Water in Ancient Mediterranean Households

Edited by Rick Bonnie and Patrik Klingborg



Contents

	List of Illustrations List of Contributors	vii xiii
1	Water in Ancient Mediterranean Households	1
	RICK BONNIE AND PATRIK KLINGBORG	
2	Household Water, Environment, and Economy in Ancient Piraeus	12
	JANE MILLAR TULLY	
3	Social Stratification and Water Sharing on Late-Hellenistic Delos	33
	PATRIK KLINGBORG	
4	Surveying Notion's Residential Water Supply: Cistern Use	
	during Hellenistic-Roman Times	53
	ANGELA COMMITO	
5	Breaking Out from Imagined Household Uniformity: Diverse	
	Rainwater Harvesting Solutions in Republican-Imperial Cosa	74
	ANN GLENNIE	
6	Rainwater Collection Strategies in Pompeian Houses	96
	GEMMA JANSEN	
7	Posthumanism, Social Justice, and Pollution in the Waters of	
	Roman Volubilis	118
	MARK A. LOCICERO	
8	Reusing Stepped Pools in Roman Palestinian Households	133
	RICK BONNIE	

9	The Significance of Household Cisterns at Roman Dura-Europos J. A. BAIRD	152
10	Water as Social Inequality in Late Roman Britain JAMES GERRARD	172
	Index	197

vi Contents

Illustrations

Figures

1.1	Map with all sites discussed in this book. Map by Patrik	
	Klingborg. Base map: Stamen Design, under CC BY 3.0.	
	Data by OpenStreetMap, under ODbL	4
2.1	Map of modern Piraeus with features of the ancient water	
	supply. Used with permission of G. Peppas, copyright Ephorate	
	of Antiquities of Piraeus and Islands, Hellenic Ministry of	
	Culture and Sports	13
2.2	Underground water supply structures excavated for the	
	Dimotiko Theatro Station on a reconstructed urban grid, with	
	features mentioned in the text labeled. Cross-section after	
	Koutis & Bendermacher-Gerousis 2015, slide 5. Copyright	
	Ephorate of Antiquities of Piraeus and Islands, Hellenic	
	Ministry of Culture and Sports	17
2.3	Interior of Well 28. Copyright Ephorate of Antiquities of Piraeus	
	and Islands, Hellenic Ministry of Culture and Sports	18
2.4	Flask-shaped Cistern 1, with Well 1β' below. Copyright	
	Ephorate of Antiquities of Piraeus and Islands, Hellenic	
	Ministry of Culture and Sports	20
2.5	Cisterns (1–5, numbered from west to east) and well (1) in	
	Pavlos Bakoyiannis Square. Copyright Ephorate of Antiquities	
	of Piraeus and Islands, Hellenic Ministry of Culture and Sports	22
2.6	Cisterns 6 (shaft, left) and 7 (flask-shaped, right). Copyright	
	Ephorate of Antiquities of Piraeus and Islands, Hellenic	
	Ministry of Culture and Sports	23
2.7	From left to right, Well 25, Tunnel 15, Well 13, Well 2, Tunnel	
	13, and Cistern 3. Copyright Ephorate of Antiquities of Piraeus	
	and Islands, Hellenic Ministry of Culture and Sports	24
3.1	Delos with neighbouring islands and their location in Greece.	
	Map by Author	34
3.2	Number of water sources per house and shop. Map by Author	39

