

# The Value of Marble in Roman Hispalis: Contextual, Typological and Lithological Analysis of an Assemblage of Large Architectural Elements Recovered at Nº 17 Goyeneta Street (Seville, Spain)

---

Taylor, Ruth; Rodríguez, Oliva; Ontiveros, Esther; Loza, María Luisa; Beltrán, José; Rodríguez, Araceli

Source / Izvornik: **ASMOSIA XI, Interdisciplinary Studies on Ancient Stone, Proceedings of the XI International Conference of ASMOSIA, 2018, 143 - 153**

Conference paper / Rad u zborniku

Publication status / Verzija rada: **Published version / Objavljena verzija rada (izdavačev PDF)**

<https://doi.org/10.31534/XI.asmosia.2015/01.13>

Permanent link / Trajna poveznica: <https://um.nsk.hr/um:nbn:hr:123:952071>

Rights / Prava: [In copyright](#)/[Zaštićeno autorskim pravom.](#)

Download date / Datum preuzimanja: **2024-11-24**



Repository / Repozitorij:

[FCEAG Repository - Repository of the Faculty of Civil Engineering, Architecture and Geodesy, University of Split](#)





# ASMOSIA XI

Interdisciplinary Studies on Ancient Stone

## PROCEEDINGS

of the XI ASMOSIA Conference, Split 2015

Edited by Daniela Matetić Poljak and Katja Marasović



Interdisciplinary Studies on Ancient Stone  
Proceedings of the XI ASMOSIA Conference (Split 2015)

Publishers:

ARTS ACADEMY IN SPLIT  
UNIVERSITY OF SPLIT

and

UNIVERSITY OF SPLIT  
FACULTY OF CIVIL ENGINEERING,  
ARCHITECTURE AND GEODESY

Technical editor:  
Kate Bošković

English language editor:  
Graham McMaster

Computer pre-press:  
Nikola Križanac

Cover design:  
Mladen Čulić

Cover page:

*Sigma shaped mensa of pavonazzetto marble from Diocletian's palace in Split*

ISBN 978-953-6617-49-4 (Arts Academy in Split)

ISBN 978-953-6116-75-1 (Faculty of Civil Engineering, Architecture and Geodesy)

e-ISBN 978-953-6617-51-7 (Arts Academy in Split)

e-ISBN 978-953-6116-79-9 (Faculty of Civil Engineering, Architecture and Geodesy)

CIP available at the digital catalogue of the University Library in Split, no 170529005

Association for the Study of Marble & Other Stones in Antiquity

# ASMOSIA XI

Interdisciplinary Studies of Ancient Stone

Proceedings of the Eleventh International Conference of ASMOSIA,  
Split, 18–22 May 2015

Edited by  
Daniela Matetić Poljak  
Katja Marasović



Split, 2018

**Nota bene**

All papers are subjected to an international review.

The quality of the images relies on the quality of the originals provided by the authors.

# CONTENT

<b>PRESENTATION</b> .....	15
<b>NECROLOGY: NORMAN HERZ (1923-2013) by Susan Kane</b> .....	17
<b>1. APPLICATIONS TO SPECIFIC ARCHEOLOGICAL QUESTIONS – USE OF MARBLE</b>	
Hermaphrodites and Sleeping or Reclining Maenads: Production Centres and Quarry Marks <i>Patrizio Pensabene</i> .....	25
First Remarks about the Pavement of the Newly Discovered Mithraeum of the Colored Marbles at Ostia and New Investigations on Roman and Late Roman White and Colored Marbles from Insula IV, IX <i>Massimiliano David, Stefano Succi and Marcello Turci</i> .....	33
Alabaster. Quarrying and Trade in the Roman World: Evidence from Pompeii and Herculaneum <i>Simon J. Barker and Simona Perna</i> .....	45
Recent Work on the Stone at the Villa Arianna and the Villa San Marco (Castellammare di Stabia) and Their Context within the Vesuvian Area <i>Simon J. Barker and J. Clayton Fant</i> .....	65
Marble Wall Decorations from the Imperial Mausoleum (4 <sup>th</sup> C.) and the Basilica of San Lorenzo (5 <sup>th</sup> C.) in Milan: an Update on Colored Marbles in Late Antique Milan <i>Elisabetta Neri, Roberto Bugini and Silvia Gazzoli</i> .....	79
Sarcophagus Lids Sawn from their Chests <i>Dorothy H. Abramitis and John J. Herrmann</i> .....	89
The Re-Use of Monolithic Columns in the Invention and Persistence of Roman Architecture <i>Peter D. De Staebler</i> .....	95
The Trade in Small-Size Statues in the Roman Mediterranean: a Case Study from Alexandria <i>Patrizio Pensabene and Eleonora Gasparini</i> .....	101
The Marble Dedication of Komon, Son of Asklepiades, from Egypt: Material, Provenance, and Reinforcement of Meaning <i>Patricia A. Butz</i> .....	109
Multiple Reuse of Imported Marble Pedestals at Caesarea Maritima in Israel <i>Barbara Burrell</i> .....	117
Iasos and Iasian Marble between the Late Antique and Early Byzantine Eras <i>Diego Peirano</i> .....	123

