PLANT REMAINS FROM VILLE ROYALE II, SUSA

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Several small samples of soil and one of charcoal were submitted for ethnobotanical analysis from the Ville Royale II excavation at Susa *. Material from level 7 B is from Neo-Elamite funerary contexts, Grave 734 and Tomb 693 ; Parthian material (level 3 A) was found on the floor of a burnt room, Locus 652.

Procedures

All samples (except 156-1) were floated at Susa (1). Identification of the material was carried out at the Ethnobotanical Laboratory of the University of Michigan with a variable power (7 x - 30 x) binocular microscope.

The criteria for sample selection were judgmental (2). Soil from within vessels associated with burials was taken, as were clearly visible concentrations of seeds and one chunk of charcoal. The remains do not therefore represent a systematic sample of the entire excavation, though their occurrence will be explained in terms of intentional and post-depositional factors (Table 1).

Level 7B (Neo-Elamite)

Most archaeologically recovered soil from Near Eastern mounds contains at least some carbonized material. Very low densities can generally be assumed to represent environmental "noise" in the soil matrix. At Ville Royale II, Level 7 B vessel contents have densities of carbonized material (whether or not burnt dung is included) that range from low (less than 1 g/l) to high (over 25 g/l). In the absence of control samples and other evidence to the contrary, those vessels in the first category can be assumed to contain the general fill of the surrounding burials, which in turn are filled with the surrounding soil matrix (3). Vessels having an intermediate density of carbonized material (4), which could be interpreted as general burial fill, might instead show evidence of funerary procedures involving fire (e.g., fuel for the burning of funerary offerings). Vessel 686-1, with a concentration of date pits, is the only one which can reasonably be interpreted as having *in situ* remains of a burnt food offering.

Grave 734 (late 8th-7th century B.C.) : The samples come from the contents of six vessels found in Grave 734, but no soil samples surrounding the vessels were taken. Compared to the other burial examined (Tomb 693), there is a relatively low density of carbonized material. The proportion of charcoal to seeds is high, and there is a relatively high proportion of burnt dung. The seeds tend to be those of weeds, rather than cultigens ; 920-2 also has some wheat spikelet forks. The use of dung as fuel may be tentatively inferred from

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I would like to thank Dr. Jean Perrot, Dr. Pierre de Miroschedji, and Geneviève Dollfus for their help and hospitality at Susa. I would also like to thank Dr. Richard I. Ford, Tristine Lee Smart, and Dr. Henry T. Wright for reading and commenting on an earlier draft of this paper.
(1) See MILLER, 1977, for technical details.
(2) P. de MIROSCHEDJI, personal communication.
(3) Sample nos. 876-1, 876-5, 876-7, 920-1.
(4) Sample nos. 637-5, 920-2, 920-3.

TABLE 1 : Plant Remains from Ville Royale II, Susa

	7B Locus 734 Late 8th - 7th Cent. B.C.											
	876-1		876-5		876-7		920-1		920-2		920-3	
	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)
Charcoal (g)		0		.03		.06		.07		.13		.31
Seeds (g), inc. frags.		+		+		.01		.05		.10		.11
SAMPLE WT (g)		+		.03		.07		.12		.23		.42
Other Carbonized Material wt (g)		—		—		—		.02 (3)		.83 (3)		.04 (3)
Approx. soil vol. (1)		(.1)		(.1)		(.25)		(.5)		(.25)		(.25)
Bot. remains Density (g/l)		+		.30		.28		.24		.92		1.68
CULTIGENS												
Gramineae :												
Hordeum											2	+
Oryza											1	+
Triticum aestivum/durum												
Triticum sp.											1	+
Triticum TOTAL									1	.01		
Cereal grain									4.5	+		
Trit. spikelet fork												
Leguminosae : *Lens*												
Palmaceae : *Phoenix*										.02		
NUTSHELL : *Amygdalus*						+						
WEED SEEDS												
Cyperaceae (cf.)												
Gramineae :					1	+	1	+				
Hordeum (wild)							1	+	6	.01	6	+
Lolium												
Phalaris												
cf. *Setaria*							1 (15)	.02	5 (15)	.01	3	.03 (15)
Other	1	+	1	+								
Leguminosae									1	+	1	+
Astragalus							2	+	3	+		
cf. *Medicago*					2	+					1	+
Malvaceae :									1	+		
Plantaginaceae :												
Plantago					1	+					1	+
Rubiaceae : *Galium*									12		2	
Umbelliferae :												
Unknown :												
CHARCOAL : *Phoenix*							1	.01	1	.01	5	.08
Populus/Salix												

