

FISH-SALTING IN THE
NORTHWEST MAGHREB
IN ANTIQUITY

A GAZETTEER OF SITES AND RESOURCES

Athena Trakadas

ARCHAEOPRESS ARCHAEOLOGY

ARCHAEOPRESS PUBLISHING LTD

Gordon House
276 Banbury Road
Oxford OX2 7ED

www.archaeopress.com

ISBN 978 1 78491 241 3
ISBN 978 1 78491 242 0 (e-Pdf)

© Archaeopress and A Trakadas 2015

Cover illustration: Complex 1 at the Roman-period fish-salting site of Tahadart, Morocco, with modern salt pans in the background. Detail: Beltrán IIB salazón amphora (photo: A. Trakadas; drawing: P. Copeland).

All rights reserved. No part of this book may be reproduced, stored in retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of the copyright owners.

Printed in England by Oxuniprint, Oxford
This book is available direct from Archaeopress or from our website www.archaeopress.com

Contents

List of Figures.....	iii
Abbreviations.....	ix
Foreword.....	xi
Introduction.....	1
1. Fish-salting in the northwest Maghreb: a brief review of the research.....	1
2. The present volume.....	3
Section I. Fish-Salting: Production, Sites, and Resources.....	7
I.1 <i>Salsamenta</i> and fish sauces.....	9
I.2 Dyes.....	12
I.3 Fish-salting sites.....	14
I.3.1 Quantification issues.....	17
I.4 Salt sources.....	17
I.5 Salazón amphorae and kilns.....	19
Section II. The Gazetteer.....	23
Catalogue 1. Fish-Salting Sites.....	25
FS-Site 1. Metrouna.....	27
FS-Site 2. Sania e Torres.....	30
FS-Site 3. <i>Septem Fratres</i>	32
FS-Site 4. Ksar-es-Seghir.....	36
FS-Site 5. Zahara.....	38
FS-Site 6. Cotta.....	40
FS-Site 7. Tahadart.....	44
FS-Site 8. <i>Lixus</i>	48
FS-Site 9. Essaouira.....	54
FS-Site 10. Sidi Bou Hayel.....	59
FS-Site 11. El Marsa.....	60
FS-Site 12. Dchar 'Askfane.....	61
FS-Site 13. Leliak.....	64
FS-Site 14. Kankouz.....	65
FS-Site 15. Kouass.....	66
FS-Site 16. <i>Banasa</i>	69
FS-Site 17. <i>Thamusida</i>	73
FS-Site 18. Emsa.....	77
FS-Site 19. Sidi Abdeselam del Behar.....	79
FS-Site 20. "Los Castillejos".....	81
FS-Site 21. Beliunes.....	82
FS-Site 22. Er Rmel.....	83
FS-Site 23. Oued Liam.....	84
FS-Site 24. Tanja el-Balia.....	85
FS-Site 25. Sidi Kacem.....	86
FS-Site 26. Sidi Bou Nouar/Lalla Safia.....	87
FS-Site 27. Asilah.....	88
FS-Site 28. Fum Asaca.....	89

Catalogue 2. Salt Sources	91
SS-Site 1. Oued Moulouya.....	93
SS-Site 2. Nador lagoon.....	93
SS-Site 3. Oued Kert.....	95
SS-Site 4. Beni Madden.....	95
SS-Site 5. <i>Septem Fratres</i>	97
SS-Site 6. Tanja el-Balia.....	97
SS-Site 7. Cotta.....	99
SS-Site 8. Tahadart.....	99
SS-Site 9. Kouass.....	100
SS-Site 10. Oued Loukkos.....	101
SS-Site 11. Souk-el-Arba du Rharb.....	103
SS-Site 12. Oued Beth.....	103
SS-Site 13. Oued Bouregreg.....	104
SS-Site 14. Fédhala.....	105
SS-Site 15. Moulay Abdallah.....	105
SS-Site 16. Sidi Abed.....	106
SS-Site 17. Oualidia.....	107
Catalogue 3. Kiln Sites	109
K-Site 1. <i>Tamuda</i>	112
K-Site 2. <i>Septem Fratres</i>	113
K-Site 3. Dchar 'Askfane.....	113
K-Site 4. Kouass.....	115
K-Site 5. Aïn Mesbah.....	116
K-Site 6. Oued Mdâ.....	116
K-Site 7. <i>Banasa</i>	117
K-Site 8. <i>Thamusida</i>	118
K-Site 9. Rirha.....	118
K-Site 10. <i>Volubilis</i>	119
K-Site 11. Emsa.....	121
K-Site 12. Sidi Abdeselam del Behar.....	121
K-Site 13. <i>Zillil</i>	122
K-Site 14. <i>Lixus</i>	122
K-Site 15. <i>Sala</i>	124
Section III. Discussion and Summary	125
III.1 Discussion.....	127
III.2 Summary.....	135
Bibliography	139
Maps List	154
Figure Permissions	155
Index	157

List of Figures

Fig. 1.	One of the figures that appears in Ponsich and Tarradell’s 1965 publication, which generally indicates the placement of fish-salting factories and the evidence for them.....	2
Fig. 2.	The <i>opus signinum</i> -lined vats, or <i>cetariae</i> , at the Roman fish-salting factory of <i>Sexi</i> , modern Almuñécar.....	2
Fig. 3.	The northwest Maghreb, the western-most part of North Africa, includes present-day northern Morocco and the Spanish North African autonomous cities of Ceuta (<i>Septem Fratres</i>) and Melilla (<i>Rusaddir</i>).....	5
Fig. 4.	The chronology applied in this volume is based on fineware and amphorae chronologies as representative of phases of the Punico-Mauretanian, Roman, and Late Roman cultural matrix in the northwest Maghreb.....	5
Fig. 5.	A contemporary example of drying fish on racks of wood and net: catfish drying in Djoudj, Senegal.....	9
Fig. 6.	A small stone oven on a beach, used for smoking fish, near Cap Tafelney.....	10
Fig. 7.	Rectangular and circular <i>opus signinum</i> -lined <i>cetariae</i> oriented around a central preparation floor at one of the fish-salting factories at <i>Baelo Claudia</i>	10
Fig. 8.	An example of <i>salsamenta</i> : sea bream with scales left on the meat.....	10
Fig. 9.	A ceramic jug, or <i>marmite</i> , used for artificially reducing <i>garum</i> sauce during manufacture.....	11
Fig. 10.	Fish bones, possibly the remains of <i>allex</i> (?), found inside the toe of an amphorae.....	12
Fig. 11.	Fish vertebra (bluefin tuna, <i>Thunnus thynnus</i>), from Punico-Mauretanian layers at <i>Tamuda</i>	12
Fig. 12.	Shark vertebra (tope shark, <i>Galeorhinus galeus</i>), from the Roman layers at Zahara.....	12
Fig. 13.	Shellfish remains (banded dye-murex, <i>Murex trunculus</i>), from the Roman layers at <i>Lixus</i>	13
Fig. 14.	The hypobranchial gland of a <i>Murex (bolinus) brandaris</i> specimen, after steaming and extraction.....	13
Fig. 15.	Major <i>cetariae</i> sites in the Mediterranean, Black Seas and Atlantic façade, dating to the Graeco-Roman periods.....	15
Fig. 16.	The remains of the Roman fish-salting site at Boca do Rio (Algarve coast, Portugal).....	15
Fig. 17.	Different sizes and shapes of <i>opus signinum</i> -lined <i>cetariae</i> at a factory at <i>Selectum/Salakta</i> , Tunisia.....	16
Fig. 18.	The layout of the <i>cetariae</i> of “Factory 1” at <i>Lixus</i> , on the Atlantic coast of Morocco, near the Oued Loukkos.....	16
Fig. 19.	One of the Roman-period <i>cetaria</i> at the Teatro de Andalucía site, in <i>Gades/Gadir/Cádiz</i> on the southern Atlantic coast of Spain.....	16
Fig. 20.	One of the modern <i>salinas</i> at Sidi Abed, on the Atlantic coast of Morocco.....	18
Fig. 21.	Raking the crystallised salt in the <i>salinas</i> along the Oued Loukkos in October 2009.....	18