viii Illustrations

3.3	Number of water sources based on size, from the largest to the	
	smallest house. Map by Author	41
3.4	Types of water sources in the houses. Map by Author	42
3.5	Water sources within 50 meters of Shop RdT 33. Map by Author	47
3.6	Water sources within 50 meters of Shop RdT 27. Map by Author	48
3.7	Water sources within 50 meters of House VI C. Map by Author	49
4.1	Map of the region around Notion. Notion Archaeological Survey	54
4.2	City plan of Notion, showing the locations of documented	
	cisterns. Notion Archaeological Survey	56
4.3	Compiled cross-sections of nine cisterns produced from laser	
	scans. Notion Archaeological Survey	57
4.4	Internal view of cistern 19, showing pick marks and excavation	
	in concentric rings. Notion Archaeological Survey	58
4.5	Placement and bedding of terracotta pipe inside cistern 19.	
	Notion Archaeological Survey	59
4.6	Masonry opening of cistern 19. Notion Archaeological Survey	59
4.7	Roofing system of cistern 9 from below, with one of two	
	terracotta pipes visible. Notion Archaeological Survey	60
4.8	View inside cistern 9, showing pick marks on the interbedded	
	schist and marble bedrock surfaces and hydraulic mortar on the	
	upper portion of shaft. Notion Archaeological Survey	61
4.9	View of cistern 14, looking North. Notion Archaeological Survey	63
4.10	Interior view of cistern 7. Notion Archaeological Survey	64
4.11		
	Survey	65
4.12	View of partial pithos reused to articulate the opening of cistern	
	1. Notion Archaeological Survey	66
4.13	View inside cistern 12, showing hydraulic mortar on uneven	
	surfaces of schist bedrock. Notion Archaeological Survey	67
4.14	Conglomerate junction block for a terracotta pipeline. Notion	
	Archaeological Survey	70
4.15	Marble block, possible part of a pressurized stone pipeline.	
	Notion Archaeological Survey	70
5.1	State plan of Cosa with Atrium Buildings and East and West	
	Block Houses. Cosa Excavations 2018, adapted	76
5.2	Reconstructed plan of Republican Atrium Building I and North	
	Corner Plot. Brown et al. 1993, Figs. 20 and 55, combined and	
	adapted	78
5.3	Reconstructed plan of Republican and Augustan Phases of	
	Atrium Building V/House of Diana. Fentress 2003, Figs. 5 and	
	15, adapted	80
5.4	State plan of the East and West Block houses. Bruno & Scott	
	1993, Fig. 3, adapted	83
5.5	Reconstructed plan of Republican Phase 1 West and East Block	
	houses Bruno & Scott 1993 Figs 5 and 10 adapted	84

	Illustr	ations	ix
5.6	Reconstructed plan of Republican Phase 2 West and East Block houses. Bruno & Scott 1993, Figs. 10 and 19, adapted		85
5.7	Reconstructed plan of Republican Phase 3 East and West Block houses. Bruno & Scott 1993, Figs. 22 and 32, adapted		86
5.8	Reconstructed plan of Imperial East Block house/House of the Birds. Bruno & Scott 1993, Fig. 43, adapted		88
5.9	Faceted plot showing the amount of water able to be collected each month (bars) and the surplus, as restricted by max cistern volume (lines), for 5, 10, 15, and 20 person households, respectively, over eight cycles of rainfall collected in the cisterns from: Atrium Building I (max. 60.69 m³); Lot 4 and 5 house (max. 24.04 m³); Lot 5 garden plot house (max. 6.82 m³); Southwest House (max. 36 m³); and House of the Skeleton		
	$(\text{max. vol. } 58.8 \text{ m}^3)$		90
6.1	Schematic presentation of the rainwater collection system in the atrium. Drawing by author		99
6.2	Impluvium with a small drain to cistern in the middle and a large drain to street at the right, Casa del Menandro I 10, 4.14.15. Photo by author. Printed with permission of the		
6.3	Ministero della Cultura, Parco archeologico di Pompei Lions as terracotta waterspouts with a dog (or lion?) on an acanthus leaf as corner spout, Casa del fabbro I 10, 7. Photo by author. Printed with permission of the Ministero della Cultura,		100
6.4	Parco archeologico di Pompei Cistern turned into cellar, house VIII 6, 9. Photo by author. Printed with permission of the Ministero della Cultura, Parco		100
6.5	archeologico di Pompei Stone slab with hole over cistern mouth and marble puteal, house VIII 6, 1. Photo by author. Printed with permission of the		102
6.6	Ministero della Cultura, Parco archeologico di Pompei Marble cistern head, puteal, with signs of wear, house VII 15, 2. Photo by author. Printed with permission of the Ministero della		102
6.7	Cultura, Parco archeologico di Pompei Holes for nails at street drain to fix a small grating. Photo by author. Printed with permission of the Ministero della Cultura,	-	103
6.8	Parco archeologico di Pompei Portico around (peristyle) garden with rain gutter at ground level and cistern mouth in portico, house I 14, 2. Photo by author. Printed with permission of the Ministero della Cultura,	,	104
5.9	Parco archeologico di Pompei Gutter in garden with access to cistern: a settling basin and in front of the opening to the cistern a perforated lead sheet attached with iron nails, house I 9, 11.12. Photo by author. Printed with permission of the Ministero della Cultura, Parco	1	104

