0.72)	(0.07)	2FS	(4.19)+11FS
Gramineae	4+E	9	2		1		1	17
Coriandrum sativum						46		46
WEEDS								
cf. Thesium sp.	6FS	1+F						1+7FS
Polygonaceae	2							2
cf. Rumex/Polygonum	1+FS				1+1MIN			2+FS+1MIN
Emex spinosa	10+FS					2FS		10+FS
Silene nutans	25	10				7		42
S.cf. nutans					3			3
S.behen		2						2
Silene sp.							1	1
S. cf. compacta/gigantea							1	1
cf. Caryophyllaceae	1							1
Petrorhagia sp.						1		1
P. cf. velutina/glumacea					1			1
Papaver cf. somniferum		1						1
P. cf. rhoeas		3			1			4
Glaucium sp. (cf.corniculatum)						1		1
cf. Vicia/Lathyrus				1				1
Ornithopus sp.	1+F				1			1+F
cf.Euphorbiaceae	1							1
cf. Cruciferae	1							1
cf. Rutaceae	1							1
Thymelaea cf. hirsuta(leaves)	C.23	3+2FS			1	2		29+2FS
Umbelliferae	2			2+F				4+F
cf. Rubiaceae	1							1
Sherardia arvensis	500	39+FS		2	17	55	1	614
Boraginaceae						4FS		4FS
Buglossoides arvensis	7+FS	3+F		1+FS	3+4FS	3+4FS		17+FS
Echium sp.		1						1
cf. Labiatae	1							1
Plantago cf. lagopus	1							1
cf. Compositae	4							4
Chrysanthemum cf. segetum					2 MIN			2MIN
cf. Circium arvense		1						1
Calendula arvensis	2+F				1			3+F
cf. Liliaceae				1				1
Ignota (type A)	19	3		1	1	3		27
Ignota (type B)		3						3
Ignota	20	10		1	3	6		40
Ignota indet.	+	+	+	+	+	+	+	+
Total	7996	2713	455	824	880	3672	138	16678

Table 5.4a: cf.Lathyrus clymenum crop
(Sector Delta)

	SAMPLE Nos. 40	41/42/43	TOTAL
No.of seed crop	281	13	294
Wt. (grams)	16.96	?	?

CONTAMINANTS	SAMPLE Nos. 40	41/42/43	TOTAL
Lathyrus cicera	7	-	7
L.cicera (end of pods)	2	-	2
Lens esculenta	2	-	2
Pisum sativum	2	-	2
Lupinus cf. albus	24	-	24
Legume sp.	14	-	14
Hordeum vulgare (hulled)	-	5S	5S
Linum usitatissimum	-	4	4
Shells	-	1f	1f

Table 5.5: Schematic table based on the results from the analysis of variance of the following crops: cf.L.clymenum, L.cicera/sativus, Lens, Hordeum sp., as well as the segetal Sherardia arvensis throughout the the same samples.

	SAMPLE Nos.						
1	5/10	9	14	16	20/29	40	65
LATHYRUS CLYMENUM							
60	60	60	60	60	60	60	60
LENGTHS					shortish	long	short
BREADTHS					narrowish	broad	narrow
THICKNESS					thinnish	thick	thin
SIZE					smallish	big	small
LATHYRUS CICERA/SATIVUS							
20	20	3	12	20	20	3	3
LENGTH					shortish	long	short
BREADTH					--------	broad	narrow
THICKNESS					thinnish	thick	thin
SIZE					smallish	big	small
LENS ESCULENTA							
30	30	5	2	23	30	2	
DIAMETER		smallish	biggish			biggish	
THICKNESS		thin	thickish			thickish	
SIZE		small	big			big	
HORDEUM SP.							
	23	1	3				
LENGTH	largish	large	small				
BREADTH	broadish	broad	narrow				
THICKNESS	thickish	thick	thin				
SIZE	largish	large	small				
SHERARDIA ARVENSIS							
30	23			10	30		
LENGTH	longish	long		medium	short		
BREADTH	broadish	broad		medium	narrowish		
THICKNESS	thickish	thick		medium	thin		
SIZE	largish	large		medium	small		

Note: The numbers indicate the number of seeds measured from each sample.

Table 5.6: Percentages of contamination by weeds in cf. Lathyrus clymenum crop.

	SAMPLE Nos.											
	1	1	5/10	5/10	14	14	16	16	20/29	20/29	65	65
WEEDS												
cf. Thesium sp.	+		1.4									
Polygonaceae	0.4											
cf. Rumex/Polygonum	0.2						6.2					
Emex spinosa	1.8											
Silene nutans	4.3	0.5	13.2	0.5					6.0	0.3		
S. cf. nutans							9.4	0.4				
S. behen			2.7									
Silene sp.											25	0.9
S. cf. compacta/gigantea											25	0.9
cf. Caryophyllaceae	0.2											
Petrorhagia sp.									0.9			
P. cf. velutina/glumacea							3.1					
Papaver cf. somniferum			1.4									
P. cf. rhoeas			4.0	0.15			3.1					
Glaucium sp.(cf.corniculatum)									0.9			
cf. Cruciferae	0.2											
cf. Vicia/Lathyrus					14.3	1.15						
Ornithopus sp.	0.2											
cf. Euphorbiaceae	0.2											
cf. Rutaceae	0.2											
Umbelliferae	0.4				2.8	0.3						
cf. Rubiaceae	0.2											
Sherardia arvensis	85.6	8.8	51.4	1.9	28.6	0.3	53.2	2.4	47.5	1.8	25	0.9
Buglossoides arvensis	1.2		4.0	0.15	14.3	0.15	9.4	0.4	2.6	0.1		
Echium sp.			1.4									
cf. Labiatae	0.2											
Plantago lagopus	0.2											
cf. Compositae	0.7											
cf. Circium arvense			1.4									
Calendula cf. arvensis	0.4						3.1					
cf. Liliaceae					14.3	1.15						
Ignota (type A)	3.3	0.4	4.0	0.15	14.3	1.15	3.1		2.6			
Ignota (type B)			4.0	0.15								
Ignota	3.5		13.2		14.3	1.15	9.4	0.4	5.2			

Note: The first number of each sample refers to the ratio of contamination of weed to the other weeds, while the second refers to the ratio of particular weed to the crop.

Table 5.7: Cumulative percentages of contamination by contaminants and weeds in cf.Lathyrus clymenum crop

	SAMPLE Nos.							
	1	5/10	9	14	16	20/29	40	65
Total no. of seeds	7996	2713	455	824	880	3672	330	138
Total no. of crop	5710	2103	431	787	717	3004	281	114
Wt. of sample(grams)	220.68	77.24	12.62	28.43	81.29	105.78	16.96	06.36
% of whole sample	4.04	35.0	72.0	50.0	3.0	3.7	90.0	50.0
Wt. of crop/60 seeds	0.95	0.72	0.45	0.79	0.71	0.85	1.72	0.25
% of crop in sample	71.5	77.5	94.5	95.0	81.5	81.2	85.1	82.6
% of cf. L.clymenum infestation	3.9	2.0		1.3	2.0	2.2		
% of L. cicera infested	3.2	2.3			2.0	3.0		
No. species of contaminants	4	4	4	5	4	3	4	4
No. of contaminants (seeds)	1702	534	22	30	131	552	49	20
First contaminant	<-------- Lathyrus cicera/sativus -------->						Lupinus L. cf.albus	cicera
% of contamination	16.5	12.7	2.0	2.1	11.0	12.0	7.3	11.6
Second contaminant	Sher. arvensis	Lens	<---- Hordeum ---->		<-Lens->		L. cicera	----
% of contamination	6.3	4.1	1.8	0.8	2.6	2.7	2.1	----
Third contaminant	Lens	Hordeum	Lens	---	Sherardia arvensis		---	----
% of contamination	4.2	2.5	1.1	---	2.0	1.5	---	----
Fourth contaminant	all other contaminants/weeds, less than 1.0 %							
No. of species of weeds	21	13	1	6	11	10		4
% of contamination of crop	28.5	22.5	5.3	4.5	18.5	18.2	14.9	17.4
No. of weeds (seed no.)	584	76	2	7	32	116		4
% of contamination by weeds	7.4	2.8	0.5	0.9	3.7	3.2		2.9

Table 5.8: Crops of Lens esculenta

	SAMPLE Nos. 13/73	17	37/61	Total
No. of seeds of crop	317	3866	232	4415
CONTAMINANTS				
cf.Lathyrus clymenum	16	6	96	118
Lens esculenta s.l.	33	11		44
Lathyrus cicera/sativus	9	6	27	42
Legume frags	(01.27)	(02.05)	(4.32)	(7.64)
Legumes sp.		82	40	122
Vicia cf. ervilia			13	13
Pisum sativum			44	44
Triticum dicoccum s.l.		1		1
Hordeum hulled grains sp.(bulgur type)	(00.01)	1+11FS	2E+4FS	3+15FS (00.01)
Gramineae		1		1
cf. Vitis stalk			1F	1F
cf. Festuca	1			1
WEEDS				
cf. Caryophyllaceae			1	1
Silene cf. nutans/nocturna		1		1
cf. Reseda luteola			1	1
Ornithopus cf. compressus		17+40FS		17+40FS
cf. Malvaceae		1		1
cf. Rubiaceae (cf. asperula)		1		1
Sherardia arvensis		27	18	45
Galium aparine		8+FS	5	13+FS
Boraginaceae	2FS			2FS
Buglossoides arvensis		2		2
cf. Teucrium sp.			1	1
Ignota	1F	5		5+1F
Ignota indet.	+	+	+	+
TOTAL	376	4036	480	4892

Table 5.9: Cumulative percentages of contamination by contaminants and weeds in Lens esculenta crops

	SAMPLE Nos.		
	13/73	17	37/61
Total no. of seeds	376	4036	480
Total no. of crop	317	3866	232
Wt. of sample (grams)	3.95	27.85	61.23
% of whole sample	50	50	10
% of crop in sample	84.3	95.7	48.3
% of lens infestation		0.8	
No. of lens infested		31	
No. of cf. L. clymenum infested			3
No. of L. cicera infested			?
No. of contaminant sp.	3	4	4
No. of contaminant (seeds)	27	14	180
First contaminant	cf.L clymenum	L. cicera	cf. L.clymenum
% of contamination	4.2	0.3	20.0
Second contaminant	L.cicera/ sativus	Sherardia arvensis	Pisum sativum
% of contamination	2.4	0.7	9.2
Third contaminant	L.cicera/ sativus	Ornithopus	L.cicera/ sativus
% of contamination	----	0.4	5.6
Fourth contaminant	----	----	Sherardia arvensis
% of contamination	<1.0	<1.0	3.7
No. of species of weeds	4	9	5
No. of weeds (seed no.)	5	63	26
% of contam of crop (weed & contam)	2.4	1.9	43.0
% of contam by weeds	1.3	0.3	5.4

Note: ? = not quantifiable

Table 5.10: Crop of Pisum sativum in Sample No. 31

No. of seed in crop	[9]
CONTAMINANTS	
cf. Lathyrus clymenum	[2]
cf. Lathyrus cicera/sativus	[1]
cf. Lens esculenta	[1]
Legume fragments	(0.61)
WEEDS	
cf. Polygonaceae	1
Sherardia arvensis	2
Ignota indet.	2
TOTAL	18

Note: The figures in square brackets [] indicate that the seeds were very damaged

Table 5.11: Crops of Hordeum sp. (hulled)

	SAMPLE Nos. 2	71
No. of seeds in crop	943	216
Wt. of sample (grams)	83.62	49.57
HORDEUM		
Hordeum hulled grains s.l.		57
2-row/lax eared	6	1
6-row/dense eared	1	1
Hulled symmetric grains		38
Hulled assymetric gr.		31
CONTAMINANTS		
cf. Lathyrus clymenum	18	
Lathyrus cicera/sativus	2	
Pisum sativum	1F	
Lens esculenta	12	
Leguminosae	2	
Triticum cf. monococcum		1
Hordeum		
Fragments	(15.15)	(1.61)
2-row rachis intermode		1
6-row rachis intermode		5
Indet. rachis intermode		11
6-row culm node (ear)		1
culm bases		3
chaff(awns-lemma etc.)	(0.16)	(0.75)
lemma indet.		1
cf. Avena sp.	1	
Hordeum / Avena (?)lemma		1
Gramineae	14	4
Ficus carica		1
Olea europaea	2FS	
WEEDS		
cf. Lolium temulentum		2
Silene cf. behen		1F
Silene cf. nutans	1	
cf. Sinapis arvensis	1	
Buglossoides sp.	1+2FS	
Buglossoides arvensis		3
Thymelaea cf. hirsuta (leaves)	1	1
Shell		FS
Schoenus cf. nigricans	1	
Ignota	5	5
Ignota indet.	+	+
Total	1012	361

Table 5.12: Samples of chaff and/or flour

	SAMPLE Nos.													
	3	12 *	19	21 **	24	25	26	33 **	38 **	39 **a	46 **	60	58 **a	59 **b
Wt. of sample	18.95	10.02	07.79	07.35	07.97	27.99	17.27	05.52	14.19	08.08	55.89	16.29	7.88	13.56
% of sample	25.0	25.0	12.5	12.5	c.50.0	c.50.0	6.2	6.2	3.1	12.5	c.50.0	12.5	3.1	6.2
CONTAMINANTS														
Legume fragments						2FS					1F			
Triticum sp.grains										1F				
Triticum sp. awns										(.02)				
Hordeum(hulled) assymmetric					1									
2-row lemma base					1									
lemma base indet					1									
lemma awn(cf.hordeum)					2									
(hulled) frags		+			+4E	+			(.04)		(.05)	(.02)		
6-row rachis internode					15									
2-row rachis internode					12									
cf.2-row/lax-eared rachis internode					6									
					73									
culm/rachis intersection					13									
culm internodes			1		13									
culm bases					4									
culm fragments					(.17)	(.01)								
chaff fragments													+	+
awns	(.28)	+	+	(1.28)	(.10)	(.08)	(.02)	+	(.06)		(.07)	(.01)		
Gramineae indet.					1+1F				9E	3FS				
Ficus carica											2			
WEEDS														
cf. Caryophyllaceae											2			
Papaver cf. hybridum											2			
Cruciferae											2			
cf. Echium sp.		1+FS												
cf. Echium/Buglossoides sp.	1				1									
Labiatae											1			
Chrysanthemum(cf.segetum)					1F									
Carex sp.(cf.distans)											1MIN			
Ignota	1				1					1		1		
Ignota indet		FS									4			

Notes: * Perhaps it is a very fine bulgur-type sample.
** Classified as flour.
**(a) Residue is very dark -organic content high- wheat flour?
**(b) Residue is dark but lighter than **(a) -barley flour?
(one would presume that due to some chaff adhering to the grain which would contain silica).

Table 5.13: Triticum monococcum, Lens, Hordeum sp. in the store (Sample No. 78)

% of sample	50
CROPS	
Lens esculenta	172
L. sp. s.l.	0.07
Lens (infested)	17
T. monococcum (one & two seeded)	80
T. monococcum s.l.	0.38
Hordeum sp. (hulled)	34
H. (bulgur-type)	0.45
awns (Hordeum & Triticum)	+++
lemma & palaea	++
culm node	1F
WEEDS	
Emex spinosa	1F
Silene sp. (S.cf.nutans)	36
Papaver sp.	1F
cf. Cruciferae	4
cf. Teucrium sp.	1
cf. Malvaceae	1
Plantago sp. (cf. lagopus)	9
Sagittaria cf. sagittifolia	18
Ignota	1
Ignota indet.	6
Total	381

Notes: +++ most of chaff (not quantifiable)
++ less (not quantifiable)

Table 5.14: Proportion of the MASLIN crops; percentages of contamination in Sample No. 78.

Total No. of seeds	381
Total No. of crop (Lens, T.monococcum Hordeum sp.(hulled)	303
Wt. of sample (grams)	41.33
% of whole sample	50
Wt. of Lens sp.	0.07
Wt. of T.monococcum s.l.	0.38
Wt. of Hordeum sp.	0.45
No. of crops	3
% of Lens sp./other	62.4
% of T.monococcum s.l.	26.4
% of Hordeum sp.(hulled)	11.2
No. of contaminants	----
No. of species of weeds	9
No. of weed seeds	78
% of contamination by weeds	20.5
% of Lens infestation	9.9

Table 5.15: Water floated samples from Xeste 3, rooms 7 and 10

	SAMPLE Nos.										
	81(1)	81(2)	81(3)	81(4)	81(5)	81(6)	81(7)	81(8)	81(11)	81(12)	81(13)
CROPS / CONTAMINANTS:											
cf.Lathyrus clymenum	2	5	1	4	7	5	9	6			
Lens esculenta	2+4FS	4	5	2	3	4	8	2			
Pisum sativum	15	6	5	15	23	23	44	21		1	1
P. sativum s.l.				1				3			
Lathyrus sativus/cicera	1										
Lathyrus cicera/sativus	2	3		2	3	2	7	3			
Legume sp.	8	2		3			42				
Legume fragments	0.25	0.16	0.16	0.32	0.74	0.61	3.13	01.14	4FS	3FS	4FS
Vicia cf. ervilia			2	4							
Vicia/Lathyrus sp.						1		10			
Olea europaea	1+0.41		0.23	0.45	0.49	2+0.45	1.63	2+0.83	4FS	0.07	0.11
Ficus carica	28	17	28	45+FS+3H	23	70+FS+5H	18	27+FS+1H	4+FS+2H	18+23H	9+100H
cf. Ficus carica			1								
Hordeum hulled grains	9	15	10	5	9	17	61	26			
assymetric grains	2	3	5	17	10	10	24	12			
symmetric grains	5	6	3	9	7	6	14	6			1
fragments				00.04	00.23			0.30			5FS
Triticum								1			
cf. monococcum spikelet fk.											
Cereal grains indet.	2				19		1+ST	1		1F	1H
Vitis vinifera											
SEEDTALS/RUDERALS/OTHER											
Cerealia			1E								2FS
Shell				1F		3FS	1				
Vitis cf. sylvestris											
Chenopodium sp.	1					1					
Caryophyllaceae											
cf. Silene sp.			1					1			1
Silene nutans											1H
Silene colorata											
Cucubalus baccifer			1								
Rumex/ Polygonum sp.	1+F			2	1						
Rumex cf. acetosa		1				3					
R. sp.(cf. R.acetosella)						1					
cf. Papaveraceae						1					
Papaver (cf. dubium)											
Silicaceae			1								
Urtica cf. dioica	1				1						
Capparis spinosa											
cf. Cruciferae			2			1					1
Cruciferae (cf. Erucastrum)											
cf. Resedaceae	1										
cf. Resedaceae (cf. R.luteola)											
Rosaceae (cf.Potentilla sp.)			1								
cf. Leguminosae	6							2			1
Trifolium sp.	25	4	8		3						2
T. sp.(cf. campestre)				4		8					2
T. cf. arvense						4					
T. cf. glomeratum						1					
T. cf. scabrum								1			
T. cf. micranthum								1			
cf. Trifolium sp.									1		
Vicia cf. villosa			4	5	10			1			
Erodium sp.			2								
cf. Malva sp.					2						
cf. Malvaceae					1	1					
Thymelaea cf.hirsuta(leav.)						1					
Thymelaea cf.hirsuta						1		1			
Guttiferae cf. Hypericum			1								
Sherardia arvensis							1				
Boraginaceae(cf. Echium sp.)								1			
Origanum sp.(cf.O.virens)	1										1H
Labiatae		1									1
Satureja sp.		1									
S. sp.(cf. S.thymbra)			1								
cf. Melissa sp.			1								
cf. Nepeta sp			1								
Thymus sp.											1
Compositae	1		2	1							
Solanaceae (cf.Hyoscyamus)			1								
cf. Hyoscyamus niger				1F							
Onopordum cf. acanthium								4H			
Chrysanthemum segetum						1	1				1
Juncus cf. acutus							1				
cf. Juncus sp.								1	1		
Schoenus nigricans											1
Lolium cf. temulentum							1				
Ignota		10			4						

Table 5.16: Samples of Legume fragments

	SAMPLE Nos.							
	7	23/28 (*)	35	36	44	47	54 (*)	55 (*)
Wt. of sample	08.63	5.57	45.69	122.67	16.96	45.11	09.85	25.29
Quantity of sample used	1/8	1/2	1/16	1/2	all	spoon	1/32	1/16
% of sample	12.0	50.0	6.0	50.0	100	?	3.0	6.0
Wt. of Legume FS	0.3	<*>	<*>	>16.2	3.8	<*>	<*>	<*>
CONTAMINANTS								
cf. Lathyrus clymenum	3		7		3			3
Lathyrus cicera/sativus			13					
Lens esculenta	2		40					
Pisum sativum			9					
Vicia cf. ervilia			6					3
cf. Lupinus sp.					2			
cf. Coriandrum sativum					1F			
Linum usitatissimum					4			
Linum cf. usitatissimum (tops)					28			
Stalk (cf. V. vinifera)					7FS			
Leguminosae			7		1			7
Gramineae						1F		
Hordeum sp.			11FS					3FS
Hordeum sp. awns				+few			1F	+v.few
Graminae culm internode				1				
Ficus carica	1	1			1			
cf. Ficus carica			1F					
WEEDS								
Silene sp.			1		7			
Silene cf. nutans								1
Polygonum sp.			3FS					
Polygonaceae					1F			
Polygonaceae(cf. Rumex)			3FS					
Rumex(cf. angiocarpus)					1			
cf. Compositae		5MIN		1				
Sherardia arvensis			24	1F				29
Galium aparine			2+3FS					
cf. Medicago sp.						1		
Calendula arvensis					1			
cf. Echium/Buglossoides							3FS	
Buglossoides arvensis			1	20+FS				
cf. Labiatae			2					
cf. Prunella sp.				1				
cf. Arctium sp.					1			
Plantago lagopus			1					3
Shell(cf. Pinus pinea)					1F			
Ignota			1	1				3
Ignota indet.	+	4	7FS	+	+	+	+	+

Notes: (*) These three samples could be legume flour
+ Present
<*> legume fragments but in powdery form.