Fig. 22.	<i>“Spuma salis”</i> or froth salt can be collected in shallow pits or pans along the coast, such as at the modern works at Marsalforn, Malta.....	19
Fig. 23.	<i>A titulus pictus</i> on the neck of a Beltrán II type amphora from the Arles Rhône 3 shipwreck, AD 60–90, France.....	20
Fig. 24.	Some of the main Punico-Mauretanian, Roman, and Late Roman amphorae that were used to trans-ship salazón products from the western Mediterranean.....	21
Fig. 25.	A view of part of the kiln structure at Kouass, before recent excavations.....	22
Fig. 26.	Amphorae at the Musée Archéologique, Tetouan, Morocco.....	22
Fig. 27.	General distribution of the 28 fish-salting and possible fish-salting sites in the northwest Maghreb included in this catalogue.....	24
Fig. 28.	Group 1 fish-salting sites.....	26
Fig. 29.	Overview south of the Oued Martil valley on the southeastern edge of the Tangier peninsula, 2007.....	28
Fig. 30.	Looking north-east from Sidi Abdeslam del Behar across the old Oued Martil mouth to Metrouna, 2007.....	28
Fig. 31.	Site plan of the complex at Metrouna.....	29
Fig. 32.	Overview of Ensenada de Ceuta, looking north, 2009.....	31
Fig. 33.	Plan of the preserved <i>cetariae</i> at Sania e Torres.....	31
Fig. 34.	Situation of the remaining <i>cetariae</i> above the beach at Sania e Torres, looking south, 2002.....	31
Fig. 35.	Detail of the remaining <i>cetariae</i> at Sania e Torres, used as beach huts, 2002.....	31
Fig. 36.	Site plan of the <i>cetariae</i> and preparation areas at <i>Septem Fratres</i>	34
Fig. 37.	Overview north-east to the Peninsula de la Almina, location of the main fish-salting area at <i>Septem Fratres</i> and the city of Ceuta, 2009.....	35
Fig. 38.	Profiles of the four <i>cetariae</i> at No. 13 Calle Hermanos Gomez Marcelo.....	35
Fig. 39.	The extant <i>cetariae</i> remains at No. 20/21 Av. Sanchez Prados.....	35
Fig. 40.	<i>Cetariae</i> from El Paseo de las Palmeras, now on display in the Museo Basilica Tardoromana.....	35
Fig. 41.	Overview, looking east, of the situation of the complex at Ksar-es-Seghir, with the Portuguese and Islamic forts at the mouth of the Oued El Kazar.....	37
Fig. 42.	Plan of the Ksar-es-Seghir site.....	37
Fig. 43.	One of the <i>cetaria</i> at Ksar-es-Seghir during excavations in 1953.....	37
Fig. 44.	The situation of the factory at Ksar-es-Seghir, 2007.....	38
Fig. 45.	Situation of Zahara, 2007: the <i>cetariae</i> excavated by Ponsich, located behind the top of the bluff.....	39
Fig. 46.	Site plan of the <i>cetariae</i> located at Zahara by Ponsich.....	39
Fig. 47.	“Base navale de Ksar-es-Seghir” during its construction, 2009.....	39

Fig. 48.	Situation of Cotta looking south-east from the Ras Ackahar bluff.....	42
Fig. 49.	Aerial view of Cotta during excavations.....	42
Fig. 50.	Looking from Cotta north-west to the Ras Ackahar bluff, 2002.....	42
Fig. 51.	Plan of Cotta during its second phase, late 3 rd century AD.....	43
Fig. 52.	Looking west over the <i>cetariae</i> and central preparation floor, fallen away and showing the domed roof of the cistern, 2002.....	43
Fig. 53.	Overview north to the fish-salting complexes at Tahadart, situated on the western edge of the lagoon formed by the Oueds Tahadart and Hachef, 2007.....	45
Fig. 54.	Situation of the six Tahadart complexes on the western edge of the estuary.....	46
Fig. 55.	Complex 1 at Tahadart with hypocaust	46
Fig. 56.	Complex 4 at Tahadart.....	46
Fig. 57.	Complex 4: filled-in <i>cetariae</i> along the south wall of the complex, 2007.....	47
Fig. 58.	Complex 2: one of the exposed <i>cetaria</i> with damaged floor, 2007.....	47
Fig. 59.	View east across Complex 1 to the <i>salinas</i> on the Oued Hachef, 2007.....	47
Fig. 60.	Overview of the Oued Loukkos basin from the city of Larache, looking north.....	51
Fig. 61.	Plan of the ten complexes at <i>Lixus</i>	51
Fig. 62.	View to the south-west over the salting complexes at <i>Lixus</i> and the Oued Loukkos, 2007.....	51
Fig. 63.	Complex 1 at <i>Lixus</i>	52
Fig. 64.	Complex 1, looking to the north-east across Area 1 noted in site plan, 2007.....	52
Fig. 65.	Complex 6 at <i>Lixus</i> , showing construction and remodelling phases.....	53
Fig. 66.	Complex 7 and Complex 8 at <i>Lixus</i> , looking south, 1999.....	53
Fig. 67.	Looking west across Complex 10, 2007.....	53
Fig. 68.	Overview of the islands at Essaouira, looking west, 2009.....	56
Fig. 69.	Plan of Jodin's excavations on the eastern face of the island of Essaouira.....	56
Fig. 70.	Photograph taken of the <i>cetariae</i> in 1955, before erosion.....	56
Fig. 71.	View of the remains of the <i>cetariae</i> and beach zone at low tide, looking north to the city of Essaouira across the bay, 2004.....	57
Fig. 72.	The remains of the two rock-cut <i>cetariae</i> with the eroded façades lying in front on the beach, 2007.....	57
Fig. 73.	Group 2 fish-salting sites.....	58
Fig. 74.	View of the southern coast of the Strait of Gibraltar, looking south-west, 2009.....	61
Fig. 75.	Dchar 'Askfane during excavations in 2005, looking south-west.....	62