TABLE 1 : *(cont.)*

	Level 3A Locus 652 1 st Cent. A.D.						Level 7B Locus 693 7 th Cent. B.C.			
	156-1 (2)		163		190		637-5		686-1	
	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)	≠	wt (g) (1)
Charcoal (g)		21.17		.10		.15 (9)		.10		1.37
Seeds (g), inc. frags.				3.80		5.25		.36		4.94
SAMPLE WT (g)		21.17		3.90		5.40		.46		6.31
Other Carbonized Material wt (g)				.04 (3)				.06		.07
Approx. soil vol. (1)				(.25)		(.25)		(.25)		(.25)
Bot. remains Density (g/l)				15.6		21.6		1.84		25.24
CULTIGENS										
Gramineae :										
Hordeum			14 (4-5)	.12	13 (10)	.11				
Oryza			337 (6)	2.84	56 (11)	.39				
Triticum aestivum/durum			21	.20	65	.67				
Triticum sp.			1	+	113 (12)	2.00				
Triticum TOTAL			22 (7)	.24	178 (13)	2.67				
Cereal Grain				.06		1.01				
Trit. spikelet fork									1	+
Leguminosae : *Lens*			1 (8)	.01		+				
Palmaceae : *Phoenix*			1	.33				.34	5 (14)	4.47
NUTSHELL : *Amygdalus*				+						.01
WEED SEEDS										
Cyperaceae (cf.) :					1	+				
Gramineae										
Hordeum (wild)										
Lolium			2	+						
Phalaris							1	+		
cf. *Setaria*							2	+		
Other			1	+	6	.01	4	+		+
Leguminosae :										
Astragalus										
cf. *Medicago*										
Malvaceae :										
Plantaginaceae :										
Plantago										
Rubiaceae : *Galium*										
Umbelliferae :										
Unknown			34		2				7	
CHARCOAL										
Phoenix	1	21.17							8	.23
Populus/Salix										

(1) Wt. includes seed fragments ; + = < .01 g.
(2) Not floated ; charcoal only.
(3) Burnt dung.
(4) 4 twisted, 10 straight ; rounded cross-section.
(5) .12 g whole, plus fragments.
(6) 1. 15 g whole, plus fragments.
(7) .20 g whole, plus fragments.
(8) 1 whole, plus fragments.
(9) Small stem fragments.
(10) 5 twisted, 5 straight, 4 indeterminate ; .11 g whole, plus fragments.
(11) .22 g whole, plus fragments.
(12) .99 g whole, plus fragments.
(13) 1.66 g whole, plus fragments.
(14) .87 g whole, plus fragments.
(15) < .01 g whole, plus fragments.

of burnt dung were themselves burnt offerings, though they could represent fuel used in relation to funeral activities. Any macroscopic traces of the original contents of these vessels have disappeared.
All of the taxa identified from the fill and tabulated in Table 1 could be expected to have grown in and around the fields at Susa.