Table 5.17: Samples of cracked Hordeum (bulgur-type)

	SAMPLE Nos.							
	4	11	15	18	22	32	34	75
Wt. of sample	22.07	09.24	05.09	05.10	30.94	73.37	53.43	1052.10
% of whole sample	20.0	6.0	100.0	25.0	14.0	9.0	4.0	12.0
Hordeum sp. frags(wt. gms.)	00.34	00.20	00.07	00.04	00.52	00.11	00.57	00.22
CONTAMINANTS								
Hordeum silicified embryo	10				4	22		
symmetric grain				1				
assymmetric grain				2				
sp. rachis (cf. distichum)							1	
2-row lemma base	1							
indet lemma base	1							
awns, lemma etc.	0.57				+	+	+	0.01
Triticum sp.						2FS		
T. sp. awn							1F	
Lens esculenta						2+FR		2
Legume fragments						14FS	2+4FS	3FS
Leguminosae					3		2	
WEEDS								
Gramineae	1			2		4FS	2	1F
cf. Polygonaceae					1		1F	
Silene sp.					1+F			
S. nutans							7	
S. cf. behen							3+1F	
Caryophyllaceae							3	
cf. Compositae					1		1	
cf. Erodium							1	
cf. Rubiaceae					1			
Sherardia arvensis		1			2		1	
Echium sp.								14
Allium cf. subhirsutum/ neapolitanum								1
cf. Juncus (cf. subulatus)								1
Ignota	1			1	1		3	
Ignota indet.					11+2FS		2FS	
Total (weeds)	2	1	0	3	18+3FS	4FS	21+4FS	16+F

Table 5.18: Cumulative table of Hordeum sp. fragments (bulgur-type)

	SAMPLE Nos.							
	4	11	15	18	22	32	34	75
No. of contaminants					1	3	2	1
No. of contaminants (seed No)					3	2+17FS	2+5FS	2+3FS
First contaminant					Legume	FS Lens	Legume	Lens
Presence of weeds	1	1	—	2	6		10	2
No. of weed seeds	1	1		3	7		21	14+F
% of contamination(*)	7.1	100		50	28		80.7	87.5

NOTE: (*) should be cautious of this estimate

Table 5.19: Contaminated samples

	SAMPLE Nos.					
	8	48	49	50	70	77
Wt. of sample	16.66	?	?	?	04.89	100.93
Quantity of sample	1/8	?	?	?	1/4	100.0
% of sample	12.5				25.0	100.0
CONTAMINANTS						
Hordeum hulled grains			2		1F	
assymmetric grains			2	1		
symmetric grains			2	1		
Rachis internode					1F	
awns					2FS	1
cf. Triticum awn						1
Indet. awn						1
Pisum sativum			3			
cf. Lathyrus clymenum			1			
cf. L. clymenum s.l.			1			
Lens esculenta				1		
Lathyrus cicera/sativus				1F		
Leguminosae			6FS	2FS		2FS
Vitis vinifera				1		
Olea europaea		2FS	3			
Coriandrum sativum					1F	
WEEDS						
cf. Chenopodiaceae					1	
cf. exocarp					12FS	
Plant frag. indet.						
Schoemus nigricans	1					1

Table 5.20: Insect infestation of crops/contaminants at Akrotiri (storage samples), here the numbers indicate the actual number of seeds showing infestation, and the percentage is a percentage of the total crop sample.

	SAMPLE Nos.															
	1		5/10		14		16		20/29		17		37/61		78	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
L.clymenum	221	3.9	23	2	10	1.3	14	2	68	2.2	—	—	3	3.1	—	—
L.cicera/ L.sativus	42	3.2	8	2.3	—	—	2	2.0	13	3.0	—	—	*?	*?	—	—
Lens sp.	-	—	—	—	—	—	—	—	1	1.0	31	0.8	—	—	17	9.9

NOTE: *? = not quantifiable because seeds were very eroded and it was impossible to tell whether cavities were due to erosion or weevil infestation.

Table 5.21: Insect infestation of crops (water-floated samples), numbers indicate the actual number of seeds in a crop sample showing signs of infestation, and the percentages show the percentage this represents of the total crop sample.

	SAMPLE Nos.					
	81(4)		81(6)		81(8)	
	n	%	n	%	n	%
Pisum sativum	1	6.7	-	-	-	-
Olea europaea	-	-	2FS	-	2FS	-

Note: FS = fragments

Table 5.22: Measurements in mm. of Linum seeds from Akrotiri (L.B.A.).

Measurements of L.usitatissimum from Akrotiri:

LENGTH	BREADTH	THICKNESS
3.2	1.7	---
3.6	2.0	0.9

As compared to the measurements for Linum bienne:

	LENGTH	BREADTH
Helbaek 1959c:107	2.4	2.7
van Zeist 1975:218	2.6	2.7

Table 5.23: Some botanical data on the segetal/ruderal plant species we find at Akrotiri.

Plant species	A	B	P	Alt.	Waste	Track Road	Prair	Ht.Pl.
Urtica dioica			+	500-2700			+	30-150
Thesium sp.	+	or+	or+					
Silene behen	+			0-1400	+			10-90
S. nutans		+(!)	+					30-60
S. compacta		+	+(!)	0-2100			+	-120
S. colorata	+			0- 800	+			10-30-50
Cucubalus baccifer			+	-1400		+		
Petrorhagia velutina	+			0- 400	+			-50
P.glumacea			+					-50
Emex spinosa	+			0				-30
Chenopodium sp.	+							
Polygonum persicaria	+		+?					15-50
Rumex acetosa			+				+	30-50
R. acetosella			+				+	
Papaver dubium	+			0-1000	+			-60
P. somniferum	+							30-<120
P. rhoeas	+			0-1400				20-<90
P. hybridum	+			0-1300	+			-40
Glaucium corniculatum	+	+(!)		0-1350				-40
Capparis spinosa				0-1800	+			-120
Sinapis arvensis	+			0-1800	+	+		20-60
Reseda luteola		+		800-1500	+	+		-100
Ornithopus compressus	+			0- 300	+			10-50
Trifolium campestre	+	+		0-2200	+	+	+	30-50
T. arvense	+			0-2300	+		+?	5-30
T. glomeratum	+			0- 200	+			10-30
T. scabrum	+			0-1100	+		+	6-20
T. micranthum	+			0-1100	+			10-30
Vicia villosa	+	+(!)		3 -1700	+			15<120
V. ervilia	+			0-1700	+	+		8-70
V. tetrasperma	+			20-1950	+			15-80
Thymelaea hirsuta			+	0				40<140
Hypericum sp.			+					
Coriandrum sativum	+			320-1300				10<70
Sherardia arvensis	+			0-1500		+		4-20
Galium aparine	+			30-1800	+			10<180
Buglossoides arvensis	+			0-2500	+			10<90
Origanum virens			+	0-2500				-120
Satureja thymbra			+	0- 400	+			20-40
Thymus sp.			+					
Teucrium sp.	+(!)	+(!)	+					
Prunella sp.			+					
Hyoscyamus niger	+(!)	+		0-2300	+	+		20-100
Plantago lagopus	+(!)							<20
Onopordum acanthium		+		600-2600	+	+	+	30-150
Chrysanthemum segetum	+			0-1250	+	+		10-70
C. glabrum								
Circium arvense			+	15-2500			+	20-100
Calendula arvensis	+			0-2000				5-30
Sagittaria sagittifolia			+					
Arctium sp.		+						
Juncus acutus			+	0- 150				15-150
J. subulatus			+	0			+	
Schoenus nigricans			+	0-2000				10-70
Carex distans			+				+	30-50
Lolium temulentum	+			0-1300				20<120

Key: A = annual; B = biennial; P = perennial;
Alt = altitude; waste = waste places;
track/road = trackside/ roadside;
prair = prairie; Ht. Pl.= height of plant;
(!) = short-lived perennial.

REFERENCES: Hanf, M. 1983; Meikle, R.D. 1977; Salisbury 1964;
Brenchley, W.E. 1911; Brenchley, W.E. 1920;
Holzner, W. & Numata, M. 1982; Polunin, O. & Huxley, A. 1965
Flowers of the Mediterranean London: Chatto & Windus.

Table 5.24: Soil preferences of weeds

	Type	moisture	ph	nitrogen
Urtica dioica	S/LM	WET		HIGH
Thesium sp.	UBIQUITOUS AMONG ALL CROPS AND ALL SOILS			
Silene behen				
Silene nutans				
Silene compacta				
Silene colorata		DRY		
Cucubalus baccifer				
Petrorhagia velutina	C/S	DRY		
P. glumacea	C/S	DRY		
Emex spinosa	S			
Chenopodium sp.				
Polygonum persicaria				
Rumex acetosa				HIGH
R. acetosella	S/LM	WET	ACID	LOW
Papaver dubium	H/LM	DRY		
P. somniferum	L/S		BASIC	
P. rhoeas (*)	L/S/LM		BASIC ?	HIGH
P. hybridum	S/LM	DRY	BASIC	
Glaucium corniculatum		DRY/SAL	?	HIGH
Capparis spinosa		DRY		
Sinapis arvensis	C/CLAY	WET	ACID	ME/HG
Reseda luteola		DRY	?	
Ornithopus compressus	S	DRY		
Trifolium campestre		DRY		
T. arvense	S/L	DRY	ACID	
T. glomeratum		WET ?		
T. scabrum	C	DRY	?	
T. micranthum	S			
Vicia villosa		WET	UBIQUITOUS	
V. ervilia			ACID ?	HIGH
V. tetrasperma		WET	ACID	
Thymelaea hirsuta	S			
Hypericum sp.				
Coriandrum sativum			?	
Sherardia arvensis (*)	LM		BC	LOW
Galium aparine	L	?		HG
Buglossoides arvensis (*)		DRY	BC	LOW
Origanum virens				
S. thymbra	C			
Thymus sp.				
Teucrium sp.				
Prunella sp.				
Hyoscyamus niger		WET ?		HIGH
Plantago lagopus (*)		DRY	BC ?	
Onopordum acanthium		DRY		
Chrysanthemum segetum (*)	S/L/NC	WET-ME	ACID	
C. glabrum				
Circium arvense	GREAT DIVERSITY OF SOIL TYPES			
Calendula arvensis (*)	CLA/LM	WET-LOW	BASIC	LOW
Sagittaria agittifolia		WET		
Arctium sp.				
Juncus acutus		WET		
Juncus subulatus		SAL		
Schoenus nigricans		WET		
Carex distans		WET		
Lolium temulentum	C	WET-LOW	BASIC	?

KEY:
S = sandy; L = light; NC = non-calcareous
C = calcareous; CF = calcifuge; LM = loam
AD = acid; BC = basic; ? = indifferent
ME = medium; HG = high; HD = humid
SAL = saline

REFERENCES: Hanf, M. 1983; Meikle, R. D. 1977; Salisbury 1964; Brenchley, W. E. 1911; Brenchley, W. E. 1920; Holzner, W. & Numata, M. 1982; Polunin, O. & Huxley, A. 1965 Flowers of the mediterranean. London: Chatto & Windus.
(*) = All weeds with asterisks are information from G. Jones (1983b) on Amorgos, Cyclades, Greece.

Table 6.1: Classification of weeds according to headedness (free or headed)

Plant species	heads	not heads
Urtica cf. dioica		
Thesium sp.	+ a	
Silene behen	+ a	
Silene nutans	+ a	
Silene cf. compacta	+ a	
Silene colorata	+ b	
Cucubalus baccifer		
Petrorhagia cf. velutina	+ b	
P.glumacea	+ b	
Emex spinosa	+ b	
Chenopodium sp.		
Polygonum cf. persicaria		
Rumex cf. acetosa		
R. cf. acetosella		
Papaver cf. dubium	+	
P. cf. somniferum	+ a c	
P. cf. rhoeas	+ a c	
P. cf. hybridum	+ c	
Glaucium cf. corniculatum	+ b	
Capparis spinosa	+ b	
cf. Sinapis arvensis		
cf. Reseda luteola		
Ornithopus compressus	+ b	
Trifolium cf. campestre	+ b	
T. cf. arvense	+ b	
T. cf. glomeratum	+ b	
T. cf. scabrum	+ b	
T. cf. micranthum	+ b	
Vicia cf. villosa	+ b	
V. ervilia	+ b	
V. cf. tetrasperma	+ b	
Thymelaea cf. hirsuta		
cf. Hypericum		
Coriandrum sativum		(1)
Sherardia arvensis	+ a	
Galium aparine	+ b	
Buglossoides arvensis	+ a	
Origanum cf. virens	+ b	
S. cf. thymbra	+ b	
Thymus sp.	+ b	
Teucrium sp.	+ b	
cf. Prunella sp.		
cf. Hyoscyamus niger		
Plantago cf. lagopus	+ b	
Onopordum cf. acanthium		
Chrysanthemum segetum	+ a	
cf. Circium arvense	+ b c	
Calendula arvensis		(1)
Sagittaria sagittifolia		
cf. Arctium sp		
Juncus cf. acutus		
Juncus cf. subulatus		
Schoenus nigricans		
Carex sp.(cf. distans)		
Lolium temulentum		

KEY: (a) = after G.Jones 1983 b, table 4.11;
(b) = R.Butcher 1961, A New Illustrated British Flora, 2 Vols. London.
(c) = Hillman 1984b: 24; headedness and winnowability of seeds should be considered as two close parameters where winnowability is the ratio of its surface area to its weight $mm^2 \times g^{-1}$.
(1) = not in heads but large when attachments are present.

Table 6.2: Pottery types which contained macrofossil plant remains

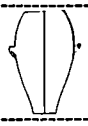
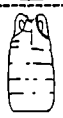
POTTERY TYPES	LATH. CLYM.	LENS	LEG. FRAGS.	PISUM	HORDEUM	BUL-GUR	CHAFF	MASLIN	CONTAM.
	*				*				
							!		
	+		* (1) + (1)				*		!
	! (2)								
	*	*				* (1) + (1)			
			+		+				
						+	*		
			*			*			
		+	+				* (3)		
			+			! (1) * (1)			

Table 6.2: Cont....

POTTERY TYPES	LATH. CLYM.	LENS	LEG. FRAGS.	PISUM	HORDEUM	BUL-GUR	CHAFF	MASLIN	CONTAM.
						*	* (1) + (1)		
	!								
	*								
	*								
?		! (3)		! (1)		!		!	
----			(1)				(4)		(4)
	*								
			*						

Notes: * = Decorated pottery
+ = undecorated
! = not known if decorated or not
No. = refer to the number of pots; if no number mentioned it is taken as representing one pot.

Table 6.3: Schematic distribution of variation/similarities within the cf.L.clymenum crops. Relative size measurements based on the results of the analysis of variance, are shown for samples of the same crop.

These eight samples can be split into six groups, where two of them (Group A & Group B) are shown in the table.

SAMPLE Nos.	L.clym.	L.cicera	Lens	Hordeum	Sherardia arvensis	% weed contamin.	Types of contam./ weeds
65	60 V.SMALL	08 V.SMALL		00	00	2.9	L.cicera 11.6 ---- ----
40	60 BIG	03 BIG		00	00	----	Lupinus cf. albus 7.3 L.cicera 2.1
20/29	60 SMALL	10		00	30 SMALL	3.2 + Group A	L.cicera 12.0 Lens 2.7
16	60	10		00	10	+ 3.7	L.cicera 11.0 Lens 2.6
14	60	04	LARGE	03	00	0.9 + Group B	L.cicera 2.1 Hordeum 0.8
9	60	04	SMALL	01	00	+ 0.5	L.cicera 2.0 Hordeum 1.8
5/10	60	10		23 LARGE	23	2.8	L.cicera 12.7 Lens 4.1
1	60	10		00	30 LARGE	7.4	L.cicera 16.5 Sherardia arvensis 6.3

Note: The number in the top right hand corner of each square refers to the number in the sample

THE PALAEOETHNOBOTANY OF THE WEST HOUSE

- AKROTIRI, THERA -

A CASE STUDY

FIGURES

Fig. 1.1:

Late Bronze Age sites from the island of Thera:

1. Akrotiri
2. Kamaras
3. Kokkino Vouno
4. Balos
5. Katsades
6. Archangelos
7. Exomiti
8. North of Profitis Ilias
9. Megalochori
10. Ftellos
11. Akrotiri Koloumbo
12. Oia Quarry
13. Phira Quarry
14. Karageorghis Quarry
15. Megalochori Quarry
16. Mavromatis Quarry
17. Alaphouzos Quarry

For the map on the following page

Fig. 1.1: Relief map of Thera/Santorini with L.B.A. sites shown.