Fig. 76.	Overview of the site of Dchar 'Askfane, looking north along the Oued El Kazar valley during construction of the toll road to the Tanger-Med port, 2007.....	63
Fig. 77.	Location of the fish-salting sites in the middle of the Strait of Gibraltar coast.....	63
Fig. 78.	Plan of Dchar 'Askfane, after the recent investigations by INSAP.....	63
Fig. 79.	Plan of the <i>cetariae</i> complexes, modern <i>salinas</i> , camp, and aqueduct at Kouass.....	67
Fig. 80.	View looking north-west over the Oued Garifa to the Atlantic, 2007.....	67
Fig. 81.	View looking south-east over the Oued Garifa, 2007.....	68
Fig. 82.	Part of the aqueduct on the bluff, built into a house, 2002.....	68
Fig. 83.	Overview of <i>Banasa</i> , with the <i>forum</i> to the left of the <i>cardo</i> , looking south, 2002.....	70
Fig. 84.	<i>Banasa</i> , with the groups of proposed <i>cetariae</i> in grey, following Cerri's numbering.....	70
Fig. 85.	Group #1 double <i>cetariae</i> at <i>Banasa</i> , 2009.....	71
Fig. 86.	Group #2 <i>cetaria</i> at <i>Banasa</i> , 2009.....	71
Fig. 87.	Group #3 octagonal vat at <i>Banasa</i> , 2009.....	71
Fig. 88.	Detail of a corner of the <i>opus signinum</i> -lined and poorly-preserved Group #4 <i>cetaria</i> at <i>Banasa</i> , 2009.....	71
Fig. 89.	Group #5 double <i>cetariae</i> at <i>Banasa</i> , 2009.....	72
Fig. 90.	Group #6 rectangular vat at <i>Banasa</i> , 2009.....	72
Fig. 91.	Site plan of <i>Thamusida</i> : <i>cetariae</i> area, salazón amphorae kilns, the Praetorian camp, and " <i>Insula aux dolia</i> ".....	74
Fig. 92.	Overview of <i>Thamusida</i> , looking east, 2007.....	75
Fig. 93.	Area of the covered-over <i>cetariae</i> at <i>Thamusida</i> , looking north over the Oued Sebou, 2007.....	75
Fig. 94.	Group 3 fish-salting sites.....	76
Fig. 95.	Location of Emsa, east of Cape Mazari.....	78
Fig. 96.	Hillock site of Emsa, looking south-east across Oued Emsa, 2007.....	78
Fig. 97.	Overview of the lower Oued Martil valley, 2007.....	80
Fig. 98.	The situation of Sidi Abdeselam del Behar on the coast, 2007.....	80
Fig. 99.	The previous location of the site of Er Rmel, when construction of the Tanger-Med port was nearly finished, 2007.....	83
Fig. 100.	Looking west across the valley of Oued Liam, 2007.....	84
Fig. 101.	Looking east over Tangier Bay, 2008.....	85
Fig. 102.	Looking north along Sidi Kacem beach to Cotta and the headland of Cap Spartel, at the western edge of the Strait of Gibraltar, 2007.....	86

Fig. 103.	Salt sources in the northwest Maghreb.....	92
Fig. 104.	<i>Salina</i> at Nador lagoon. Detail of <i>Fezzae et Marrochi Regna</i>	94
Fig. 105.	<i>Salina</i> at Nador lagoon. Detail of <i>Estats et Royaumes de Fez et Maroc Darha et Segelmesse</i>	94
Fig. 106.	<i>Salina</i> at Nador lagoon. Detail of <i>Statuum Marocca Norum</i>	95
Fig. 107.	<i>Salina</i> at Nador lagoon. Detail of <i>Des Principaux Plans Des Ports et Rades de la Mer Mediterranee</i>	95
Fig. 108.	Salt piles and <i>salinas</i> at Beni Madden, 1925.....	96
Fig. 109.	Salt piles and <i>salinas</i> at Beni Madden, adjacent to Sidi Abdeselam del Behar, 1966.....	96
Fig. 110.	A plan view of the <i>salinas</i> at Tanja el-Balia, 1905.....	98
Fig. 111.	An overview of the modern <i>salinas</i> at Tahadart, looking south-east over the Oued Tahadart estuary, 2007.....	100
Fig. 112.	An overview of the modern <i>salinas</i> at Kouass, looking south-west across the Oued Garifa to the Atlantic, 2007.....	100
Fig. 113.	<i>Salinas</i> along the lower basin of the Oued Loukkos. <i>Plano de Larache</i>	102
Fig. 114.	Overview of the <i>salinas</i> along the banks of the Oued Loukkos, looking south-west from <i>Lixus</i> to the city of Larache, 2009.....	102
Fig. 115.	The <i>salinas</i> and “ <i>briquetage</i> ” around the banks of the Oued Bouregreg, 1956.....	104
Fig. 116.	Aerial photo of the <i>salinas</i> along the Oued Mellah at Fédhala, looking east from the Atlantic, 1923.....	105
Fig. 117.	The rock-cut salt pits at Moulay Abdallah, looking west to the Atlantic, 2007.....	106
Fig. 118.	Detail of one of the slightly eroded salt pits at Moulay Abdallah, 2007.....	106
Fig. 119.	The <i>salinas</i> at Sidi Abed, showing, right to left, the progressive stages of the brine concentrating to saturation, 2007.....	106
Fig. 120.	The <i>salinas</i> in the long lagoon at Oualidia, looking west/north-west towards the Atlantic, 2007.....	107
Fig. 121.	Salazón kiln and possible kiln sites in the northwest Maghreb.....	110
Fig. 122.	The Punico-Mauretanian, Roman, and Late Roman salazón type amphorae that were manufactured at kilns in the northwest Maghreb.....	111
Fig. 123.	The chronology applied in this volume is based on fineware and amphorae chronologies as representative of phases of the Punico-Mauretanian, Roman, and Late Roman cultural matrix in the northwest Maghreb.....	111
Fig. 124.	General distribution of the 28 fish-salting and possible fish-salting sites in the northwest Maghreb as presented in Section II, Catalogue 1.....	128
Fig. 125.	The 28 fish-salting and possible fish-salting sites presented in Section II, Catalogue 1: chronology of activities or proposed activities and structures.....	129
Fig. 126.	Salt sources in the northwest Maghreb as presented in Section II, Catalogue 2.....	130

Fig. 127.	The 17 salt sources presented in Section II, Catalogue 2: chronology of exploitation or proposed exploitation.....	131
Fig. 128.	Salazón kiln and possible kiln sites in the northwest Maghreb as presented in Section II, Catalogue 3.....	132
Fig. 129.	The 15 salazón kiln sites and possible kiln sites presented in Section II, Catalogue 3: chronology of production or proposed production and amphorae types.....	133

Abbreviations

In this volume, sites and provinces noted in italics refer to their ancient names.