Grave 693 (7th century B.C.) : Remains from this tomb come from jar contents (637-5) and from soil collected amidst sherds of a smashed jar (686-1). The latter remains are more likely to represent an actual funerary offering, as there is a predominance (by weight) of date pit *(Phoenix)* ; 686-1 also has some almond *(Amygdalus)* shell. According to the excavator, "probably the majority of the vessels of this tomb contained food offerings, but the vessels (including 686-1) were crushed and disturbed during subsequent burials, so that their content was scattered" (6) ; the relatively high density of poplar/willow charcoal in 686-1 is more likely to represent the fuel with which offerings were burnt than in Grave 734. The few weed seeds probably represent the use of dung as additional fuel ; they are not part of any food offering because they occur in very low densities.

Level 3A (Parthian, 1st century A.D.)

Room 652 : A large piece of palm charcoal, representative of material interpreted by the excavator as burnt roof collapse from locus 652, was identified (7). Supporting this interpretation, Strabo mentions the use of palm wood for construction purposes in Mesopotamia (8).
Two samples were taken from the room floor beneath the roof collapse of locus 652 (9). This room had been "filled with vessels (mostly big amphorae) crushed by the collapsed roof" (10). Sample 163 contains predominantly rice, and sample 190 contains predominantly wheat. The admixture of other cultivated crops (barley, wheat, rice, lentil, date) may just indicate that various crops were stored in this room, and were somewhat mixed during or after the room's destruction. There are a small number of weed seeds relative to cultigens ; it is most likely that they represent impurities harvested with the crops. Relative proportions of crops stored in this room cannot be estimated on the basis of these two samples, however.

Additional notes on the plants

CULTIGENS

All cultigens reported here would have required artificial irrigation if grown locally.
Barley *(Hordeum)* : The cultivated barley found in the Parthian level is the 6-row type, as a number of twisted grains were seen. The rounded cross-section of these grains suggests that we might be dealing with the naked variety, *H. vulgare* var. *nudum*, rather than the hulled, though the transverse wrinkling typical of naked barley was not observed.

TABLE 2 : *Hordeum vulgare* from Ville Royale II, Susa (in mm)

Sample N°	*N*	*L*	*B*	*T*	*L:B*	*T:B*
163	8	5.3	2.6	2.2	206	83
		(4.5-6.0)	(1.8-3.4)	(2.0-2.5)	(168-250)	(73-111)
190	1	5.0	2.3	2.1	217	91
	1	5.0	2.5	1.8	200	72
	1	5.4	2.6	2.0	208	77

Wheat *(Triticum)* : The wheat found in the Parthian levels has been tentatively identified as bread wheat *(T. aestivum)*, on the basis of a generally plump shape, and the appropriate L : B and T : B ratios (Table 3) (11).

(5) Miller, ms. in preparation.
(6) P. de Miroschedji, personal communication.
(7) Sample 156-1
(8) *Geography*, Book 15.
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(10) P. de Miroschedji, personal communication.
(11) Cf. Van Zeist and Heeres, 1973 : L : B = ca. 161, T : B = ca. 88.

	L	*B*	*T*	*L:B*	*T:B*
Min.	4.1	2.3	1.9	130	71
Av.	4.6	2.9	2.5	163	87
Max.	5.3	3.7	3.0	204	104

Rice *(Oryza)* : Unlike wheat and barley, rice is not native to the Near East. Ultimately from East Asia, the cultivation of rice spread west. Possibly cultivated rice was found in the third millennium levels at Lothal and Rangpur in west-central India ; definitely cultivated rice was found in the second millennium levels at Maheshwar and Navdatoli in central India and at Pirak in Pakistan (12). Literary evidence shows that rice was at least known in Mesopotamia in the seventh century B.C., and "that rice was already in Mesopotamia in the Persian period is well known" (13).
The rice at Parthian Susa belongs to a short-grained variety, with an average carbonized length of 4.7 mm and thickness of 2.3 mm (Table 4) (14). In general aspect, the rice at Ville Royale II is not unlike rice from Navdatoli-Maheshwar (15). Compared to wheat and barley, rice has a higher water requirement. It is grown today in Susiana.