Fig. 1.2: Geological stratigraphy of ancient soils on Thera
(after Seward et al.,1980:104)

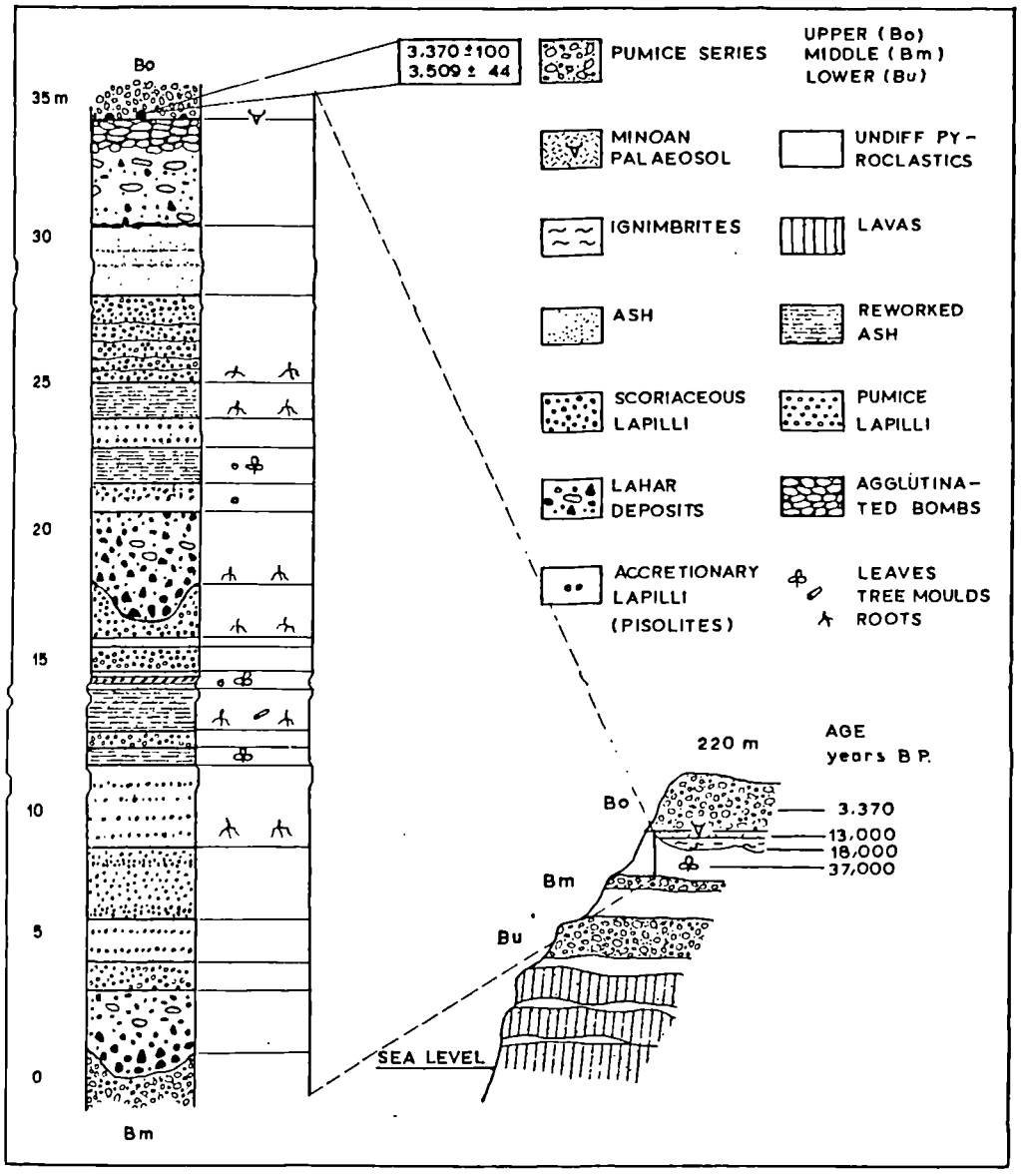


Fig. 1.3: Inter-annual variation in precipitation: selected stations (after Mariolopoulos 1925; Wagstaff 1981:257).

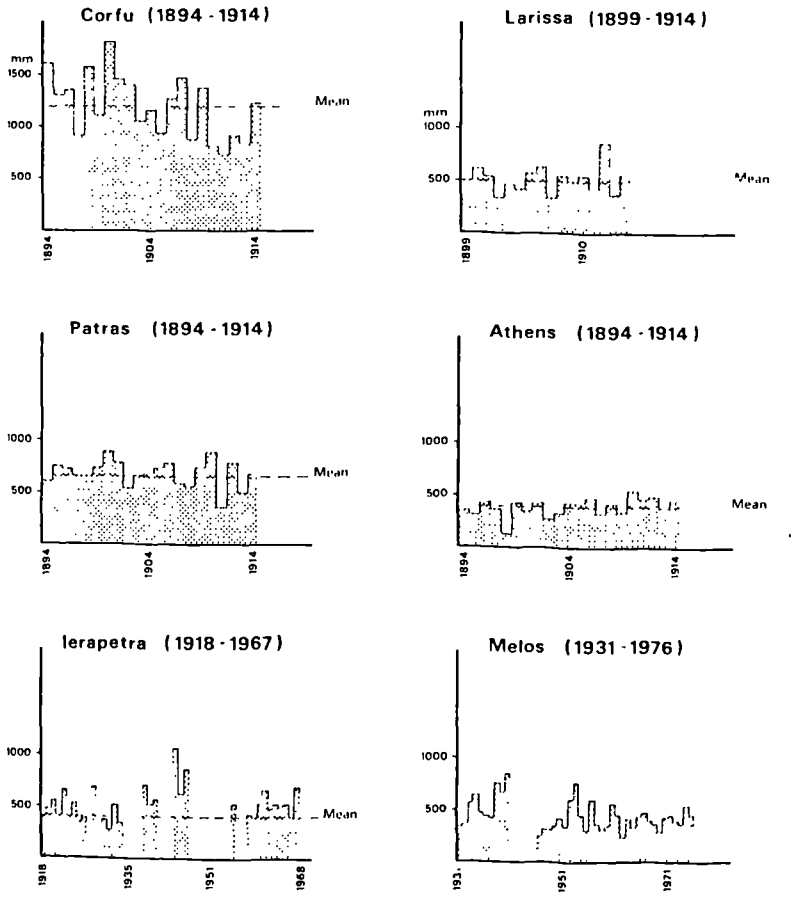
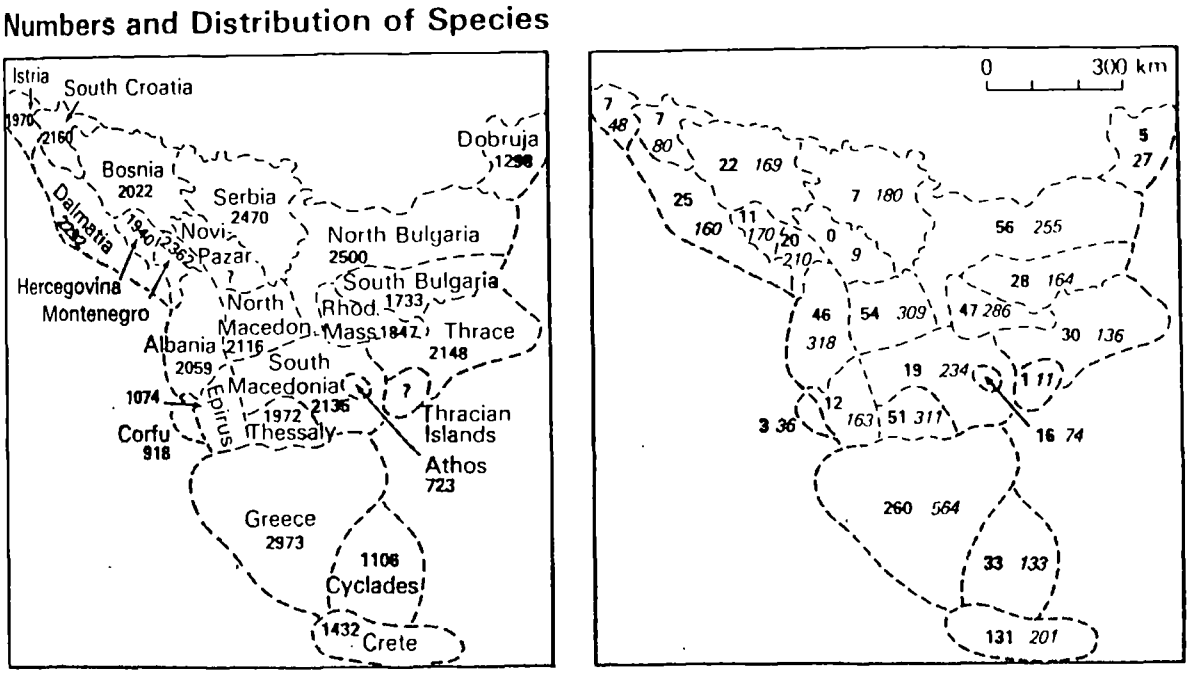


Fig. 1.4: Numbers and distribution of species in each district in Greece (after Polunin 1980).



Botanical districts and the numbers of species in each district where known

131 — Numbers of species endemic to each botanical district

201 — Numbers of Balkan endemic species present in each botanical district

Fig. 1.5: Stages in the degeneration and regeneration of plant communities and the effect of man on the Mediterranean vegetation (after Polunin & Huxley 1965:7).

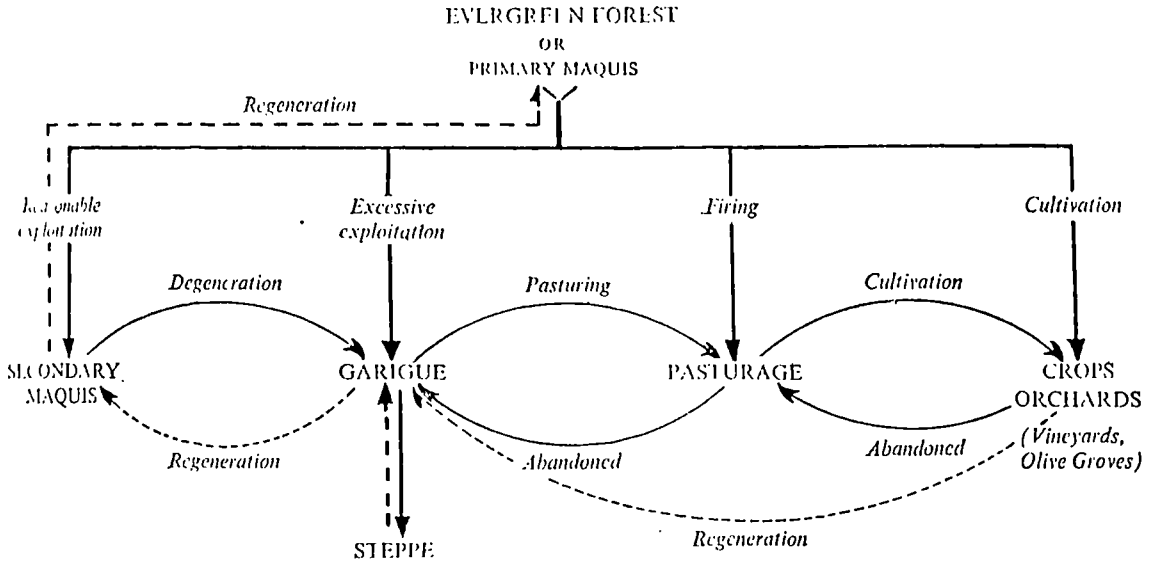


Fig. 1.6: Plant succession under the influences of grazing and fire in southern France (after Walter 1973:119).

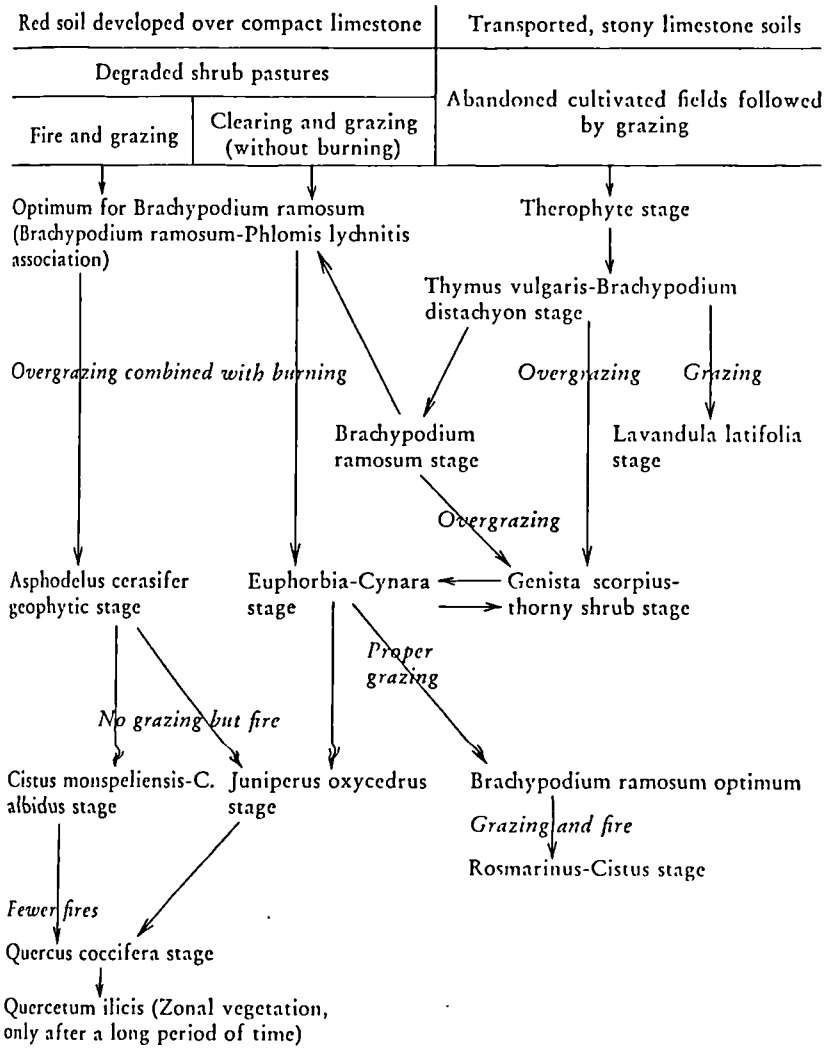
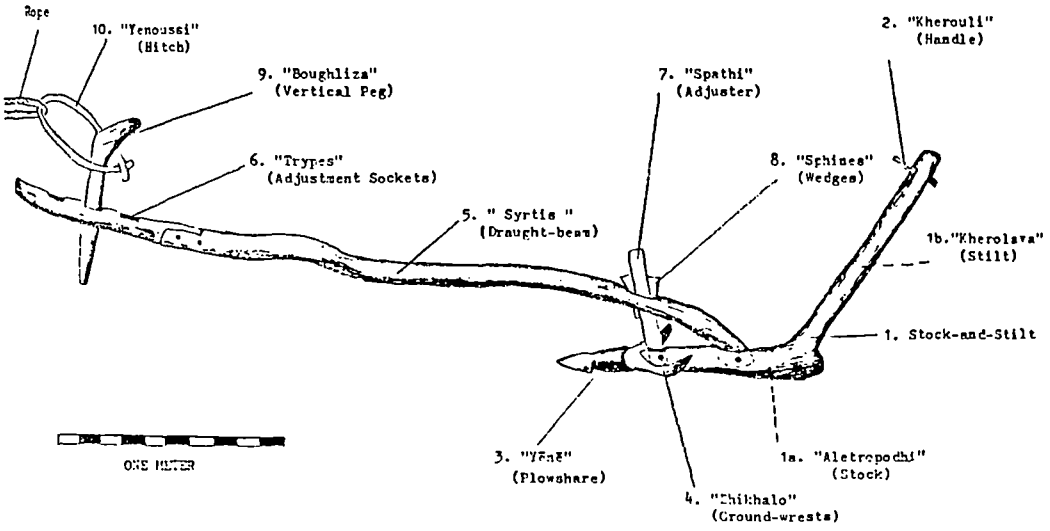


Fig. 1.7: a) The 'scratch' plough (ard) from Corfu, Greece
(after Sordinas).
b) The 'scratch' plough from Santorini, Greece.



The Ropas plow. Now preserved at Kothoniki, Corfu. Drawn by A.S. / Der Ropas-Pflug.

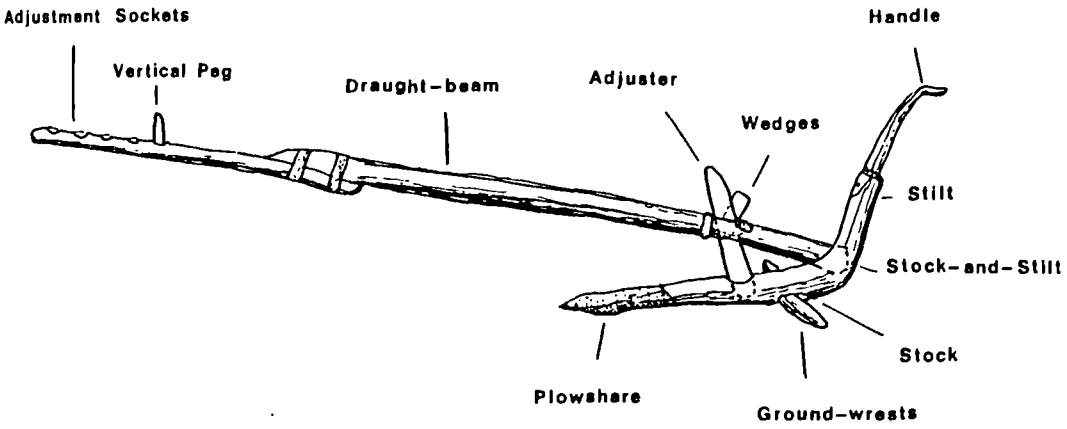


Fig. 1.8: Some types of ploughing from Santorini, Greece.

A = ploughing type when only ploughed once.
B + C = ploughing types when ploughed twice.

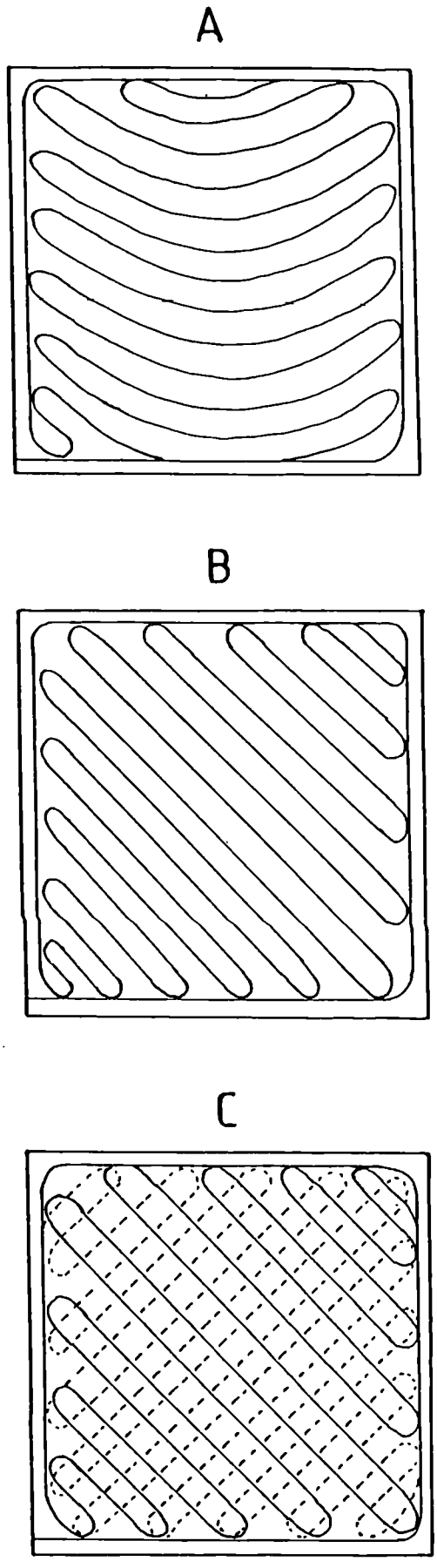


Fig. 1.9: Underside of a cypriote threshing sledge studded with flints. Length about 2.5 (after Singer 1957:106).