<i>AEspA</i>	<i>Archivo Español de Arqueología</i>	al-Idrīsī	Hadj-Sadok, M. (trans.), Abu Abd Allah Muhammad al-Idrīsī, <i>Kitāb Nuzhat al-Mushtāq fī ikhtirāq al-āfāq (Le Maghrib 6^e siècle de l'hégire [12^e siècle après J.C.]</i> (Paris 1983)
<i>ANP</i>	L'Agence nationale des Ports (http://www.anp.org.ma/En/Services/Mohammedia/port/Pages/Presentation.aspx ; accessed 10/2015)	<i>ILM</i>	Chatelain, L., <i>Inscriptions latines du Maroc</i> (Paris 1942)
<i>AntAfr</i>	<i>Antiquités Africaines</i>	INSAP	Institut National des Sciences d'Archéologie et du Patrimoine (Morocco)
ARSW	African Red Slip Ware	<i>ItAnt</i>	Anonymous, <i>Antonine Itinerary</i>
<i>Astr.</i>	Manilius, <i>Astronomica</i>	<i>JRA</i>	<i>Journal of Roman Archaeology</i>
AT	Athena Trakadas	<i>MEFRA</i>	<i>Mélanges de l'École Française de Rome, Antiquité</i>
al-Bakrī	de Slane, M.G. (trans.), Abou Abdullah al-Bakrī, <i>Kitāb al-Massālik wa-l-Mamālik (Description de l'Afrique septentrionale par Abour-Obeïd-el-Bekri)</i> (Paris 1965)	<i>NA</i>	Aelian, <i>De Natura Animalium</i>
<i>BAM</i>	<i>Bulletin d'Archéologie Marocaine</i>	<i>NAP</i>	<i>Nouvelles archéologiques et patrimoniales</i>
<i>BCTH</i>	<i>Bulletin Archéologique du Comité des Travaux Historiques et Scientifiques</i>	<i>NH</i>	Pliny, <i>The Natural History</i>
<i>CAF</i>	Kock, T. (ed.), <i>Comicorum Atticorum Fragmenta</i> (Leipzig 1880, 1884, 1888)	NID I	Naval Intelligence Division, <i>Morocco, I. BR 506A Geographical Handbook Series</i> (Oxford 1941)
<i>CIL VIII</i>	Mommsen, T., <i>Corpus Inscriptionum Latinarum VIII: Inschriften Nordafrikas ohne Agypten und die Cyrenaica, d. h. der Provinzen Mauretaniae Tingitana, Caesariensis und Sitifensis, Numidia und Africa proconsularis</i> (Berlin 1881-)	<i>Onom.</i>	Pollux, <i>Onomasticon</i>
<i>Cod. Just.</i>	Blume, F.H. (trans.), & T. Kearley (ed.), <i>Annotated Justinian Code</i> (2 nd edn, Laramie, WY 2009)	Pomp. Mela	Pomponius Mela, <i>De Chorographia</i>
<i>CRAI</i>	<i>Comptes rendus des séances Académie des inscriptions et belles-lettres</i>	<i>PSAM</i>	<i>Publications du Service des Antiquités du Maroc</i>
<i>DRR</i>	Columella, <i>De Re Rustica</i>	<i>Ramsar</i>	Ramsar Sites Information Services (https://rsis.ramsar.org/ris/1474 ; accessed 9/2015)
<i>Geo.</i>	Claudius Ptolemy, <i>The Geography</i>	Rav. Cosmog.	<i>Ravennatis Anonymi Cosmosgraphia</i>
Ibn Hawkal	Kramers, J.H., & G. Weit (trans.), Moh. Abul-Kassem Ibn Hawkal, <i>Kitāb Sūrat al Ard (Configuration de la terre)</i> (Paris, Beirut 1964)	<i>Roman Amphorae</i>	Roman Amphorae: a digital resource. University of Southampton, 2005 (updated 2014)(http://ads.ahds.ac.uk/catalogue/archive/amphora_ahrb_2005/cat_amph.cfm ; accessed 9/2015)
		TALIM	Tangier American Legation Institute for Moroccan Studies

Foreword

This book is an expanded and updated version of an appendix that was part of a PhD thesis, completed at the University of Southampton in 2009, entitled *Piscationes in Mauretania Tingitana: marine resource exploitation in a Roman North African province*. I would especially like to thank Dr. Aomar Akerraz (Director, INSAP) for his support of this research project and his permission to publish the material presented in this book.

The research and survey stays in Morocco and Spain, which were part of the PhD project, were undertaken due to generous grants from the American Institute of Maghrib Studies, the University of Southampton, the Society for the Promotion of Roman Studies, and the Morocco Maritime Research Group.

The production of this book could not have been accomplished without the help of many individuals. Lloyd Huff (University of New Hampshire), Nadia Mhammdi and Mohamed Ali Geawhari (Université Mohamed V – Agdal) have tirelessly supported my research interests during our fieldwork campaigns in the Oued Loukkos basin, and I am grateful to them for their encouragement and inter-disciplinary contributions. Fernando Villada Paredes (Instituto de Estudios Ceuties, Ceuta) and Abdelatif Elboudjay (Délégation de la Culture, Tangier) helpfully shared source material and ideas, and Thor Kuniholm (former director of Tangier American Legation Institute for Moroccan Studies) provided an open welcome during my repeated research visits to Tangier. Hicham Hassini (Conservateur du site archéologique de Lixus) kindly shared his knowledge and provided invaluable assistance during research stays in Larache and throughout our fieldwork campaigns. From the University of Southampton, I indebted to Lucy Blue for her guidance and extremely helpful comments on many early drafts of this text, and to Simon Keay and David Williams who kindly suggested most welcome corrections. I would like to thank Dario Bernal Casasola (Universidad de Cádiz), Tønnes Bekker-Nielsen (University of Southern Denmark), and Matthew Harpster (University of Birmingham), who also read various drafts of this text. This book has undoubtedly benefitted from their discussions and suggestions. Any remaining errors are certainly mine.