105

archeologico di Pompei

6.10	Lightwell with terracotta downpipe, collection and distribution	
	basin and cistern mouth, house I 7, 18. Photo by author.	
	Printed with permission of the Ministero della Cultura, Parco	• • • •
	archeologico di Pompei	106
6.11	Plan of Pompeii with insulae of investigation indicated,	
	composition B. de Fraiture	108
6.12	Small compluvium and small impluvium underneath, house I 9,	
	16.17. Photo by author. Printed with permission of the Ministero	
	della Cultura, Parco archeologico di Pompei	110
6.13	Terracotta puteal, raised washbasin and amphora in the portico	
	of Casa degli amanti (I 10, 10.11); three bronze vessels, one of	
	which was the standard vessel for drawing water from cisterns	
	were found here, too, but are not present on this photograph.	
	After Jashemski 1993, 50	112
6.14	Collection and distribution basin in corner of courtyard of Casa	
	del Menandro (I 10, 4.14.15): (a) overview with cistern head	
	and basin in corner. Photo by author. Printed with permission of	
	the Ministero della Cultura, Parco archeologico di Pompei; (b)	
	detail of basin with drain to street at bottom and drain to cistern	
	at top. After Ling 1997, 120, plate 66	113
7.1	Photograph of aqueduct in Queretaro (Mexico), designed to	
	resemble ancient Roman aqueducts in Spain	119
7.2	Location of Volubilis. After Bigi 2018, 167, Fig. 2, reproduced	
	with permission	120
7.3	Plan of Volubilis. Drawing by author	125
7.4	North-East Quarter of Volubilis, with aqueduct supply lines	
	indicated by the thick solid line. Drawing by author	126
7.5	Location of olive oil presses (marked by the numbers) in	
	Volubilis, with the vast majority in the southern part of the city.	
	After Bigi 2018, 168, Fig. 3, reproduced with permission	128
8.1	Sepphoris SP4, an example of stepped pool structure.	
	Photo by author	134
8.2	Map of the region with sites mentioned in the text.	
	Map by author	136
8.3	Jerusalem, stepped pool 'miqweh 65': (a) looking northwest,	
	showing the ashlar collapse inside the pool; (b) Concentration	
	of pottery bowls trapped under ashlar collapse, looking north.	
	Reich 2000, Photos 2.77–78, courtesy of the Israel Exploration	
	Society	138
8.4	Jericho, stepped pool area 'A(A)209-A(A)243': (a) overview of	
	area, looking north; (b) plates exposed in the connecting pool	
	A(A)243, looking east. Netzer 2001, Ills 55 and 61, courtesy of	
	the Israel Exploration Society	139