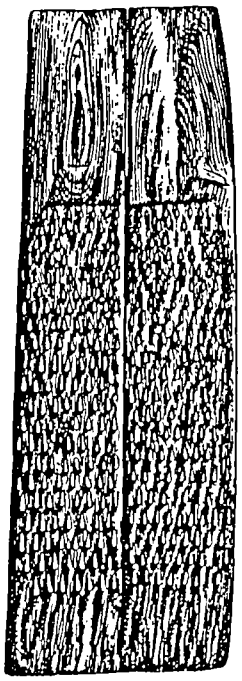
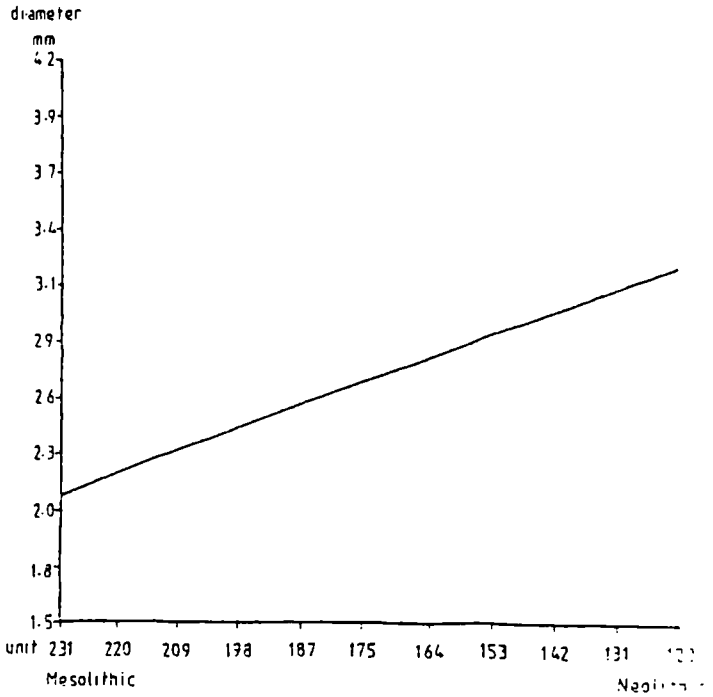
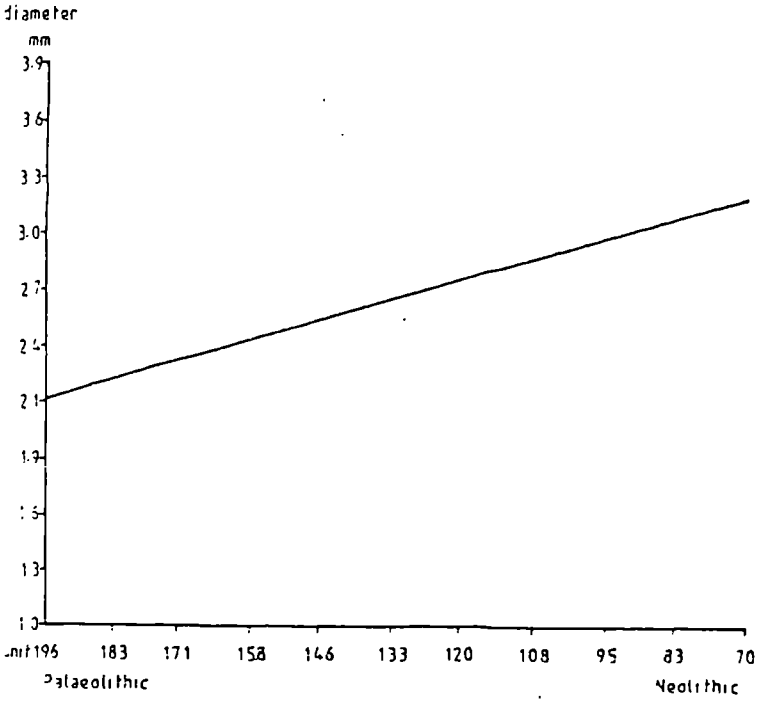


Fig. 3.1 : a) Regression analysis of Lens sp. measurements in F/A N (after Hansen 1980:fig.57b)
b) Regression analysis of Lens sp. measurements in F/A S (after Hansen 1980:fig.57a).

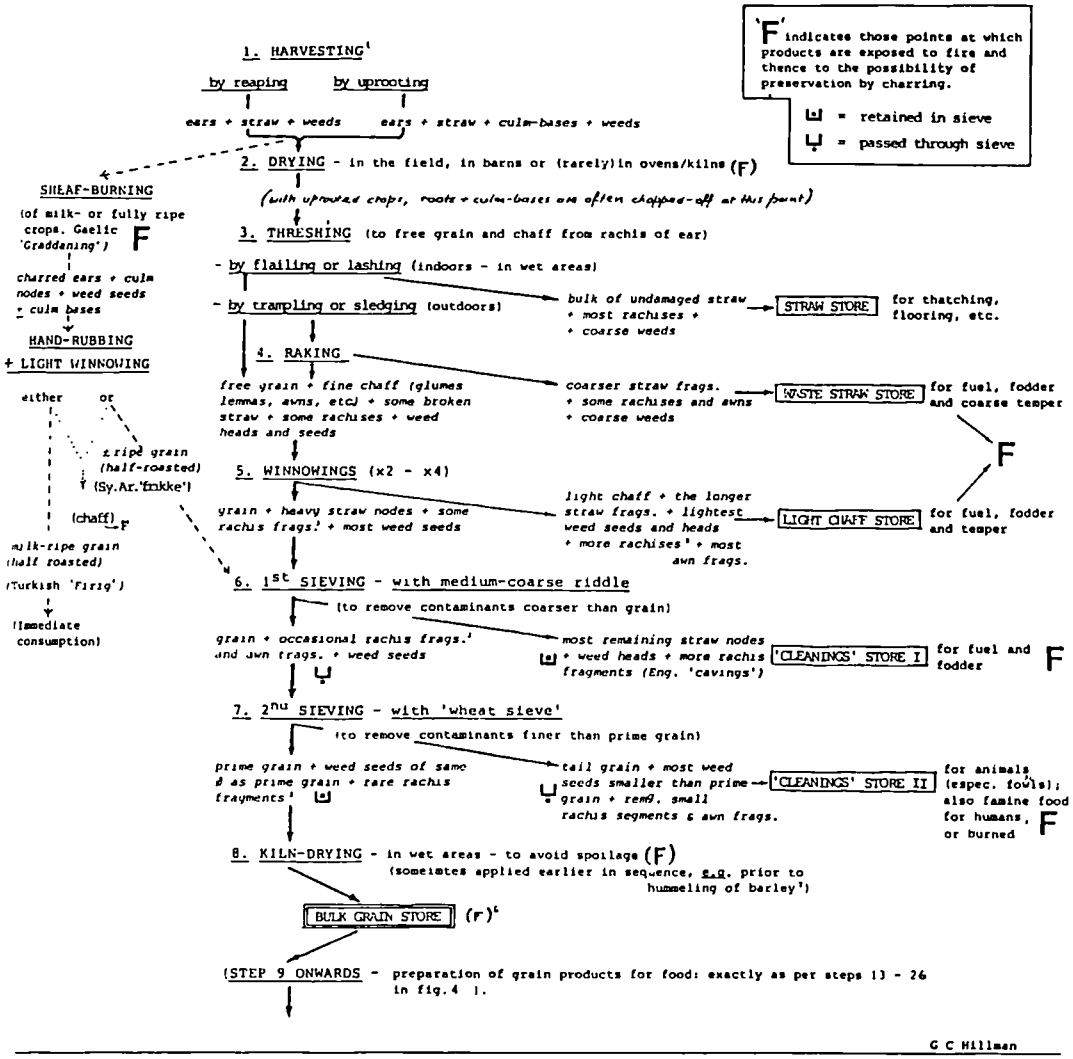


Regression analysis of Lens sp. measurements in F/A N



Regression analysis of Lens sp. measurements in F/A S

Fig. 3.2 : The traditional processing of free-threshing cereals, e.g. barley (after Hillman 1984b:4)



1. To limit the complexity of the diagram, separate harvesting of ears and straw and its effects on composition have not been incorporated, though they are discussed in the text. 2. The heavy, basal rachis segments are disproportionately well represented in the primary products (relative to the lighter, upper segments). 3. Many of the lighter, upper segments of broken rachises are winnowed out with the fine chaff. 4. These two sets of cleanings are often amalgamated (see text).
5. Fenton 1978; Grant 1981 . 6. If prime products are stored in pits, then annual cleansing of these pits by firing will char any grain adhering to the sides (see Reynolds in this volume). 7. The sequence for barley (and oats) differs slightly - in the hulled forms - in that an extra step (HUMMELING) is applied to remove the remaining, basal part of their awns. This is generally done prior to step 5.

THE TRADITIONAL PROCESSING OF FREE-THRESHING CEREALS e.g. BREAD-WHEAT, RYE (NB. BARLEY[7])
and the composition of their products when harvested together with the straw[1]

The sequence of operations applied to pulse crops - e.g. horse-beans, field-peas or vetches - is identical in most respects, tho.). the sieve mesh sizes are different and the terminology for chaff fractions is not strictly comparable).

(reproduced from Hillman 1981)

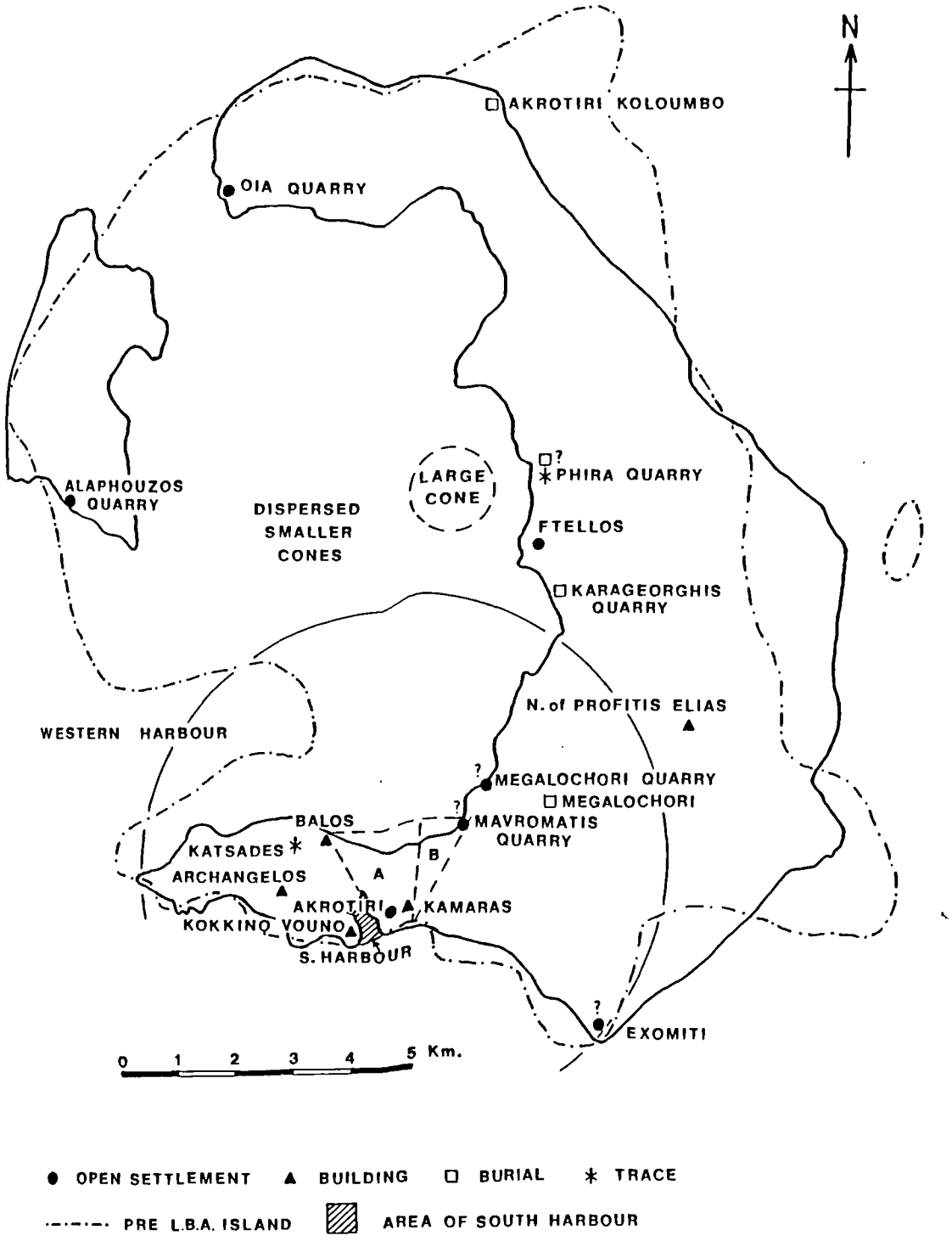


Fig. 4.1 : Map of Thera showing the following:

a) The pre L.B.A. island with its western and southern harbours (after Pichler et al., 1980)
b) The L.B.A. sites
c) The possible extent of the site of Akrotiri; Area A and B.
d) The carrying capacity of the site of Akrotiri

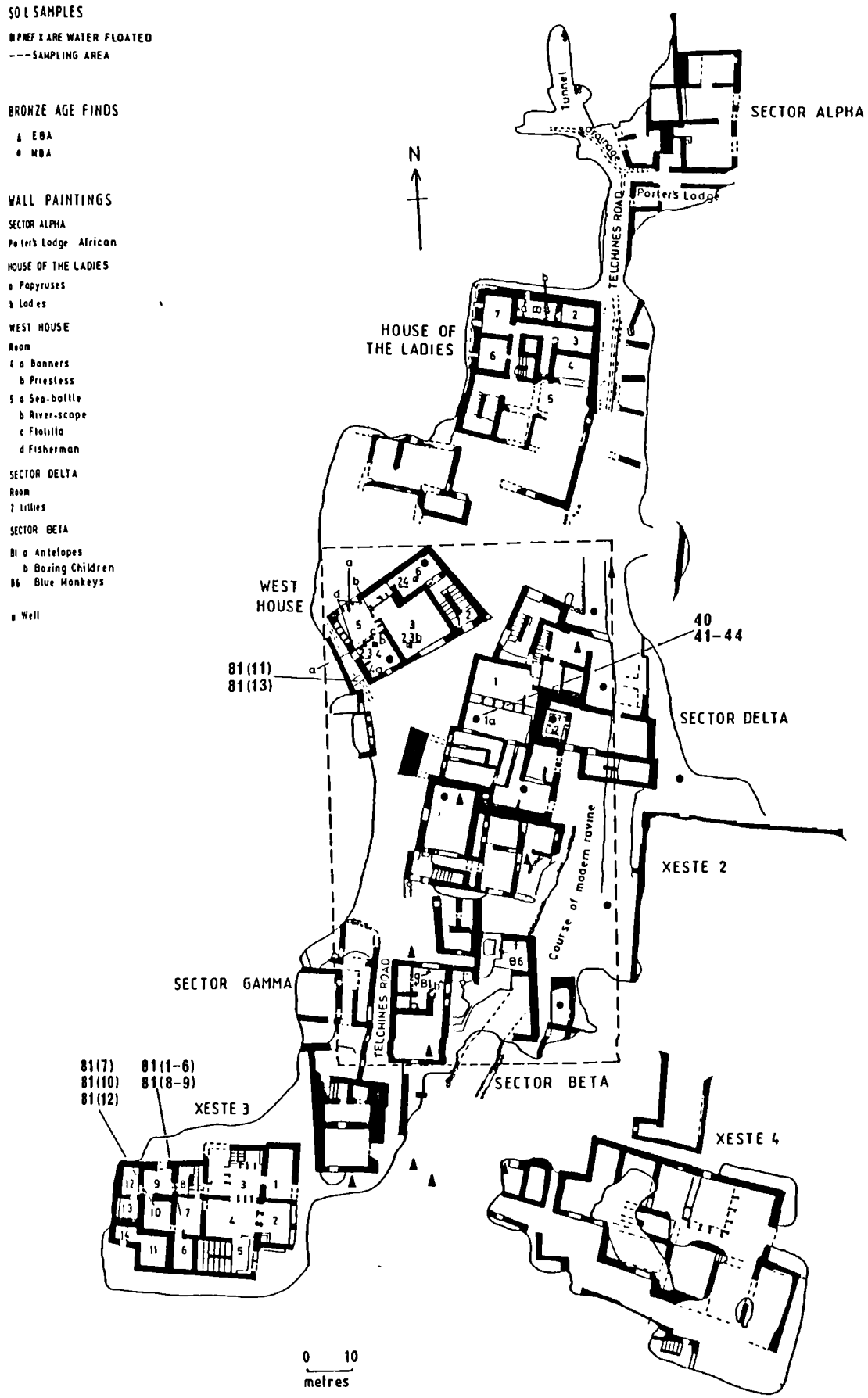


Fig. 4.2 : Map of the archaeological site of Akrotiri showing the settlement, E.C. and M.C. find spots, the location of wall paintings, and locations of macrofossil plant remains studied. The sampling area refers to Fig.4.7

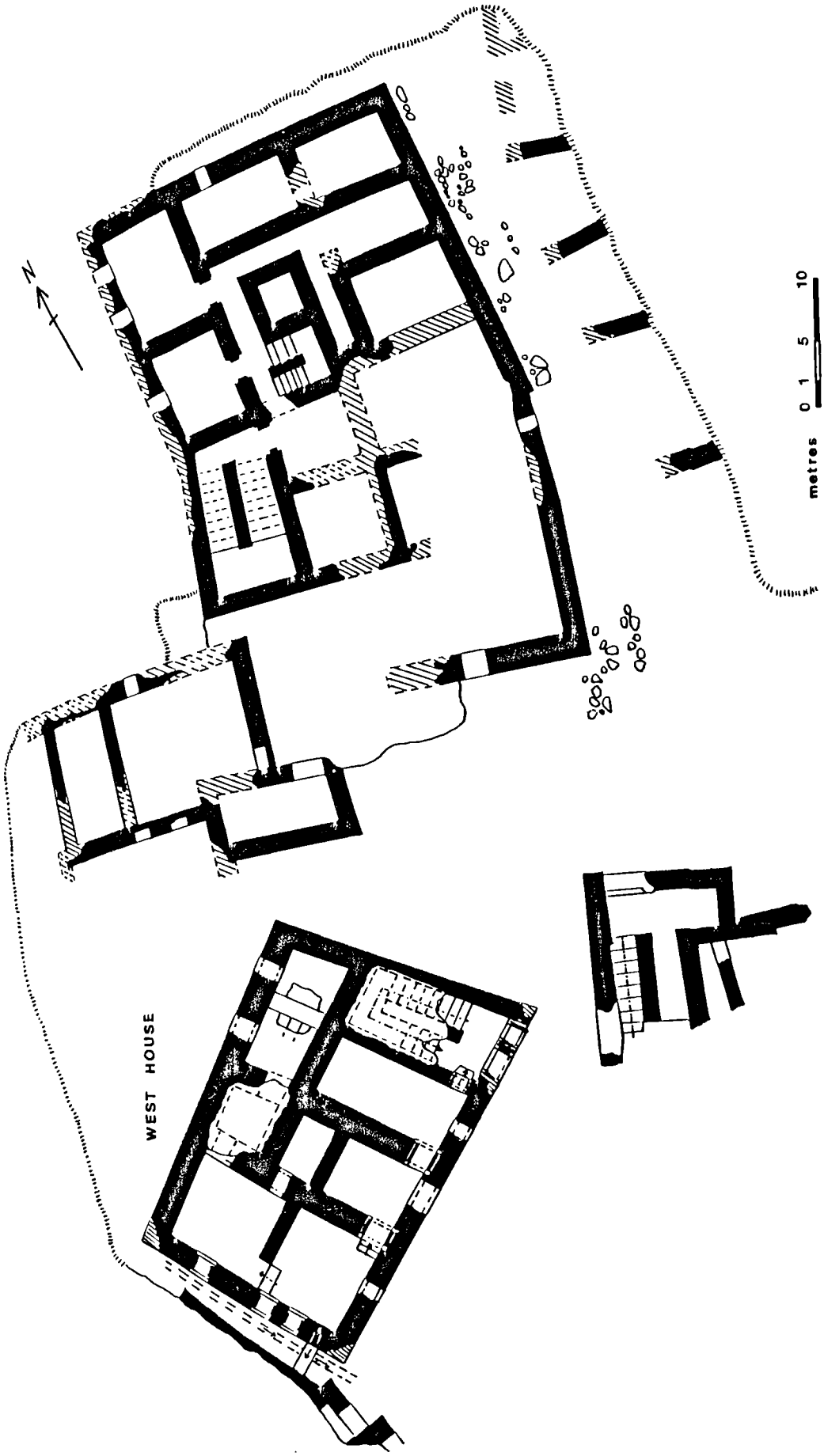
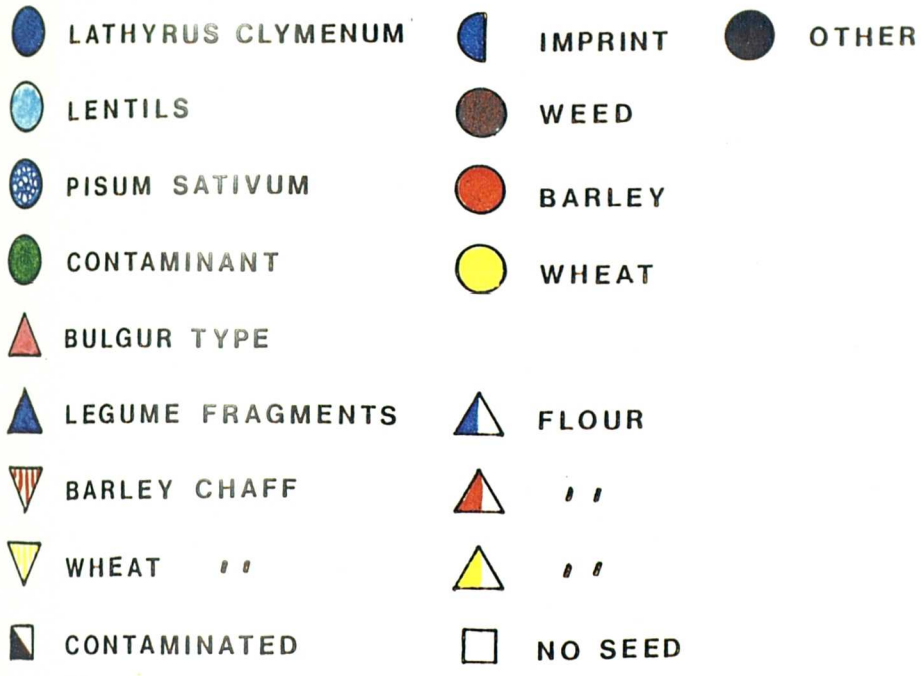
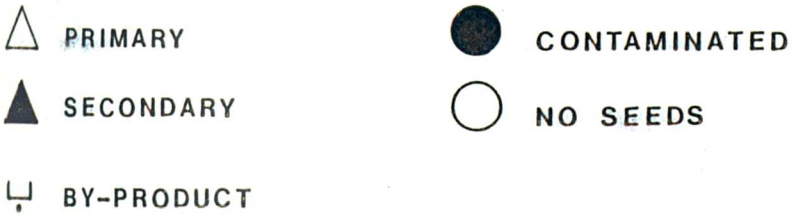