Athena Trakadas
Department of History,
University of Southern Denmark

Copenhagen, October 2015

Introduction

1. Fish-salting in the northwest Maghreb: a brief review of the research

This volume is a detailed gazetteer of fish-salting production in the northwest Maghreb in antiquity. It consists of a catalogue of fish-salting sites in addition to catalogues of other related resources that are necessary for the production and trans-shipment of the industry's products: salt and amphorae kilns. The gazetteer is intended to serve as a comprehensive source book, and as such, it builds upon previous studies and current research on the region's fish-salting industry.

The first study that focused on the subject of fish-salting in the region in antiquity was published by Michel Ponsich and Miguel Tarradell in 1965, entitled *Garum et industries antiquae de salaison dans la Méditerranée occidentale*.¹ The volume compiles the textual and archaeological evidence for the locations in the western Mediterranean and methods by which the salting of marine resources produced wet and dried foodstuffs and fish sauces (such as *garum*), as well as purple textile dyes (Fig. 1).

The detailed archaeological evidence presented in Ponsich and Tarradell's volume is geographically divided into two regions, centred on the Strait of Gibraltar: the southern Iberian coast, discussing Portugal but focusing largely on Spain, and the "Mauretanian coast" of northern Morocco. Presented in these sections are the archaeological sites, as they were then known, where not only fish but shellfish species and marine mammals were processed with salt for later consumption or for dye making. The sites are rather homogenous in constructional features, and represent so-called "factories", almost all with *opus signinum*-lined vats, or *cetariae*, in which the salted products were manufactured (Fig. 2).

In Ponsich and Tarradell's volume, the seven sites that are described in detail along the "Mauretanian coast" of northern Morocco are more numerous and better documented compared to those presented from southern Spain, reflecting the extensive fieldwork the authors had carried out here.² Ponsich was the long-serving Inspector of Antiquities and Historical Monuments in Northern Morocco and then Inspector of Antiquities of Morocco; Tarradell had been the Director of the Archaeological

Service of the Spanish Protectorate of Morocco prior to independence in 1956.³ The publication draws upon their excavations and surveys throughout northern Morocco that had taken place during the 1950s and 60s. Although the "Mauretanian" sites in their publication largely are dated to the initial period of Roman influence in the region, in the 1st century BC, to the Late Roman period, in the early 6th century AD, the majority date to the region's incorporation as the Roman province of *Mauretania Tingitana* – AD 42/43 to ca. 280.⁴

The book *Garum et industries antiquae de salaison dans la Méditerranée occidentale* remains a fundamental investigation and important point of departure for wider studies of the so-called "fish-salting industry" in antiquity, and in particular for analyses in the western Mediterranean region.⁵ However, the compilation of this present gazetteer is due to the fact that since 1965 there have been several important developments – and lack thereof – on the "Mauretanian" side of the Strait of Gibraltar (encompassing northern Morocco and the Spanish North African territories, referred to throughout this volume as the northwest Maghreb).

First, surveys and excavations conducted over the last five decades have led to the identification of additional contemporary fish-salting facilities within the province of *Mauretania Tingitana*. In addition to the original seven sites listed by Ponsich and Tarradell – Sania e Torres, Ksar-es-Seghir, Zahara, Cotta, Tahadart, Kouass and *Lixus*⁶ – fish-salting production in *opus signinum*-lined *cetariae* has been identified at sites such as Essaouira, *Thamusida*, *Septem Fratres*, Metrouna, and Dchar 'Askfane. Several of these recently-discovered sites have been treated individually in monographs or articles. Curiously, the fish-salting facilities at the sites of Essaouira and *Thamusida*, first published in 1967 and 1977, respectively,⁷ were not included in Ponsich's 1988 publication, *Aceite de oliva y salazones de pescado; factores geo-economicos de Betica y Tingitania*, which is largely a re-print of the 1965 volume in the section where the "Mauretanian"

¹ M. Ponsich & M. Tarradell, *Garum et industries antiquae de salaison dans la Méditerranée occidentale* (Paris, Presses universitaires de France, 1965)

² Eight sites are mentioned, but Asilah (Arzila) is only treated in a paragraph as a possible fish-salting site, and, as is now known, was incorrectly identified as ancient *Zilil* (Ponsich & Tarradell 1965: 37).

³ See Blázquez Martínez 2000; López Pardo & Mederos Martín 2008: 58.

⁴ The 6th century AD abandonment date given for complexes at *Lixus* in Ponsich & Tarradell 1965; later revision of some material has assigned abandonment dates to the 7th century; see Section II, Catalogue 1, **FS-Site 8**. For the chronology of the Roman province of *Mauretania Tingitana*, see Whittaker 1994: 92; Montero 2000; Akerraz 1992: 379; Shaw 1986: 86, n. 64; Rebuffat 2001: 30.

⁵ See, for example, Curtis 1991a: 46-71; Arévalo González, *et al.* 2004; Lagóstena, *et al.* 2007; Bernal Casasola 2009.

⁶ For the eighth site, see n. 2.