8.5	Gamla, stepped pool '1293', looking east, with broken storage	
	jars at the bottom. Photo Danny Syon/Gamla Excavations	140
8.6	Sepphoris, stepped pool SP1 / L85.3228, looking north, with	
	the later installation mortared on its floor. Gordon 2018a,	
	Photo 4.25, courtesy of Eric and Carol Meyers/Duke Sepphoris	
	Excavation Project	143
9.1	Plan of the site indicating excavated area and main monuments,	
	with approximate position of river marked to the east. Site plan	
	adapted by author from Detweiler, YUAG, Dura-Europos Archive	153
9.2	Aerial photograph of Dura-Europos in 1932 from south showing	
	position relative to the Euphrates, before building of modern	
	dams upstream. YUAG, Dura-Europos Archive DS-2	154
9.3	Idealised Durene house, drawn in the 1930s by architect Henry	
	Pearson, which brings together features found in a number	
	of houses at Dura. Note square 'latrine' in the centre of the	
	courtyard. YUAG, Dura-Europos Archive	157
9.4	Cistern opening (left) and partially overgrown cistern cover	
	(right) in courtyard of house D5-E, excavated in 1930s.	
	Photo by author, 2006	161
9.5	Plan of city block D5 indicating cisterns and relationships of	
	house units of final period; by then, only four house units were	
	present, as houses D5-A and D5-E were internally connected, as	
	were houses D5-F and D5-F1, and houses D5-C/D5-D. Plan by	
	author, incorporating field and archival data (after Pearson 1932	
	and Pillet 1931). The large collapsed cistern was that of room F1	165
10.1	Drapers' Gardens: late second to third century showing timber	
	buildings to the east of the road supplied with piped water.	
	[1215] is the pipe illustrated in Fig. 10.2. The building to the	
	west of the road was served by a well that existed within a	
	private, fenced yard not shown on this plan. Courtesy of	
	Pre-Construct Archaeology Ltd	174
10.2	A bored wooden pipe with lead fitting from Drapers' Gardens.	
	It is shown as [1215] on Figure 10.1. Courtesy of Pre-Construct	
	Archaeology Ltd	175
10.3	Drapers' Gardens in the late fourth and early fifth centuries. The	
	open space east of the road is now occupied by two wells. The	
	most southerly contained an important hoard of bronze, pewter,	
	and iron vessels. Courtesy of Pre-Construct Archaeology Ltd.	176
10.4	The westernmost well at Drapers' Gardens (see Fig. 10.1).	
	Note the white clay used to backfill between the edge of	
	the construction pit and the timber planking. Courtesy of	
	Pre-Construct Archaeology Ltd.	177
10.5	The diurnal cycle of water use. After White 1977, Fig. 6.6	178

xii Illustrations

10.6	Plan showing the relationship between the unusually wide and	
	deep well at Rudston and the villa's bath building. After Stead	
	1980, Fig. 3	182
10.7	Simplified sketch section of the well at Rudston showing the	
	various deposits mentioned in the text. After Stead 1980, Fig. 16	183
10.8	The late Prof. Philip Rahtz, wearing a British army 'tin helmet',	
	excavating the Roman well at Pagans Hill, Somerset in the	
	early 1950s. This image underlines not only the danger inherent	
	in excavating wells, but also the proximity that the modern	
	archaeologist's experience has to that of the ancient well digger.	
	University of York and the Estate of Prof. Philip Rahtz:	
	CC BY-NC-SA	184
10.9	A sketch section of the well at Dalton Parlours.	
	After Wrathmell & Nicholson 1990, Fig. 158	189
Table	es	
3.1	Number of sources based on size, from the largest to the	
	smallest house	40
5.1	Detailed information available from publication about the	
	Atrium Buildings' rainwater harvesting features	93
5.2	Detailed information available from publication about the East	
	and West Block houses' rainwater harvesting features	94
6.1	Insulae investigated and their courtyards	108
9.1	Cisterns in houses at Dura-Europos. Houses in bold were	
	internally connected with adjacent houses in the final period.	
	List does not include cisterns in buildings which were not in	
	use in the final period (e.g., those which might have belonged	
	to houses which were sealed below later structures). For a full	
	list of houses at the site, including internal connections between	
	houses and bibliography for each, see appendix in Baird 2014	159