Fig. 4.3 : The West House in its architectural setting

Keys of the symbols used in Figs.4.4, 4.5, 4.6

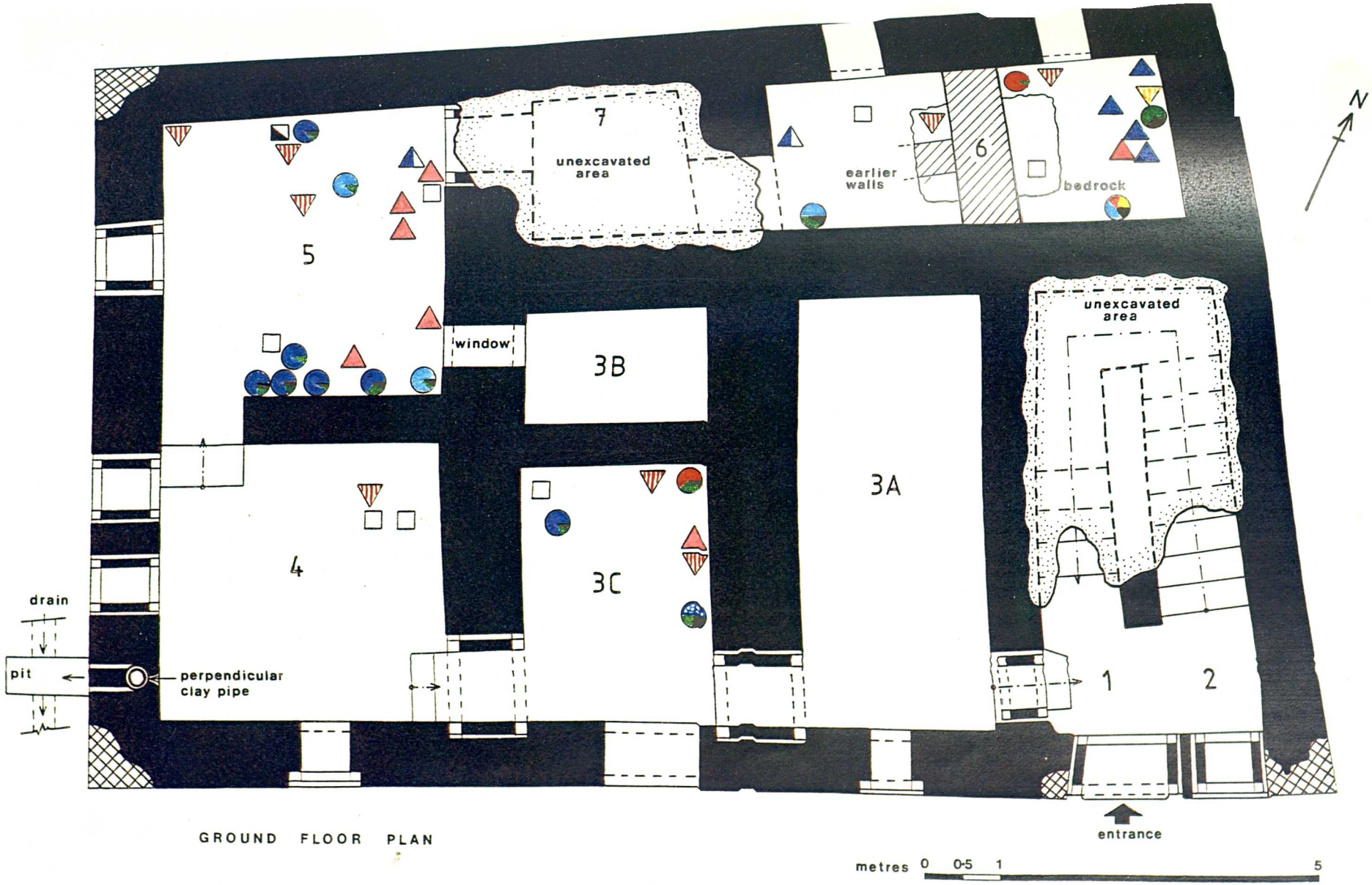

LATHYRUS CLYMENUM
LENTILS
PISUM SATIVUM
CONTAMINANT
BULGUR TYPE
LEGUME FRAGMENTS
BARLEY CHAFF
WHEAT ''
CONTAMINATED
IMPRINT
WEED
BARLEY
WHEAT
FLOUR
''
''
NO SEED
OTHER


PRIMARY
SECONDARY
BY-PRODUCT
CONTAMINATED
NO SEEDS

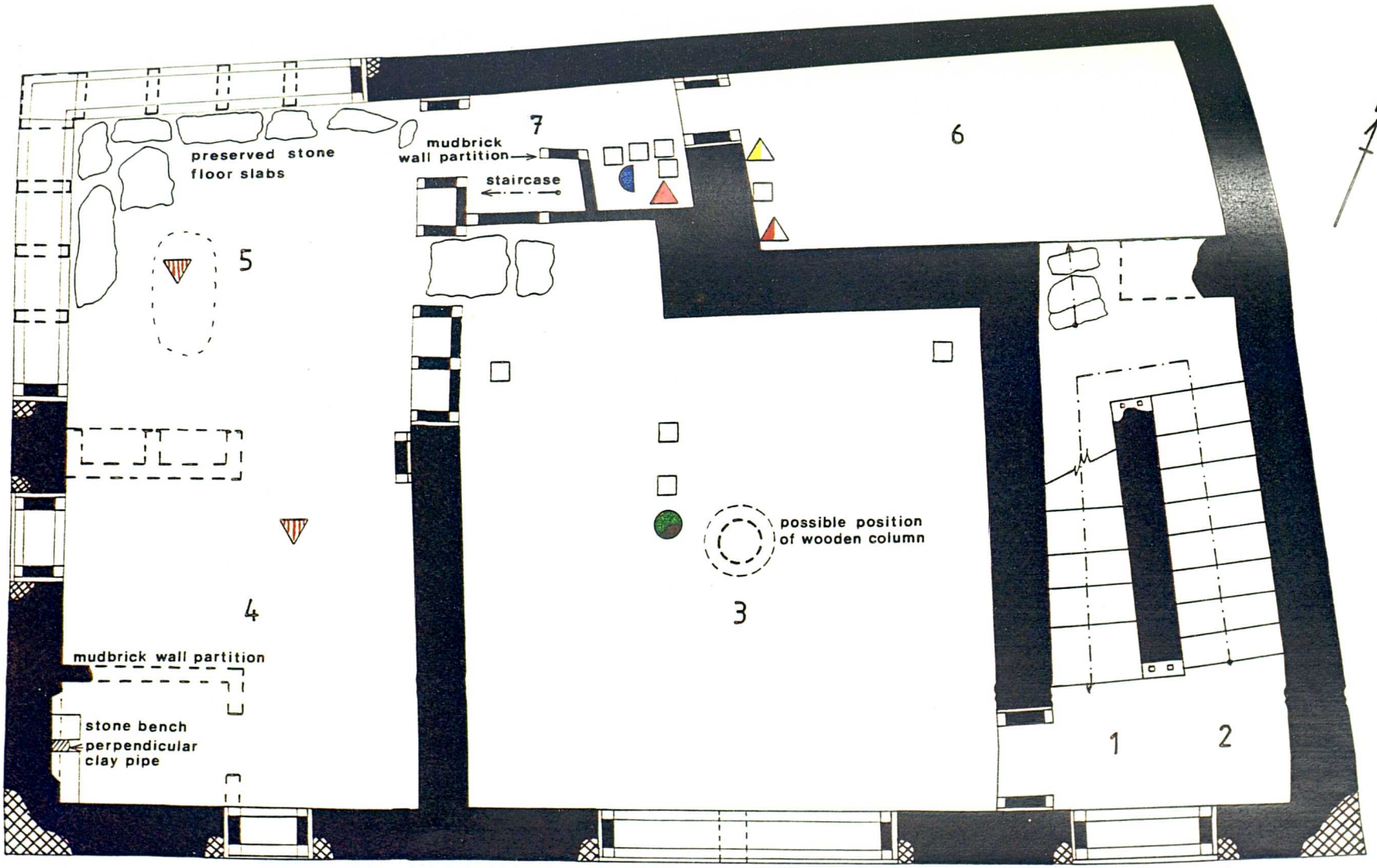

DECORATED
UNDECORATED
UNKNOWN
NON-POT

Fig. 4.4 : The West House: distribution of the plant remains

a) The ground floor
b) The first floor



GROUND FLOOR PLAN

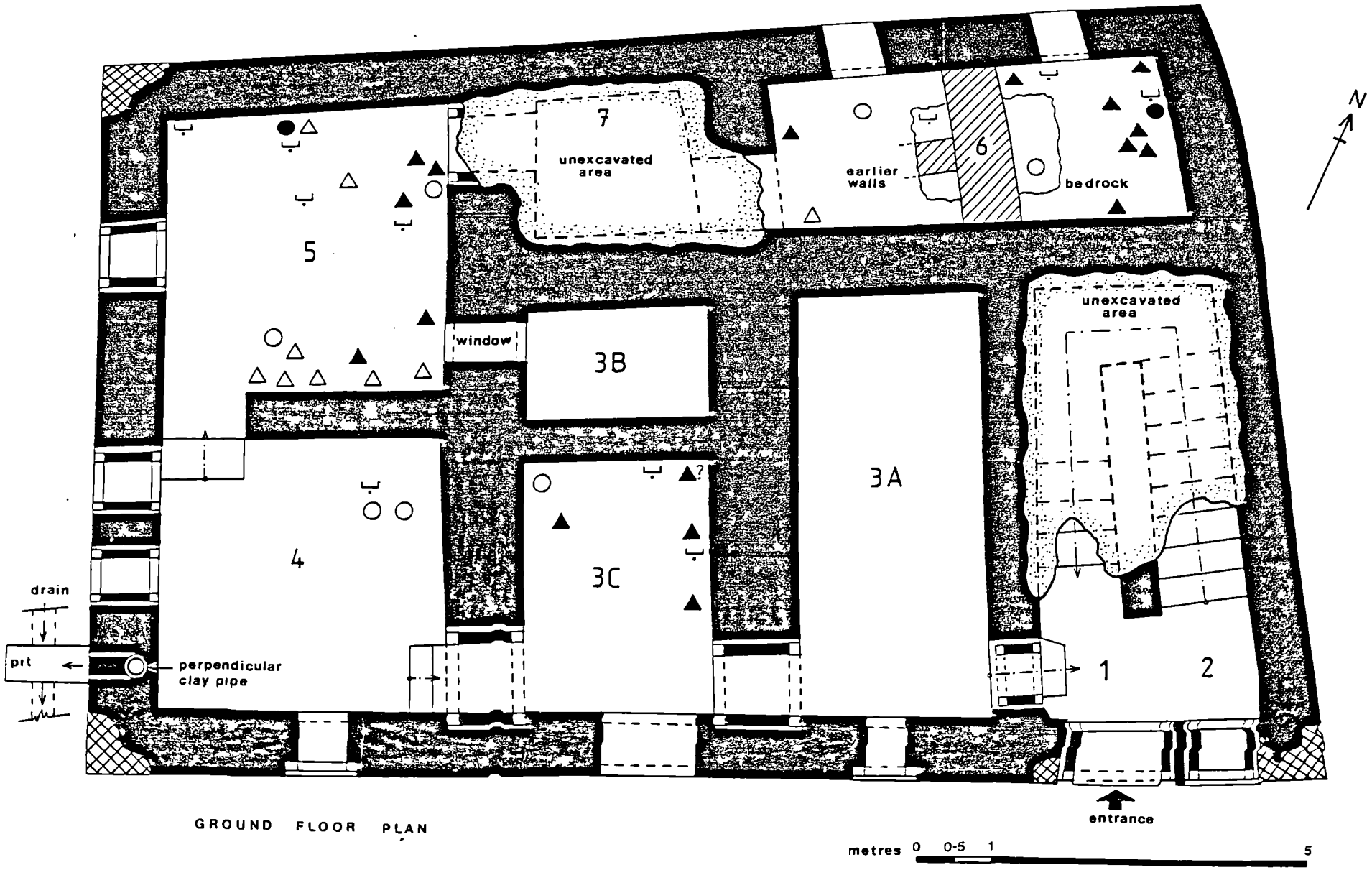


FIRST FLOOR PLAN

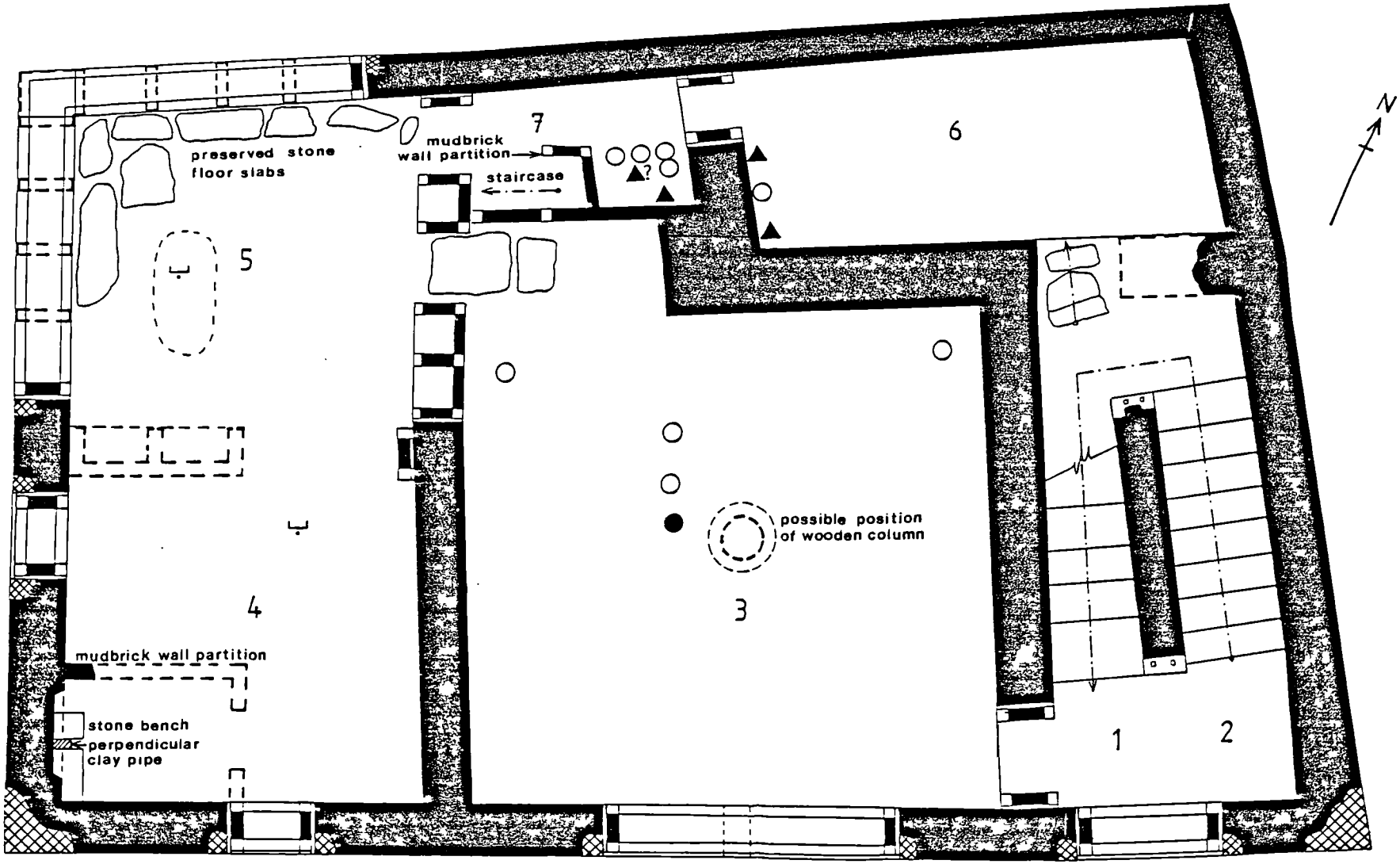
metres 0 0·5 1 5

Fig. 4.5 : The West House: distribution of samples according to primary and secondary products and by-product