⁷ Jodin 1967; Rebuffat 1977

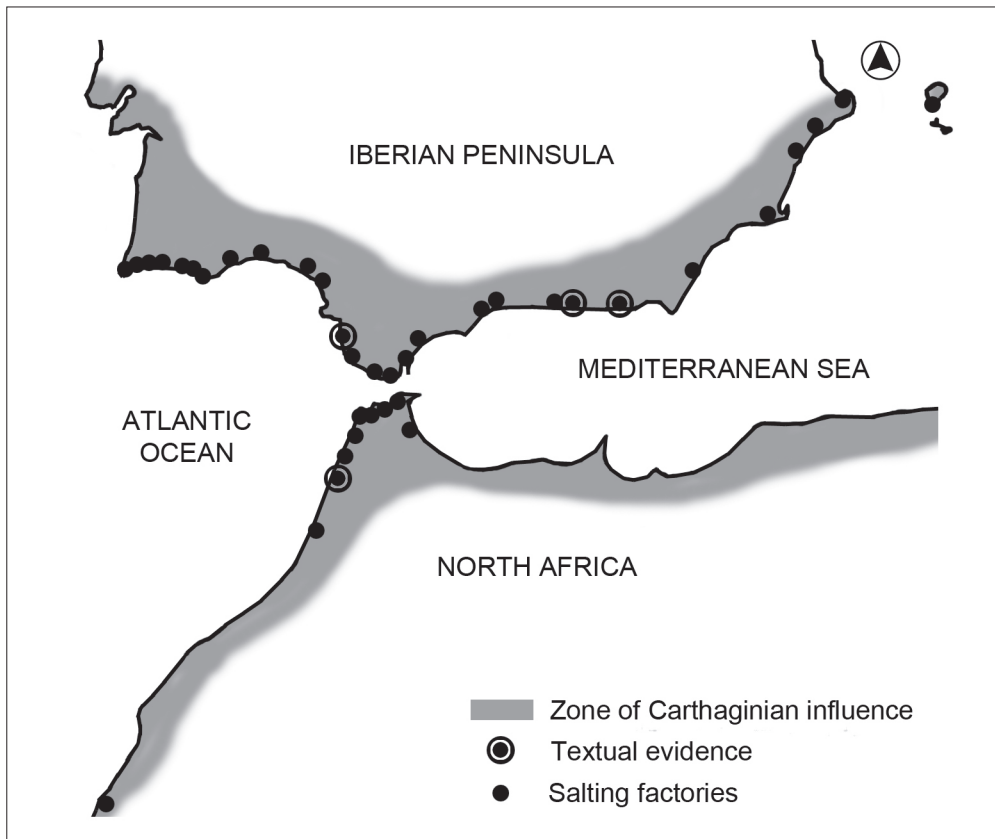


FIG. 1. ONE OF THE FIGURES THAT APPEARS IN PONSICH AND TARRADELL'S 1965 PUBLICATION, WHICH GENERALLY INDICATES THE PLACEMENT OF FISH-SALTING FACTORIES AND THE EVIDENCE FOR THEM, WITHIN THE ZONE OF "CARTHAGINIAN [PUNIC] INFLUENCE" IN THE WESTERN MEDITERRANEAN (DRAWING: AT, AFTER PONSICH & TARRADELL 1965: FIG. 58).



FIG. 2. THE *OPUS SIGNINUM*-LINED VATS, OR *CETARIAE*, AT THE ROMAN FISH-SALTING FACTORY OF *SEXI*, MODERN ALMUÑÉCAR, ON THE SPANISH MEDITERRANEAN COAST (PHOTO: AT).

fish-salting industry is discussed.⁸ Between 1991 and 2009, lists of known sites with *cetariae* in the region, some more extensive than others, have been published by R.I. Curtis, D. Bernal Casasola, L. Cerri, A. Cheddad, and the present author, in preliminary attempts at creating a synthesis of this available material.⁹ As of 2015, more sites can certainly be added to the list, and important corrections can be made to some of the original published data of the seven “Mauretanian” sites.¹⁰

It is also important to point out that fish-salting activities occurred in the region centuries prior to the Roman provincial administration, during the Punico-Mauretanian period: sites such as Emsa and Sidi Abdeslam del Behar lacked *cetariae* but might have used other methods and means for salting and preserving marine resources. Similar types of sites might have existed during the Roman period, such as at Oued Liam and Tanja el-Balia. At present, however, there is no diachronic synthesis of all types of fish-salting sites now known, and proposed, in the northwest Maghreb.¹¹ This is needed not only for correlating the sites that predominantly operated with *cetariae*, but those that did not; moreover, a synthesis from the Punico-Mauretanian to Late Roman periods is necessary for understanding the history of the development of salting practices in the region.

Second, and no less significant, adjustments to ceramic chronologies in the past few decades and re-evaluations of excavated ceramic material have affected the dating of some of the fish-salting sites and kilns that were investigated prior to 1965.¹² Although published, these re-evaluations are not often cited or remain largely unknown as they are not widely disseminated, and some newer publications that reference western Mediterranean fish-salting sites still cite the original – but now incorrect – dating assigned in Ponsich and Tarradell’s publication and early publications relating to ceramic production.

Third, in general there exists limited examination in the northwest Maghreb region of the important relationship between the fish-salting sites and other natural resources required for the processing of marine resources, such as salt and fresh water (discussed in Section I).¹³ The availability

of these additional natural resources can impact the production of salted products, not to mention the quantities produced. Importantly, such an examination needs to consider the environmental changes since antiquity that impact the possible presence of these resources.

Fourth, the packaging of the industry’s products in fish-salting or “salazón” amphorae in the northwest Maghreb has long been an open question, as it impacts greatly our understanding of the chronology and logistics of the production and the ensuing quantity of goods transhipped.¹⁴ As with the fish-salting sites, some of the earliest kiln excavations were not clearly defined stratigraphically, and were also conducted when amphorae chronologies were only beginning to be developed in the western Mediterranean. Revisions of the excavated material have been on-going, and new excavations have taken place at sites such as Kouass and *Banasa*, but these are sometimes not known to a wider audience, or made clear in publications relating to the region’s fish-salting industry.¹⁵ A list of the kilns in the region that manufactured salazón amphorae was compiled in 2006 by D. Bernal Casasola; since then, subsequent chronological revisions and more kilns have come to light due to extensive surveys and excavations. Other kilns have also been postulated due to archaeological contexts.¹⁶ An updated synthesis of the salazón amphorae kilns in the region is warranted in order to map out clearly their locations and chronologies, and to link them, if possible, to the region’s fish-salting factories.

2. The present volume

The recent archaeological developments, outlined above, demonstrate a clear need for a comprehensive, updated, and annotated catalogue of fish-salting sites in the northwest Maghreb in antiquity. In addition, catalogues of other related resources and industries that are necessary for the production and trans-shipment of salted-fish products are needed to amend the lacunae related to the traditional lines of enquiry regarding the industry. As these catalogues also need to be contextualised, this volume is organised into three main sections.

Section I. Fish-salting: production, sites, and resources

An overview of salted-fish products, processing techniques, salting facilities, as well as the related resources and logistical requirements for production comprises the first section of this volume. As such, it provides the overall background and contextualisation for the site-specific catalogues that follow in Section II.

⁸ Ponsich 1988: 103-168; Curtis 1991b. There are some additions and corrections to chronology, but the eight sites are still listed as in the 1965 publication, including a short comment on Asilah (Arzila), now not identified as *Zilil* (Ponsich 1988: 136); see n. 2.

⁹ Curtis 1991a: 46-71; Bernal Casasola 2006a: 1368-1369, 1391; Cerri 2007a: 195-195; Cerri 2007b: 33-37; Cheddad 2006; Cheddad 2007; Cheddad 2008: 391-396; Trakadas 2005; Trakadas 2009: Appendix 3

¹⁰ In some instances, the numbers of *cetariae* noted in Ponsich and Tarradell’s text does not correspond to the published site plans, and noted measurements do not correspond to the scaled drawings. Reconnaissance and survey by the present author has hopefully amended these issues; see discussion of individual sites in Section II, Catalogue 1.

¹¹ Although there have been calls for such a synthesis; see i.e., Bernal Casasola 2006a; Bernal Casasola & Sáez Romero 2008: 49.

¹² See, for example, Habibi 2007; Hassini 2008; Kbir Alauoui 2007.