TABLE 4 : *Oryza sativa* from Ville Royale II, Susa, Locus 652, no. 163 (N = 90 ; in mm)

	L	*B*	*T*	*L:B*	*T:B*
Min.	3.8	0.9	1.3	237	115
Av.	4.7	1.5	2.3	326	159
Max.	5.6	2.0	4.3	509	208

Note : L/(T × B) = 142, with a range of 82 to 325.

Lentil *(Lens)* : Lentils are not common in these samples, but there is no reason to believe this is representative of the importance of lentil as a crop. Lentil is common on other Susiana sites (16).
Date *(Phoenix)* : The date palm is represented by both charcoal and fruit pit (Table 5). Lowland Iran and Mesopotamia are well known date producing regions, and have been since the fourth millennium B.C. (17). Dates seem to have been used as a funerary offering in the Neo-Elamite burial 693. A similar custom has been reported for the mid to late third millennium burials at Ur, as well ; at Ur, carbonized date pits, some of which were actually placed in saucers with other food remains, were found (18).

TABLE 5 : *Phoenix dactylifera* from Ville Royale II, Susa (in mm)

Sample No.	*L*	*B*	*T*
163	20.7	5.4	5.6
686-1	14.7	6.2	6.1
	13.4	6.0	5.9

NUTSHELL

Amygdalus : A few fragments have been tentatively identified as a smooth-shelled wild almond. Almond would have grown on the lower slopes of the Zagros, extending on to the steppe (19).

(12) Vishnu-Mittre, 1977 ; Costantini, 1979.
(13) Thompson, 1949 : 106.
(14) Cf. Grist, 1953 : fresh seeds of a short variety have average measurements of 5.5 mm by 3.2 mm. « Thickness » is the maximum measurement between the dorsal and ventral side of the grain.
(15) Vishnu-Mittre, 1977 : Pl. 2.
(16) Miller, 1977.
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(18) Ellison *et al.*, 1978.
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the presence of weed seeds and spikelet forks (5). Although there are no control samples from the grave itself, the vessel contents seem to represent general grave fill ; it is unlikely that the poplar/willow charcoal or burnt dung were themselves burnt offerings, though they could represent fuel used in relation to funeral activities. Any macroscopic traces of the original contents of these vessels have disappeared.
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TABLE 3 : *Triticum aestivum* from Ville Royale II, Susa, Locus 652, no. 190 (N = 25, in mm)

	L	*B*	*T*	*L:B*	*T:B*
Min.	4.1	2.3	1.9	130	71
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WEEDS

All of the weeds found could have been grown in and around irrigated crops. These include wild grasses *(Hordeum, Lolium, Phalaris, Setaria)*, sedge (Cyperaceae), wild legumes *(Astragalus, Medicago)*, mallow (Malvaceae), plantain *(Plantago)*, bedstraw *(Galium)*, and a member of the wild carrot family (Umbelliferae). Several of these genera could have grown wild on the steppe plain, and all could be eaten by cattle, sheep or goats. It is suggested that weed seeds found in the tombs were originally carbonized as constituents of dung fuel. Some of the samples actually contain the fibrous fragments of burnt dung, but these fragments cannot be attributed to any particular herbivore. Dung is a standard source of fuel in pastoral societies which produces a steady, even heat.

CHARCOAL

Palm wood and poplar/willow are the only two tree species identified in these samples. The former was cultivated, and the latter might have been planted in groves, or growb wild along the Karkheh, as today. Tamarisk, which today is (and would have been) a common species in the area is not found in these limited samples.

Summary

Carbonized plant remains from the Ville Royale II excavations at Susa provide a glimpse of economic and ritual activity. Evidence from the Neo-Elamite funerary deposits is suggestive of the ritual and economic importance of the date. Almond could have been obtained from a short distance, but the fuel represented in these samples consisted of local wood or readily obtainable dung. Dietary and economic information can be gleaned from the burnt Parthian room. Wheat, barley, rice, lentils, and date were all cultivated as food crops, and palm wood was used in construction.

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