a) The ground floor
b) The first floor



GROUND FLOOR PLAN

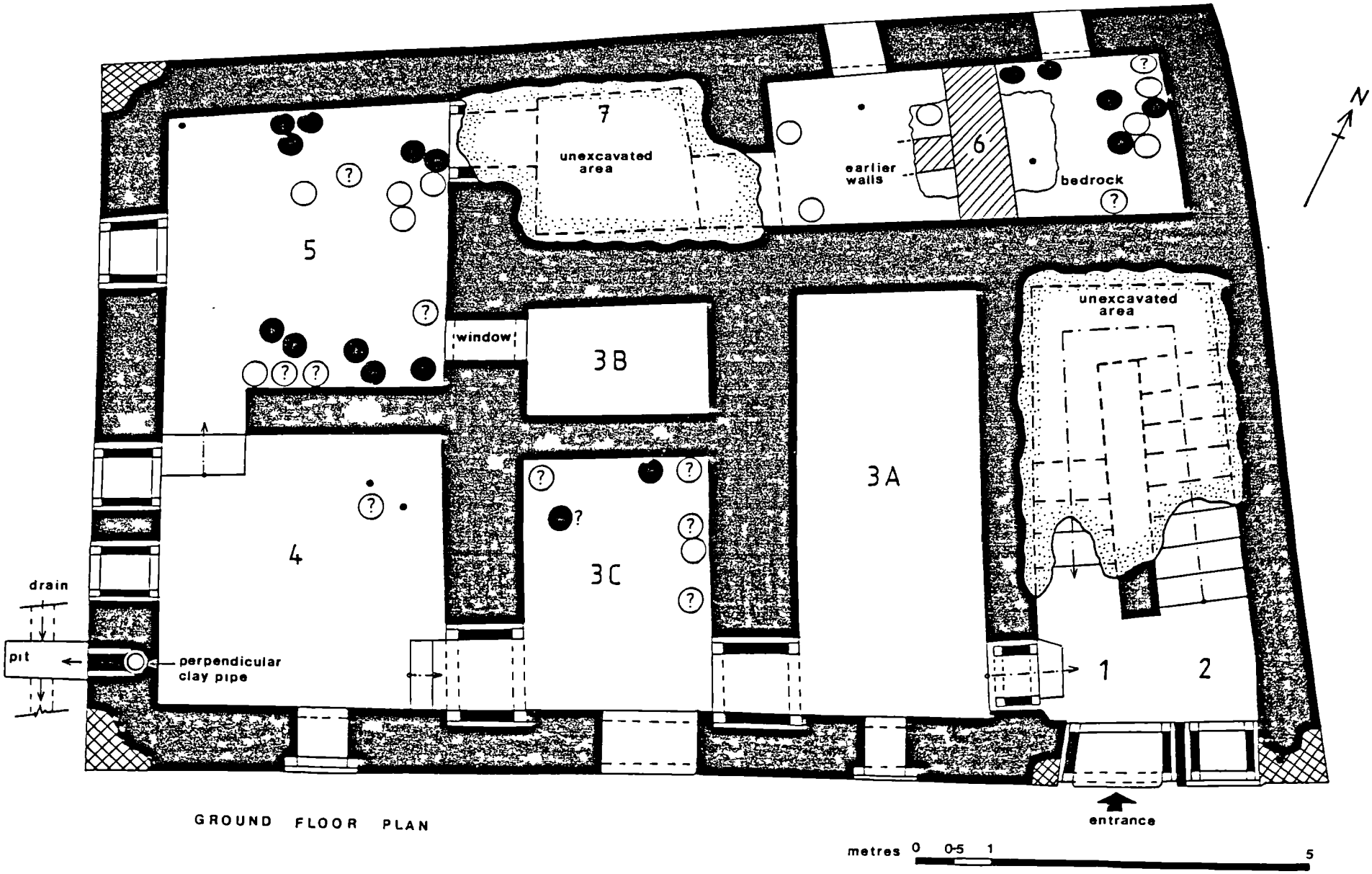


FIRST FLOOR PLAN

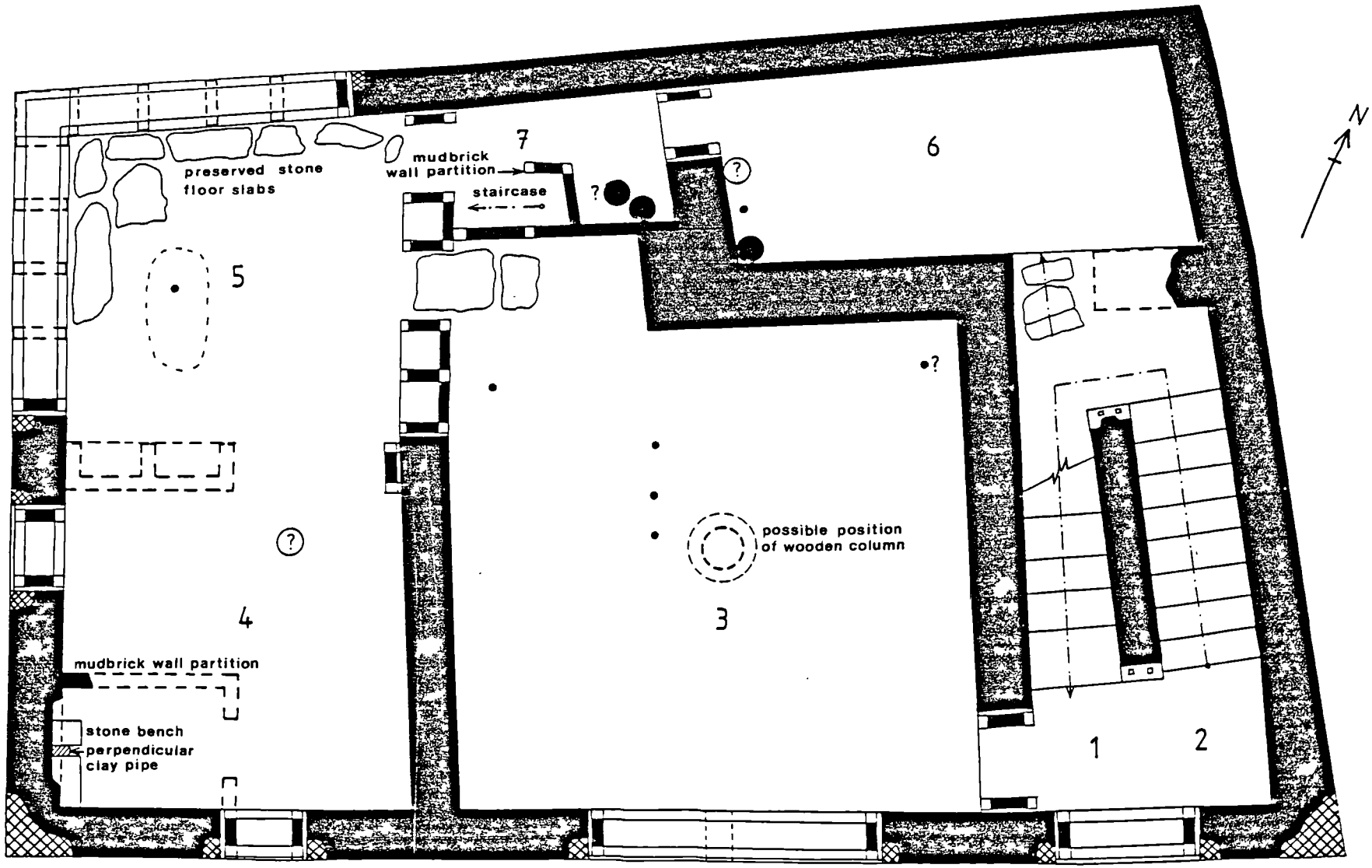
metres 0 0·5 1 5

Fig. 4.6 : The West House: distribution of samples according to decorated, undecorated, non-pots, and unknown

a) The ground floor
b) The first floor



GROUND FLOOR PLAN



FIRST FLOOR PLAN

metres 0 0·5 1 5

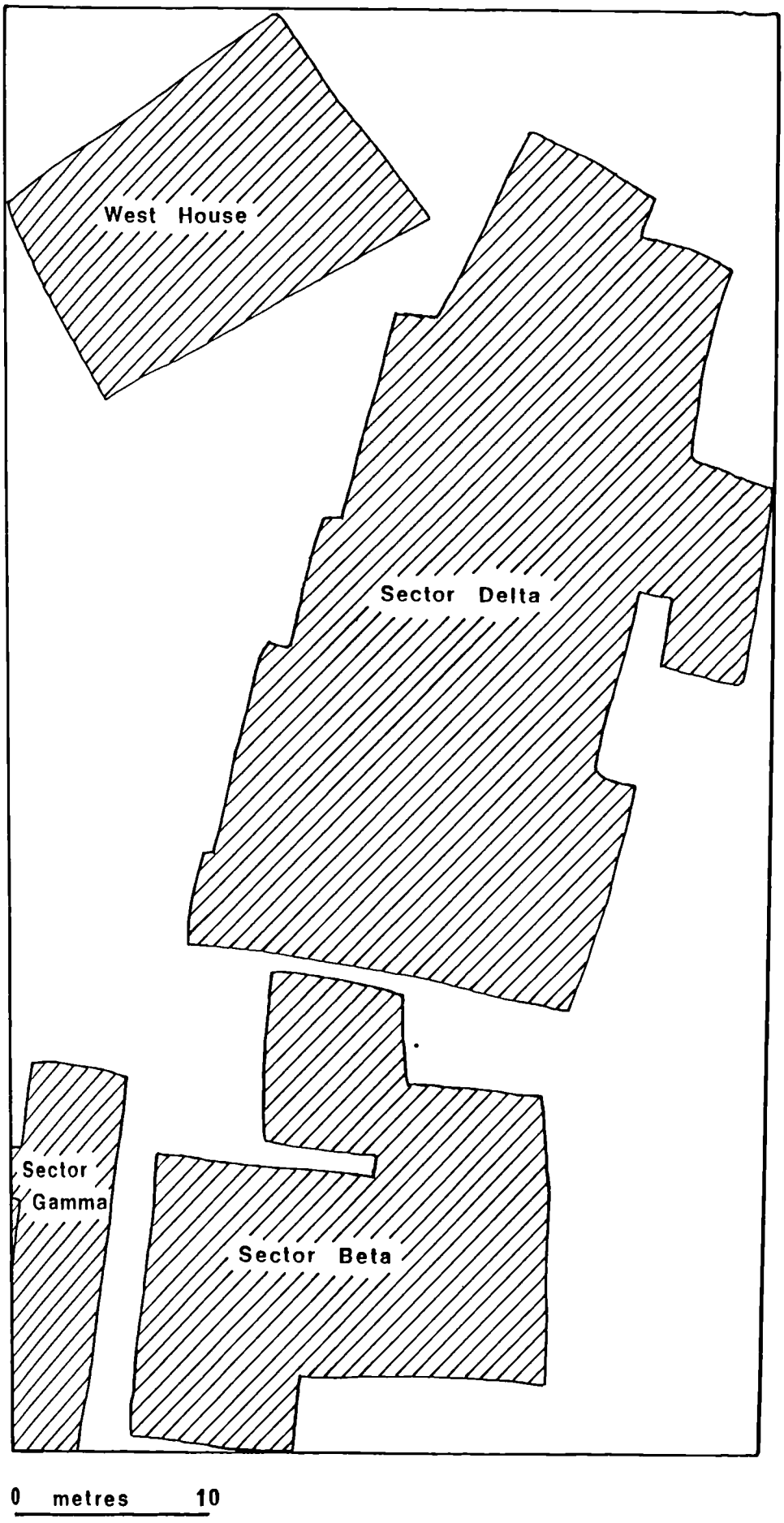
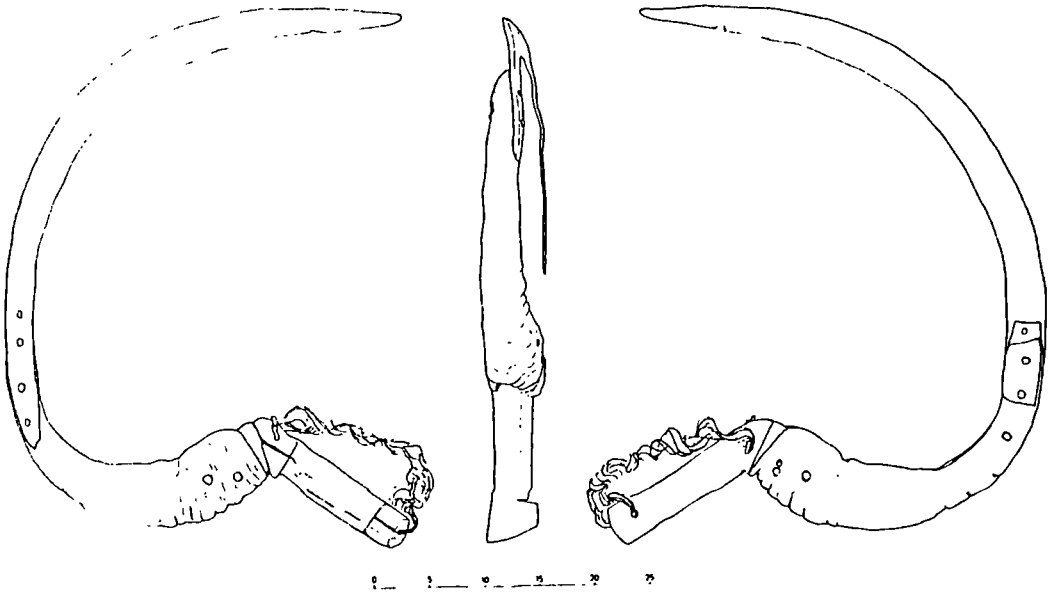


Fig. 4.7 : Section of the site of Akrotiri on which the area of habitation vis a vis open spaces has been calculated (refer to sampling area of Fig.4.2)

Fig. 4.8 : Sickles from Iran

Top) Large sickle used for wheat harvesting (after Lerche 1968:35)

Bottom) Small sickle used for wheat and barley harvesting as well as other green crops (after Lerche 1968:36)



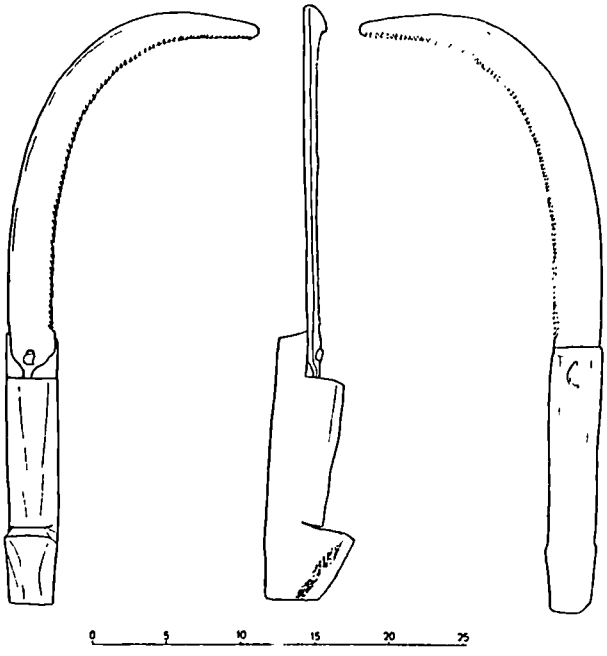
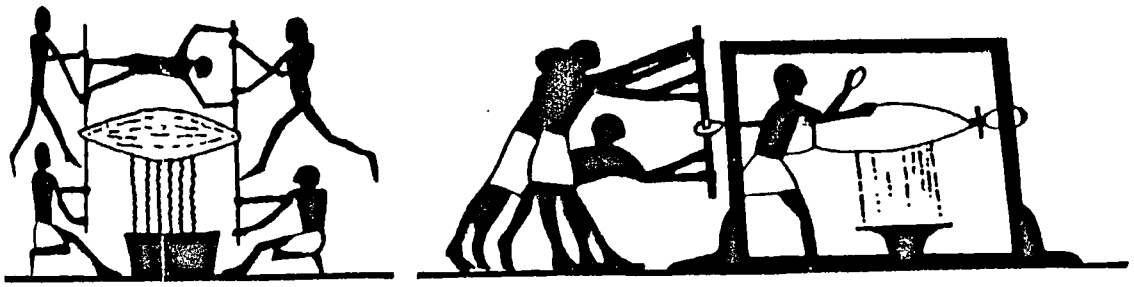


Fig. 4.9 : Egyptian grape-pressing, c.2000 B.C. from a tomb (after Hodges, H.1970:101).



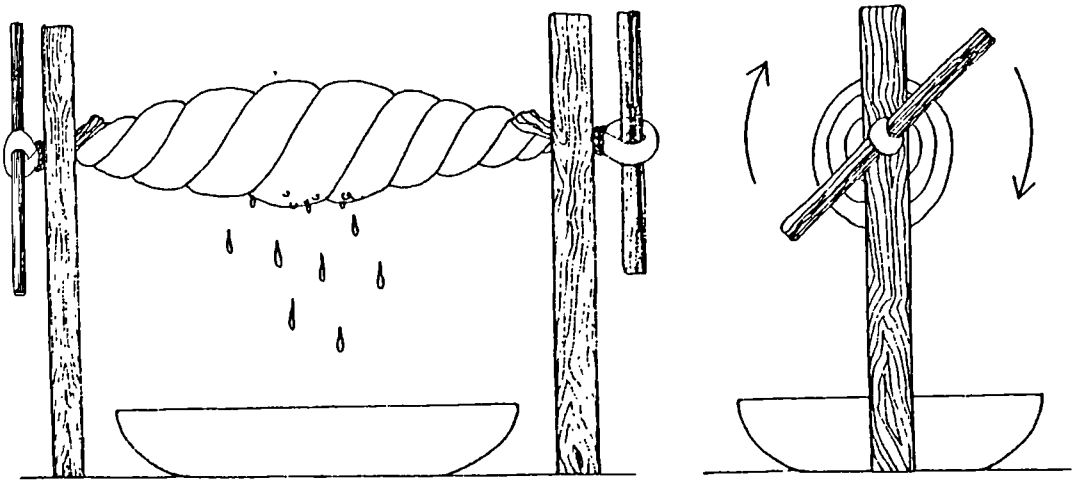
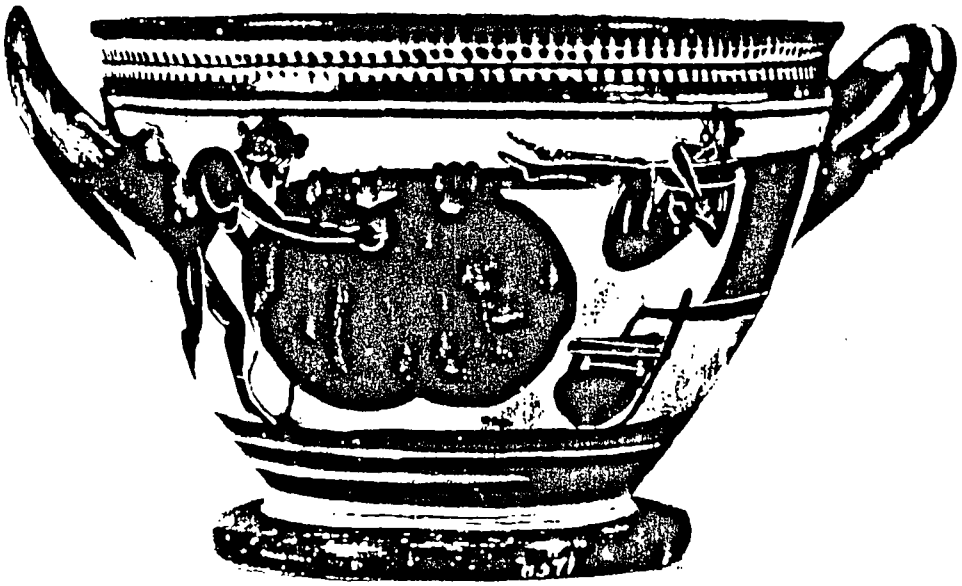
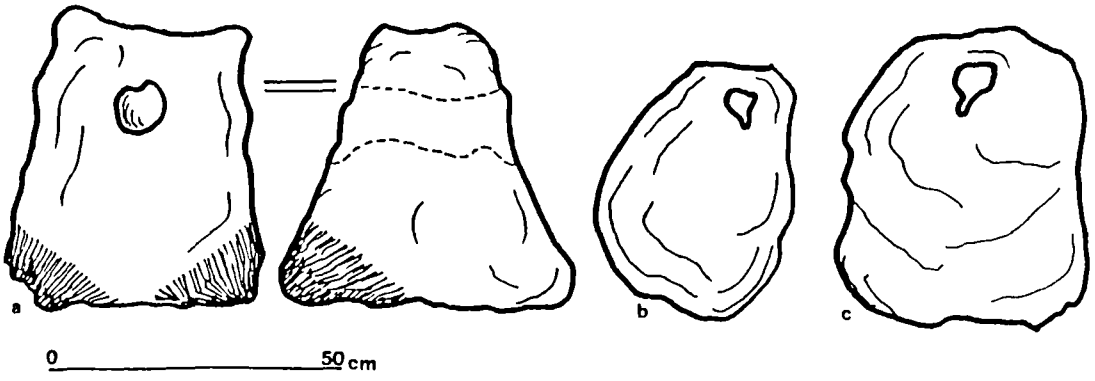
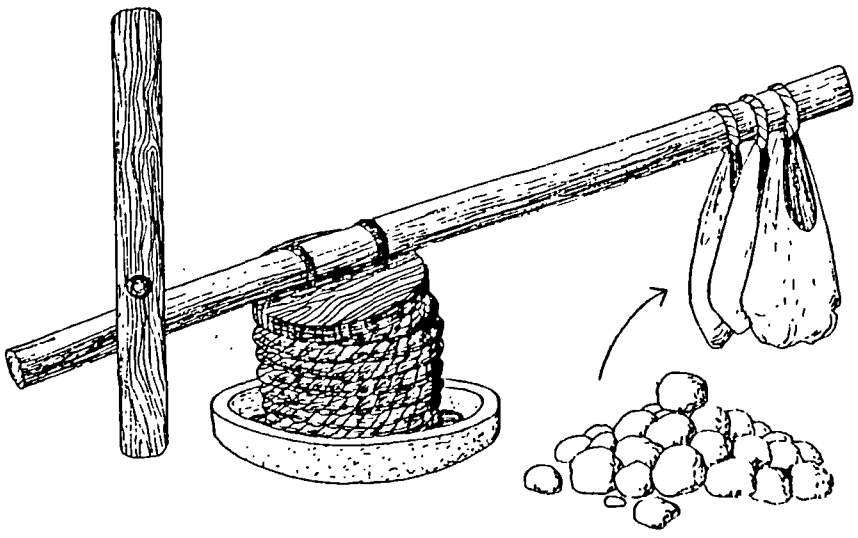