¹³ It must be noted that there are exceptions for specific sites in the region, such as cited in Bernal Casasola 2006a; Hesnard 1998; Bernal, *et al.* 2014b; for the Iberian Peninsula, see Étienne & Mayet 2002.

¹⁴ Étienne 1970; Ponsich 1970: 336; Curtis 1978: 277-278; Teichner & Pons Pujol 2008; Pons 2007

¹⁵ For discussion of Kouass and *Banasa*, see Section II, Catalogue 3, **K-Sites 4, 7.**

¹⁶ For earlier kiln finds updated to 2006, see Bernal Casasola 2006a. For more recent individual kilns finds, see Limane & Rebuffat 2004; Mlilou 1991; Kbir Alauoui 2007; Cerri 2007a; Cerri 2007b; Gliozzo & Cerri 2009; Habibi 2007; El Khayari & Lenoir 2012; Diaz Rodriguez 2011: 569-577; see Section II, Catalogue 3.

Section II. The gazetteer

Section II is comprised of three inter-related catalogues: fish-salting sites, salt resources, and salazón amphorae kiln sites.

Catalogue 1. Fish-salting sites

Catalogue 1 (“FS-Sites”) is a list of fish-salting sites in the northwest Maghreb. Significantly, this catalogue also distinguishes between types of these sites, and is therefore sub-divided into three groups. The order of these groups reflects their identification with fish-salting activities, based upon structures, finds, and the present extent of investigation.

Group 1: Sites with *opus signinum*-lined vats (*cetariae*) used for fish-salting. Identification is based on the sites’ architecture, contexts, and associated finds.

Group 2: Sites with *opus signinum*-lined structures that have been identified or proposed as fish-salting sites with *cetariae* but have not been fully investigated, are awaiting final publication, or are not adequately preserved for a thorough investigation. In some cases the identification of these structures as associated with fish-salting activities is very probable, in other cases, fish-salting activities have only been suggested.

Group 3: Sites that have been proposed as having fish-salting activities due to their proximity to marine environments, particular structures, or associated finds such as fish bones, shells, and large salazón amphorae. In these cases, further investigation is warranted, although at a few sites this is not possible due to a poor state of preservation or destruction.

The sites are presented in catalogue form, each with a topographical description, an outline of the history of the investigations at the site, and the evidence for fish-salting. Resources such as fresh water are listed, as well as salt sources and salazón amphorae kilns (the latter two cross-referenced in Catalogues 2 and 3, see below). A site chronology (in some cases revised since original publication) and relevant bibliography are given. Metadata regarding the sites are presented at the beginning of the catalogue.

Catalogue 2. Salt sources

This catalogue (“SS-Sites”) is a compilation of evidence regarding the logistical requirements and availability of a resource necessary to the production of fish-salting: salt (see also Section I). The type of salt source is listed in the catalogue, in addition to its chronology. Importantly, any environmental changes that could affect the availability or production of the source are also addressed. Relevant bibliography is also included, and metadata are presented at the beginning of the catalogue.

Catalogue 3. Kiln sites

This catalogue (“K-Sites”) is comprised of the evidence for kilns in the northwest Maghreb that produced salazón amphorae. This catalogue also distinguishes between site types, and is sub-divided into two groups.

Group 1: Identified kilns: sites with excavated or surveyed kiln structures securely identified as having produced salazón amphorae.

Group 2: Proposed kilns: sites with the presence of ceramic wasters and/or an abundance of amphorae fragments of a particular fabric but no kiln structures yet identified. In these cases, further investigation is warranted.

The amphorae types, general period of production, and relevant bibliography are given. Metadata regarding identification and chronologies are presented at the beginning of the catalogue.

Section III. Discussion and summary

The third section of this volume discusses and summarises the material presented in the three catalogues of Section II, focusing on the chronological development of the fish-salting industry in the northwest Maghreb, the inter-relationships of resources, the logistical requirements, and the broader historical matrices at play during the periods in question.

Geography

Geographically, the material in the catalogues of Section II derives from the area of the northwest Maghreb that was part of the Punico-Mauretanian sphere of influence and subsequently the Roman province of *Mauretania Tingitana*. The ancient geography therefore included the northern portion of the present Kingdom of Morocco and the Spanish North African autonomous cities of Ceuta and Melilla (Fig. 3).¹⁷

Chronology

In order to provide an overview of the development of the industry as well as the type of sites and their features, material presented in the catalogues of Section II extends chronologically from the late 6th century BC to the 7th century AD – from the Punico-Mauretanian period to the Late Roman period.¹⁸ A uniformly applied chronology does

¹⁷ The ‘outpost’ sites of Essaouira, ca. 650 km south of the Strait of Gibraltar, and Fum Asaca, ca. 260 km south of Essaouira, are included in this volume, see Section II, Catalogue 1, **FS-Sites 9, 28**; salt sources nearby are listed in Catalogue 2.

¹⁸ Some of the salt sources listed in Section II, Catalogue 2 extend beyond this chronological range; see explanation in ‘Metadata’ section of the catalogue.

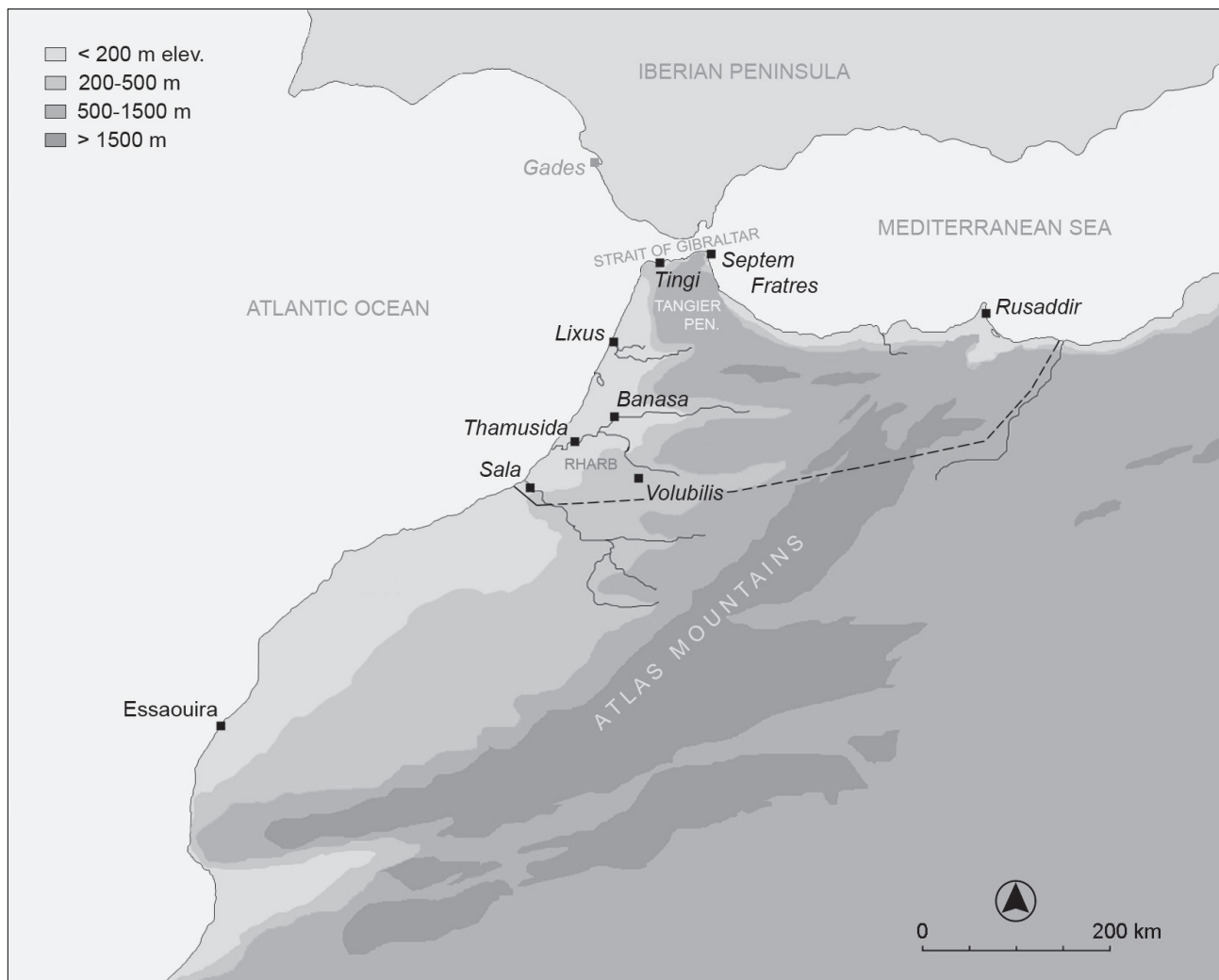


FIG. 3. THE NORTHWEST MAGHREB, THE WESTERN-MOST PART OF NORTH AFRICA, INCLUDES PRESENT-DAY NORTHERN MOROCCO AND THE SPANISH NORTH AFRICAN AUTONOMOUS CITIES OF CEUTA (*SEPTEM FRATRES*) AND MELILLA (*RUSADDIR*). MANY OF THE PUNICO-MAURETANIAN SETTLEMENTS WITHIN THIS REGION WERE OCCUPIED DURING THE ROMAN PERIOD. A FEW “OUTPOSTS”, SUCH AS ESSAOUIRA, EXTEND FURTHER DOWN THE ATLANTIC COAST. THE BOUNDARIES OF THE ROMAN PROVINCE OF *MAURETANIA TINGITANA* ENCOMPASSED THE RHARB PLAIN AND EXTENDED FROM SALA (MODERN RABAT) ON THE ATLANTIC COAST, LIKELY FOLLOWED THE ATLAS MOUNTAINS, AND REACHED EAST OF *RUSADDIR* ON THE MEDITERRANEAN COAST, AT THE *MALVA FLUMEN* (MODERN OUED MOULOUYA). (THE SOLID LINE REPRESENTS THE PHYSICALLY-DELINEATED BOUNDARIES OF THE PROVINCE AND THE DASHED LINE FOLLOWS TOPOGRAPHICAL FEATURES THAT COULD SERVE AS BOUNDARIES.) (DRAWING: AT).

Punico-Mauretanian	Late 6 th century BC– ca. AD 75
Roman	Ca. AD 75–late 3 rd / early 4 th centuries AD
Late Roman	Late 3 rd /early 4 th centuries–6 th /early 7 th centuries AD

FIG. 4. THE CHRONOLOGY APPLIED IN THIS VOLUME IS BASED ON FINWARE AND AMPHORAE CHRONOLOGIES AS REPRESENTATIVE OF PHASES OF THE PUNICO-MAURETANIAN, ROMAN, AND LATE ROMAN CULTURAL MATRIX IN THE NORTHWEST MAGHREB.

not exist for the archaeology of the northwest Maghreb; dates applied at certain archaeological sites can be very refined, whilst those at others are more generalised.¹⁹ Additionally, as some material included in this volume was excavated and/or published when diagnostic ceramic chronologies were not as well established as they are at present, this volume must accommodate generalised chronological data, e.g., a ceramic assemblage referenced in a publication only as “Roman”. As much as possible, and with noted consideration, such chronologies are given a specific date range in this volume (Fig. 4).

¹⁹ See, for example at *Lixus*: Aranegui Gascó 2001b; Aranegui Gascó 2005a; Aranegui Gascó 2005b; and the recent excavations at *Thamusida*: Akerraz, *et al.* 2013: xiv, xvii, xxi; compared to the more generalised dates given in Euzennat 2000.

Significance

This gazetteer is comprised of detailed catalogues of fish-salting sites and associated resources and industries required for production and trans-shipment. It is intended to serve as a thorough source book of data, corrected and updated to 2015, for those interested in the ancient fish-salting industry in general and, more specifically, the history and structures of past exploitation of marine resources in the northwest Maghreb. As the relevant publications for the sites are almost exclusively in French and Spanish, the catalogues are also intended to serve as an English summary of the current state of the research with critical commentary.

The appearance of this volume is also quite timely as some of the sites are no longer accessible, or over the last decades have undergone alteration due to man-made and natural factors. In this sense, the present volume serves

to document what in some cases was previously visible in years past, but now is no longer extant.

Certainly, this volume does not intend to replace forthcoming publications that examine the Strait of Gibraltar's fish-salting industries, nor the eagerly-awaited final publications of some sites, discussed here, such as Metrouna and Dchar 'Askfane.²⁰ It is hoped that the data presented here provide not only a history of the scholarship of fish-salting activities in the northwest Maghreb in antiquity but moreover a critical basis for further regional analyses of marine resource exploitation in antiquity that also consider broader environmental, economical, and historical matrices. Such an undertaking is beyond the intended aims of this gazetteer. However, this volume's synthesis of data and data types are crucial elements necessary to quantify, even at a general level, the varied salted-fish products and to establish the role of these in the ancient economy.

²⁰ Some of the main publications include El Khayari & Akerraz, forthcoming; Ephrem & Bernal Casasola, forthcoming; Akerraz, *et al.*, forthcoming; also publications arising from current research projects, including "*Garum. Pesquerías y artesanado haliéutico en el Fretum Gaditanum. Caracterización arqueológica, arqueozoológica y experimental a escala piloto de las conservas marinas (s. II a.C. – VII d.C.)*" (Universidad de Cádiz, Universidad de Sevilla).