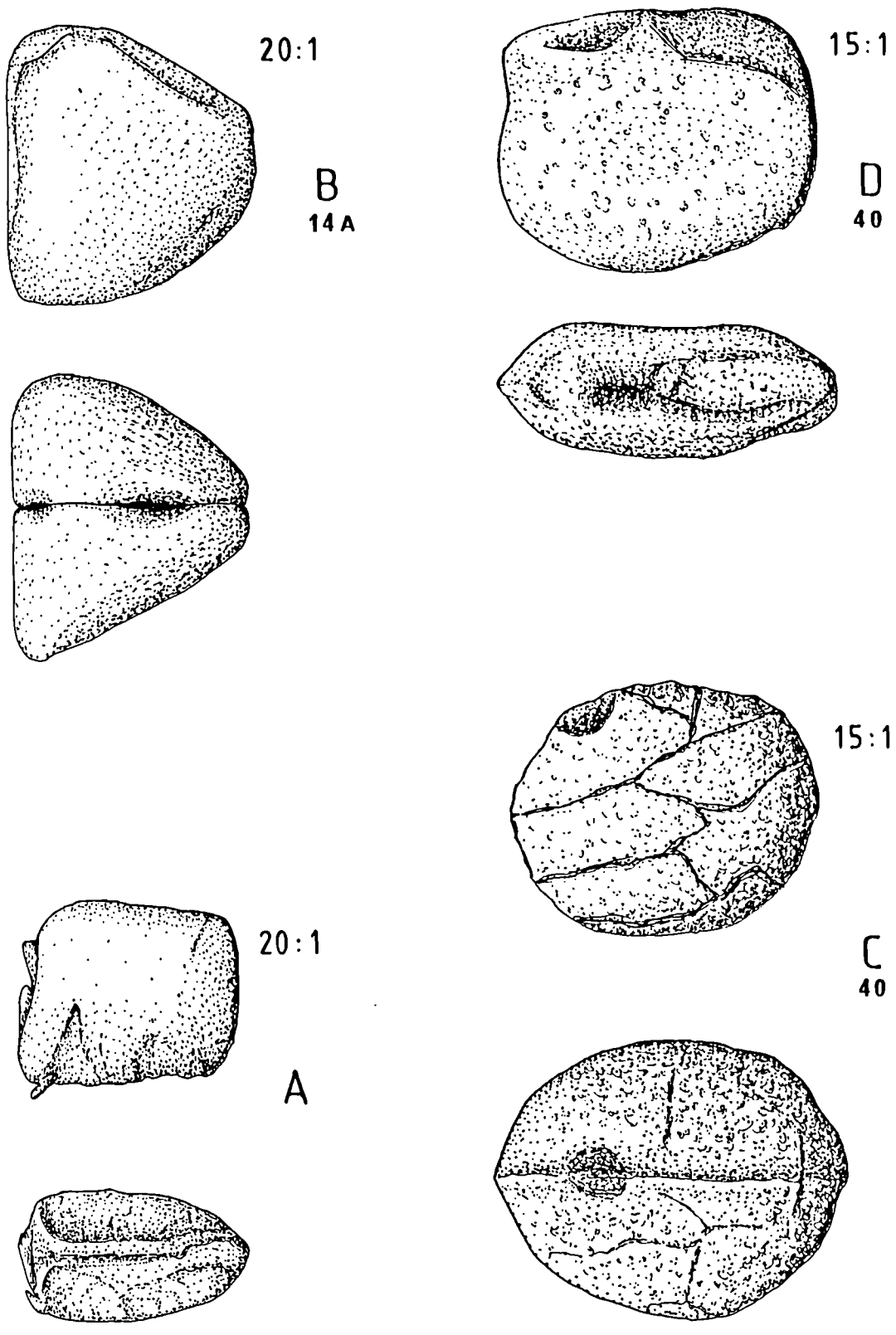
Fig. 4.10 : a) Olive pressing as shown on a Greek vase, 6th century B.C. Attic vase (Museum of Fine Arts, Boston) (from Forbes, H. 1978:43)

b) Part of an olive press from a Greek relief of the 6th century B.C. (relief is in the British Museum) (after Hodges, H. 1970:165)





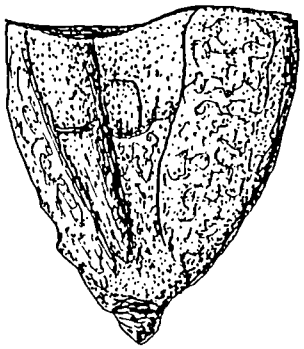




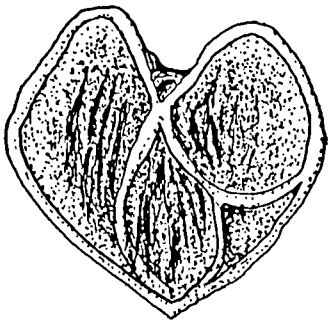
8.5.1 : Drawings of a) Lathyrus clymenum
b) cf. Vicia sp.(cf.ervilia) (sample 14)
c) Legume sp. (sample 40)
d) Lupinus cf.albus (sample 40)

Fig. 5.2 : Drawings of a) 1) Hordeum sp. awn and
cross section;
2) Triticum sp. awn and
cross section - archaeological material
3) Triticum sp. awn and
cross section - modern material

b) Cracked Hordeum (hulled)
1) overhead view
2) cross section



20:1



B

1A

1

2

20:1

A

1

Δ 2

2

1A

3

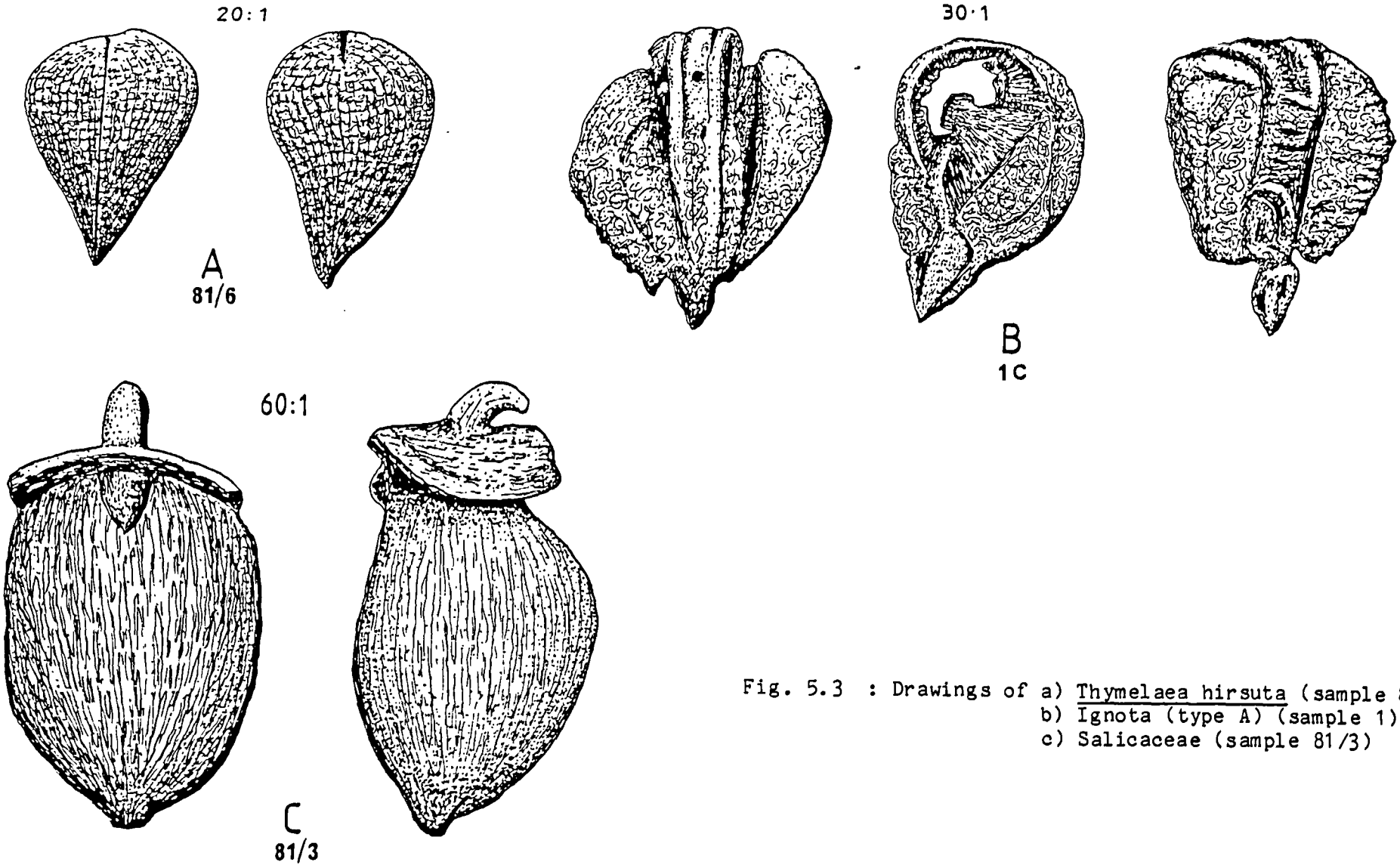


Fig. 5.3 : Drawings of a) Thymelaea hirsuta (sample 81/6)
b) Ignota (type A) (sample 1)
c) Salicaceae (sample 81/3)

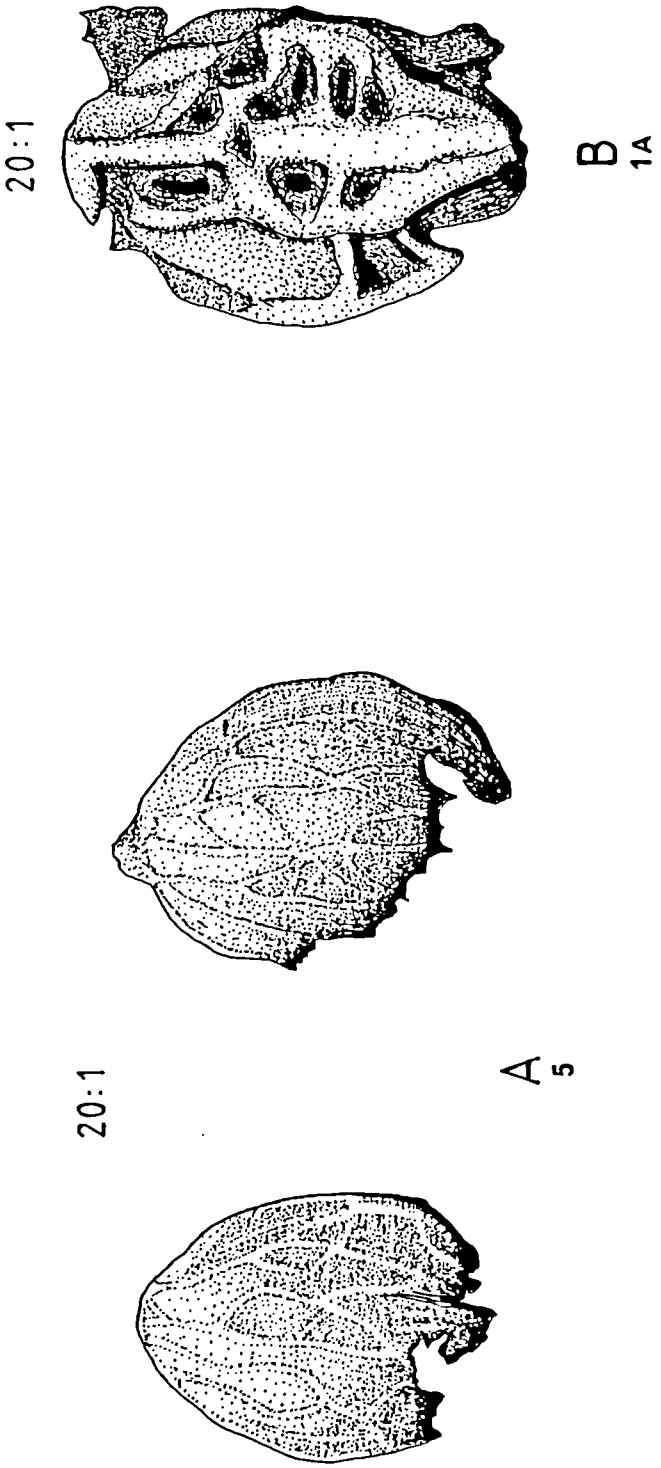


Fig. 5.4 : Drawings of a) cf.Thesium sp. (sample 1)
b) Emex spinosa (sample 1)

Fig. 5.5 : Analysis of variance of the following crops:

a) cf. Lathyrus clymenum
Length, breadth, thickness
ratio of L/B and L/T

b) Lathyrus cicera/L.sativus
Length, breadth, thickness

c) Hordeum
Length, breadth, thickness

d) Sherardia arvensis
Length, breadth, thickness

Fig.5.5 (A): Analysis of variance of cf.Lathyrus clymenum, for length, breadth, thickness and the ratios of length to breadth and length to thickness.

LENGTH

SOURCE	DF	SS	MS	F
C1	7	98.684	14.098	89.65
ERROR	472	74.222	0.157	
TOTAL	479	172.906		

SAMPLE	N	MEAN	STDEV	INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV
1	60	3.8250	0.3176	(-*)
5/10	60	3.6900	0.3502	(-*)
9	60	3.7867	0.4073	(-*-)
40	60	4.8233	0.5196	(*-)
14	60	3.7667	0.3808	(-*)
16	60	3.6950	0.4164	(-*)
20/29	60	3.4133	0.3362	(-*-)
65	60	3.1433	0.4090	(*-)
POOLED STDEV =		0.3965		3.60 4.20 4.80

BREADTH

SOURCE	DF	SS	MS	F
C1	7	90.0959	12.8708	130.41
ERROR	472	46.5855	0.0987	
TOTAL	479	136.6814		

SAMPLE	N	MEAN	STDEV	INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV
1	60	2.8550	0.2783	(*-)
5/10	60	2.9067	0.2840	(*-)
9	60	2.8283	0.3130	(-*)
40	60	3.9467	0.4560	(-*-)
14	60	2.8267	0.2899	(-*)
16	60	2.7867	0.3078	(-*)
20/29	60	2.6550	0.2143	(*-)
65	60	2.3333	0.3177	(-*)
POOLED STDEV =		0.3142		2.50 3.00 3.50 4.00

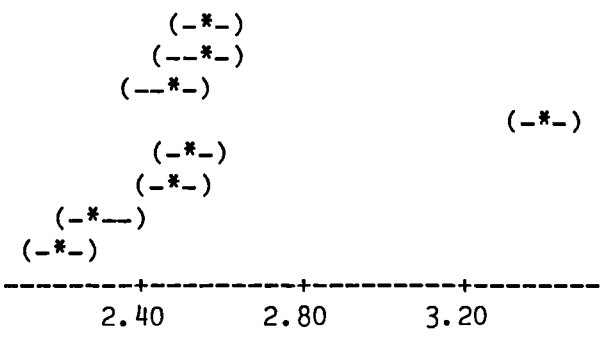
THICKNESS

SOURCE	DF	SS	MS	F
C1	7	55.323	7.903	74.43
ERROR	472	50.115	0.106	
TOTAL	479	105.438		

SAMPLE	N	MEAN	STDEV
1	60	2.5567	0.2360
5/10	60	2.5400	0.2533
9	60	2.4617	0.3273
40	60	3.3917	0.5006
14	60	2.5183	0.2843
16	60	2.4667	0.3358
20/29	60	2.2983	0.2554
65	60	2.1833	0.3361

POOLED STDEV = 0.3258

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV



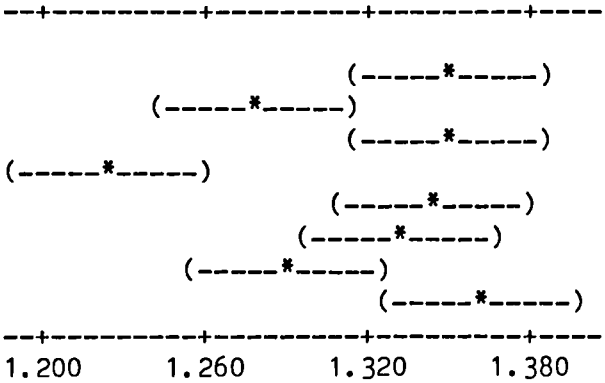
LENGTH TO BREADTH

SOURCE	DF	SS	MS	F
C1	7	0.9153	0.1308	6.47
ERROR	472	9.5445	0.0202	
TOTAL	479	10.4598		

SAMPLE	N	MEAN	STDEV
1	60	1.3482	0.1399
5/10	60	1.2772	0.1370
9	60	1.3493	0.1668
40	60	1.2263	0.0912
14	60	1.3417	0.1528
16	60	1.3317	0.1297
20/29	60	1.2886	0.1139
65	60	1.3596	0.1848

POOLED STDEV = 0.1422

INDIVIDUAL 95 PCT CI'S FOR MEAN
BASED ON POOLED STDEV



LENGTH TO THICKNESS

SOURCE	DF	SS	MS	F
C1	7	0.5522	0.0789	2.79
ERROR	472	13.3491	0.0283	
TOTAL	479	13.9013		

SAMPLE	N	MEAN	STDEV
1	60	1.5041	0.1465
5/10	60	1.4605	0.1439
9	60	1.5519	0.1638
40	60	1.4388	0.1702
14	60	1.5081	0.1736
16	60	1.5124	0.1675
20/29	60	1.4944	0.1443
65	60	1.4608	0.2220

POOLED STDEV = 0.1682

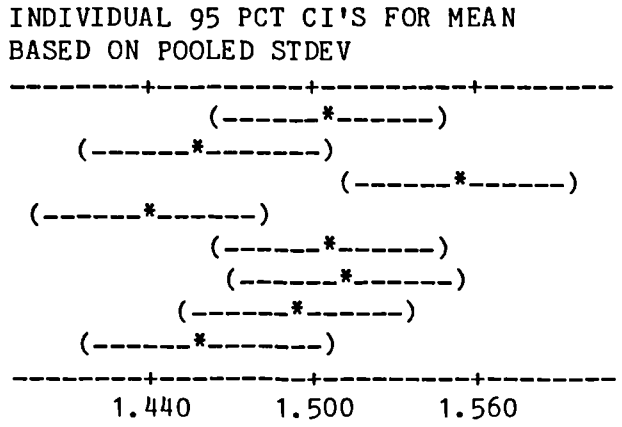


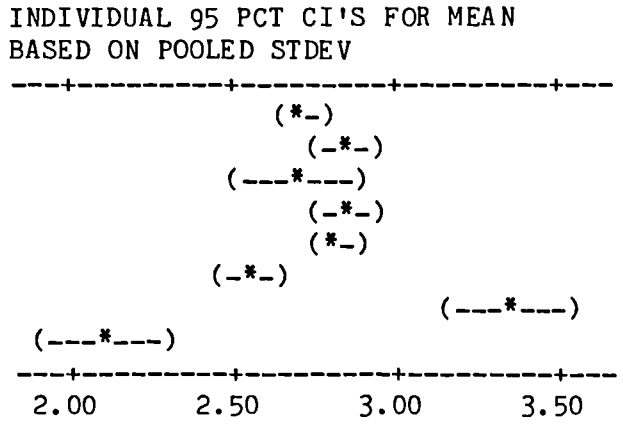
Fig. 5.5 (B): Analysis of variance of Lathyrus cicera/L.sativus of the length, breadth and thickness of the seeds which are in the middle and the end of the pod.

LENGTH - MIDDLE POD

SOURCE	DF	SS	MS	F
FACTOR	7	3.4847	0.4978	15.20
ERROR	93	3.0458	0.0328	
TOTAL	100	6.5305		

SAMPLE	N	MEAN	STDEV
1	20	2.715	0.176
5/10	20	2.845	0.157
9	3	2.700	0.173
14	12	2.858	0.219
16	20	2.815	0.157
20/29	20	2.555	0.154
40	3	3.333	0.351
65	3	2.100	0.346

POOLED STDEV = 0.181

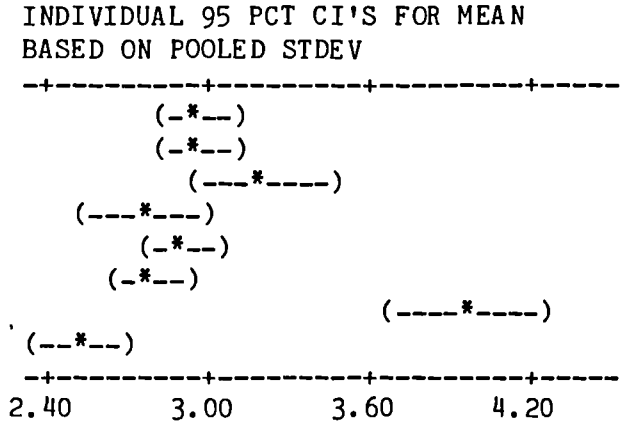


LENGTH - END OF POD

SOURCE	DF	SS	MS	F
FACTOR	7	5.1554	0.7365	11.59
ERROR	51	3.2402	0.0635	
TOTAL	58	8.3956		

SAMPLE	N	MEAN	STDEV
1	10	2.970	0.236
5/10	10	2.970	0.250
9	4	3.200	0.365
14	4	2.775	0.340
16	10	2.900	0.226
20/29	10	2.790	0.137
40	3	3.967	0.462
65	8	2.525	0.231

POOLED STDEV = 0.252

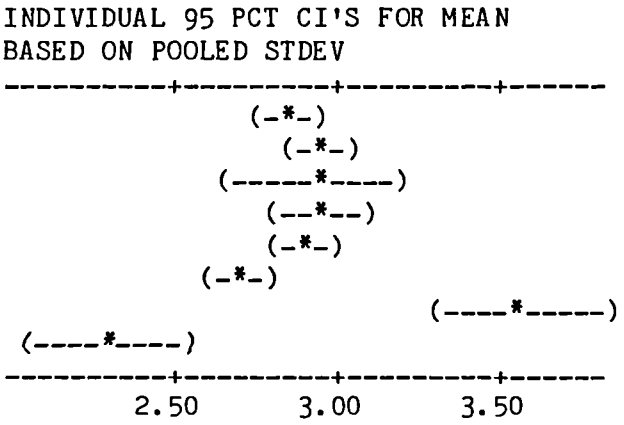


BREADTH - MIDDLE POD

SOURCE	DF	SS	MS	F
FACTOR	7	3.4258	0.4894	9.03
ERROR	93	5.0423	0.0542	
TOTAL	100	8.4681		

SAMPLE	N	MEAN	STDEV
1	20	2.870	0.308
5/10	20	2.970	0.159
9	3	2.933	0.058
14	12	2.950	0.157
16	20	2.905	0.242
20/29	20	2.685	0.198
40	3	3.567	0.208
65	3	2.300	0.520

POOLED STDEV = 0.233

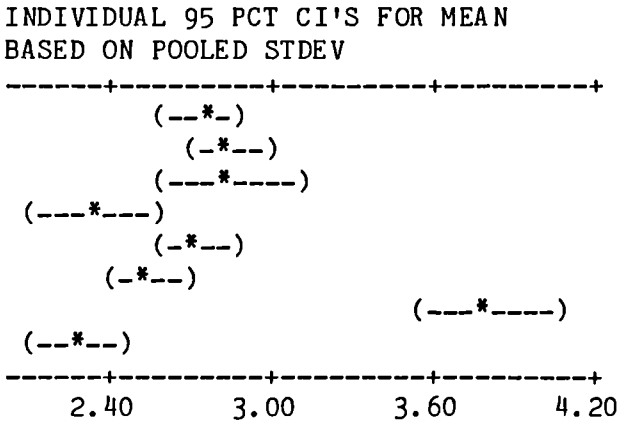


BREADTH - END OF POD

SOURCE	DF	SS	MS	F
FACTOR	7	6.1779	0.8826	15.09
ERROR	51	2.9837	0.0585	
TOTAL	58	9.1617		

SAMPLE	N	MEAN	STDEV
1	10	2.740	0.201
5/10	10	2.830	0.320
9	4	2.850	0.300
14	4	2.350	0.238
16	10	2.720	0.220
20/29	10	2.540	0.171
40	3	3.800	0.173
65	8	2.262	0.267

POOLED STDEV = 0.242

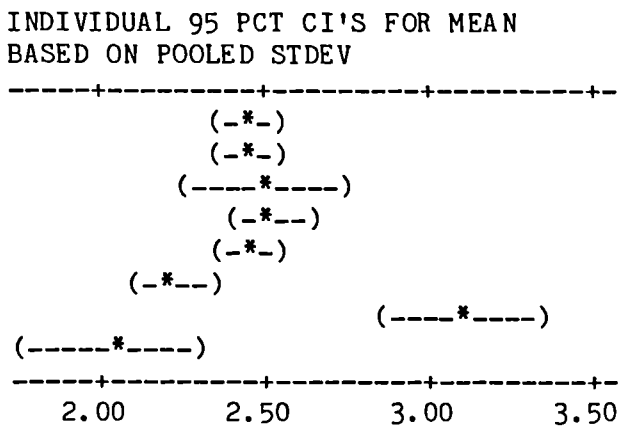


THICKNESS - MIDDLE POD

SOURCE	DF	SS	MS	F
FACTOR	7	2.7882	0.3983	7.51
ERROR	93	4.9322	0.0530	
TOTAL	100	7.7204		

SAMPLE	N	MEAN	STDEV
1	20	2.440	0.173
5/10	20	2.440	0.244
9	3	2.500	0.265
14	12	2.525	0.230
16	20	2.455	0.226
20/29	20	2.225	0.194
40	3	3.100	0.265
65	3	2.033	0.586

POOLED STDEV = 0.230



THICKNESS - END OF POD

SOURCE	DF	SS	MS	F
FACTOR	7	4.6679	0.6668	12.06
ERROR	51	2.8209	0.0553	
TOTAL	58	7.4888		

SAMPLE	N	MEAN	STDEV
1	10	2.230	0.177
5/10	10	2.300	0.221
9	4	2.450	0.370
14	4	2.025	0.206
16	10	2.320	0.235
20/29	10	2.170	0.095
40	3	3.333	0.351
65	8	1.962	0.325

POOLED STDEV = 0.235

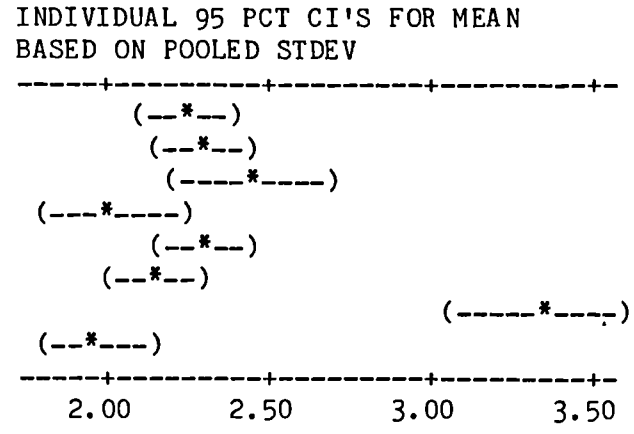


Fig.5.5 (C): Analysis of variance of Hordeum vulgare of the West House and Xeste 3 for length,breadth, thickness.

LENGTH

SOURCE	DF	SS	MS	F
FACTOR	4	264.831	66.208	468.19
ERROR	40	5.657	0.141	
TOTAL	44	270.488		

LEVEL	N	MEAN	STDEV	INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV
5/10	23	5	1	(*)
9	1	5	0	(---*---)
14	3	0	0	(-*-)
81/5	9	0	0	(*)
81/8	9	0	0	(*)

POOLED STDEV = 0

0.0 2.0 4.0 6.0

THICKNESS

SOURCE	DF	SS	MS	F
FACTOR	4	28.8311	7.2078	533.91
ERROR	40	0.5400	0.0135	
TOTAL	44	29.3711		

LEVEL	N	MEAN	STDEV	INDIVIDUAL 95 PCT CI'S FOR MEAN BASED ON POOLED STDEV
5/10	23	2	0	(*
9	1	2	0	(---*---)
14	3	0	0	(-*-)
81/5	9	0	0	(*)
81/8	9	0	0	(*)

POOLED STDEV = 0

0.00 0.60 1.20 1.80

THICKNESS

SOURCE	DF	SS	MS	F
FACTOR	4	13.15864	3.28966	507.80
ERROR	40	0.25913	0.00648	
TOTAL	44	13.41777		

LEVEL	N	MEAN	STDEV
5/10	23	1	0
9	1	1	0
14	3	0	0
81/5	9	0	0
81/8	9	0	0

POOLED STDEV = 0

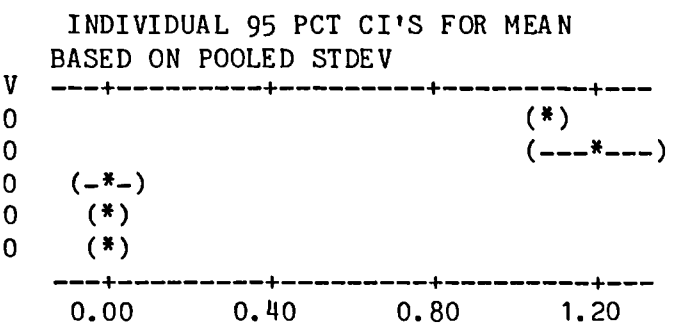


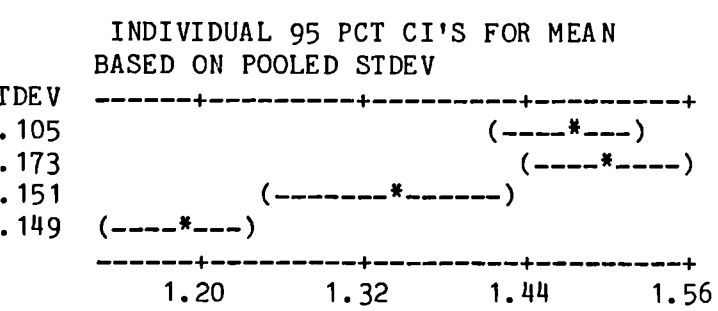
Fig.5.5(d): Analysis of variance of Sherardia arvensis from the West House for length, breadth, and thickness (L/B and L/T ratios do not have a significant F value (less than 1.13) and therefore have not been included.

LENGTH

SOURCE	DF	SS	MS	F
FACTOR	3	1.7630	0.5877	28.67
ERROR	89	1.8243	0.0205	
TOTAL	92	3.5873		

LEVEL	N	MEAN	STDEV
1	30	1.473	0.105
5/10	23	1.500	0.173
16	10	1.340	0.151
20/29	30	1.183	0.149

POOLED STDEV = 0.143

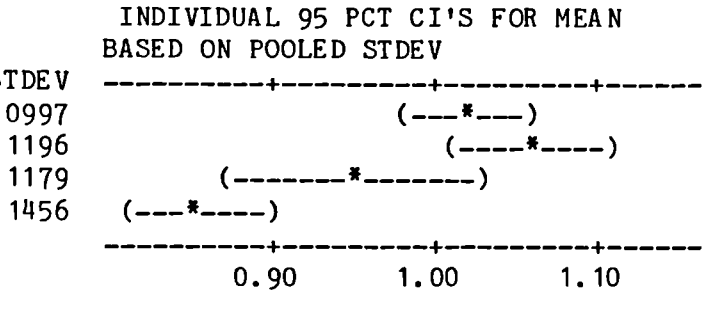


BREADTH

SOURCE	DF	SS	MS	F
FACTOR	3	0.6771	0.2257	14.96
ERROR	89	1.3424	0.0151	
TOTAL	92	2.0196		

LEVEL	N	MEAN	STDEV
1	30	1.0200	0.0997
5/10	23	1.0609	0.1196
16	10	0.9500	0.1179
20/29	30	0.8533	0.1456

POOLED STDEV = 0.1228



THICKNESS

SOURCE	DF	SS	MS	F
FACTOR	3	0.6905	0.2302	20.43
ERROR	89	1.0026	0.0113	
TOTAL	92	1.6931		

LEVEL	N	MEAN	STDEV
1	30	0.8567	0.0728
5/10	23	0.9087	0.1240
16	10	0.7700	0.1252
20/29	30	0.6967	0.1129

POOLED STDEV = 0.1061

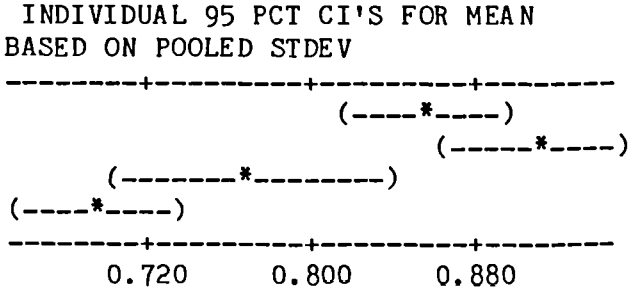
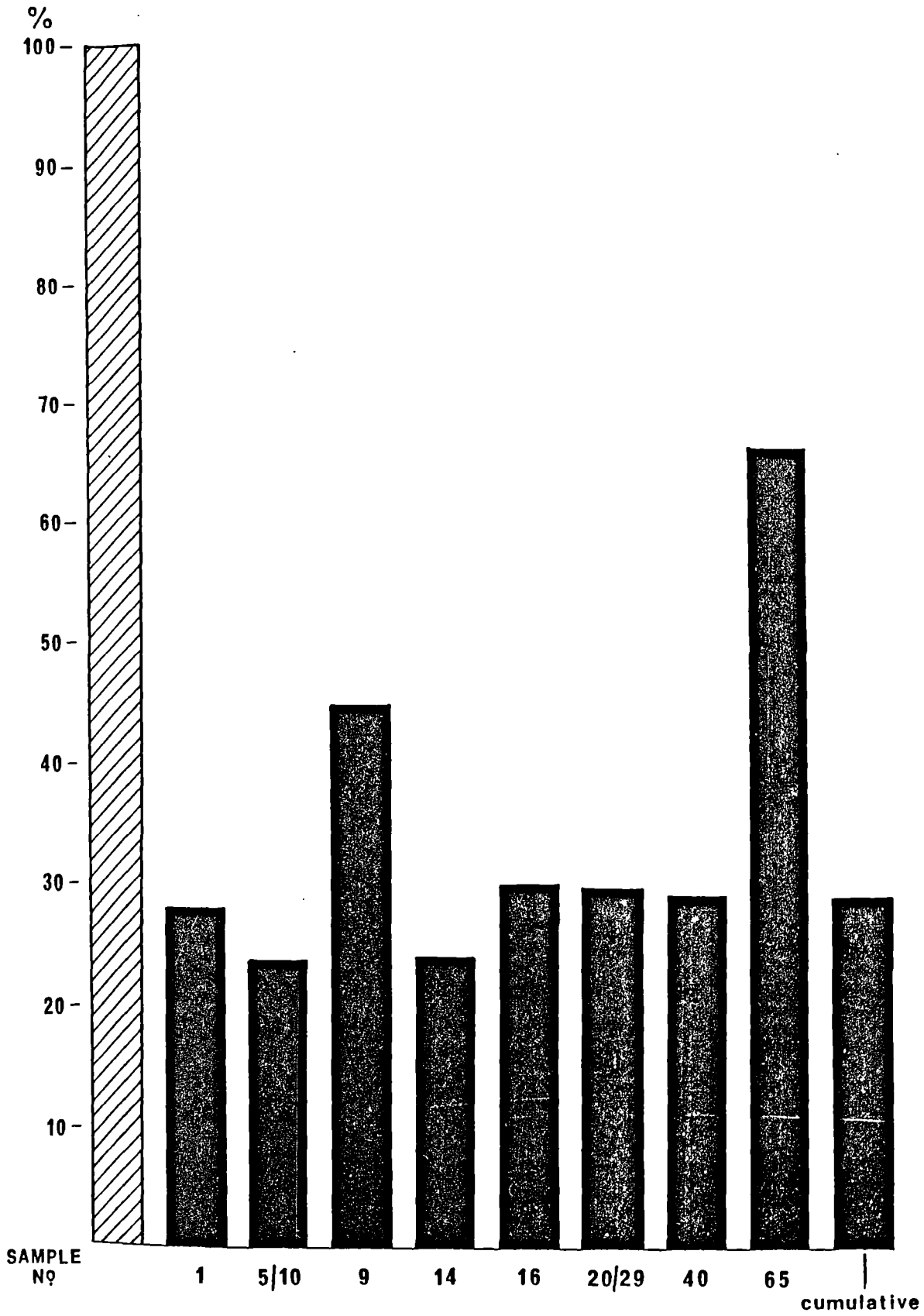


Fig. 5.6 : Histograms of end of pods of Lathyrus cicera/L.sativus



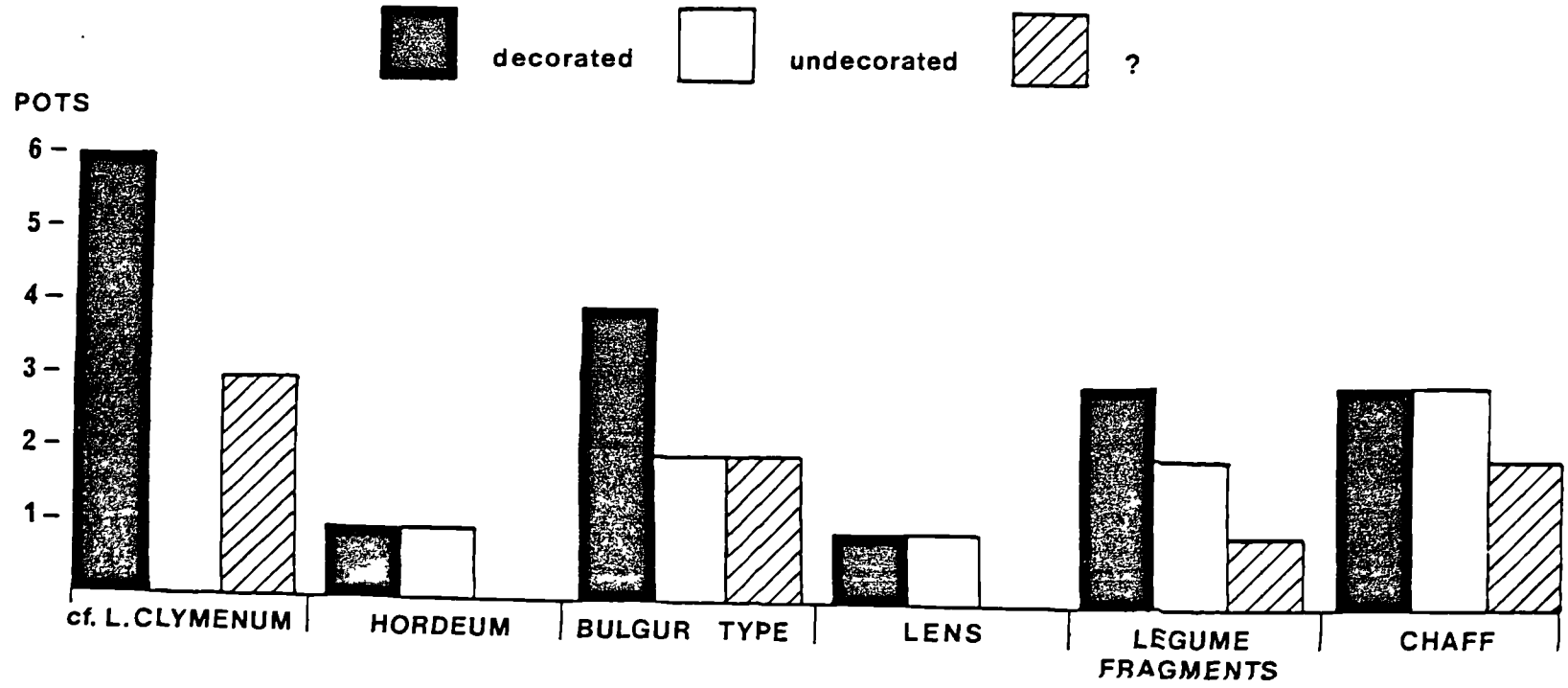


Fig. 6.1 : Histograms of the number and type of pot attributed to each of the following crops: cf.L.clymenum, Lens sp., bulgur-type, legume fragments, and by-products.