Thassos, Known Inscriptions with New Data <i>Tony Kozelj and Manuela Wurch-Kozelj</i> .....	131
The Value of Marble in Roman <i>Hispalis</i> : Contextual, Typological and Lithological Analysis of an Assemblage of Large Architectural Elements Recovered at N° 17 Goyeneta Street (Seville, Spain) <i>Ruth Taylor, Oliva Rodríguez, Esther Ontiveros, María Luisa Loza, José Beltrán and Araceli Rodríguez</i> .....	143
<i>Giallo Antico</i> in Context. Distribution, Use and Commercial Actors According to New Stratigraphic Data from the Western Mediterranean (2 <sup>nd</sup> C. Bc – Late 1 <sup>st</sup> C. Ad) <i>Stefan Ardeleanu</i> .....	155
<i>Amethystus</i> : Ancient Properties and Iconographic Selection <i>Luigi Pedroni</i> .....	167
<b>2. PROVENANCE IDENTIFICATION I: (MARBLE)</b>	
Unraveling the Carrara – Göktepe Entanglement <i>Walter Prochaska, Donato Attanasio and Matthias Bruno</i> .....	175
The Marble of Roman Imperial Portraits <i>Donato Attanasio, Matthias Bruno, Walter Prochaska and Ali Bahadır Yavuz</i> .....	185
Tracing Alabaster (Gypsum or Anhydrite) Artwork Using Trace Element Analysis and a Multi-Isotope Approach (Sr, S, O) <i>Lise Leroux, Wolfram Kloppmann, Philippe Bromblet, Catherine Guerrot, Anthony H. Cooper, Pierre-Yves Le Pogam, Dominique Vingtain and Noel Worley</i> .....	195
Roman Monolithic Fountains and Thasian Marble <i>Annewies van den Hoek, Donato Attanasio and John J. Herrmann</i> .....	207
Archaeometric Analysis of the Alabaster Thresholds of Villa A, Oplontis (Torre Annunziata, Italy) and New Sr and Pb Isotopic Data for <i>Alabastro Ghiaccione del Circeo</i> <i>Simon J. Barker, Simona Perna, J. Clayton Fant, Lorenzo Lazzarini and Igor M. Villa</i> .....	215
Roman Villas of Lake Garda and the Occurrence of Coloured Marbles in the Western Part of “Regio X Venetia et Histria” (Northern Italy) <i>Roberto Bugini, Luisa Folli and Elisabetta Roffia</i> .....	231
Calcitic Marble from Thasos in the North Adriatic Basin: Ravenna, Aquileia, and Milan <i>John J. Herrmann, Robert H. Tykot and Annewies van den Hoek</i> .....	239
Characterisation of White Marble Objects from the Temple of Apollo and the House of Augustus (Palatine Hill, Rome) <i>Francesca Giustini, Mauro Brilli, Enrico Gallochio and Patrizio Pensabene</i> .....	247
Study and Archeometric Analysis of the Marble Elements Found in the Roman Theater at Aeclanum (Mirabella Eclano, Avellino - Italy) <i>Antonio Mesisca, Lorenzo Lazzarini, Stefano Cancelliere and Monica Salvadori</i> .....	255



Two Imperial Monuments in Puteoli: Use of Proconnesian Marble in the Domitianic and Trajanic Periods in Campania <i>Irene Bald Romano, Hans Rupprecht Goette, Donato Attanasio and Walter Prochaska</i> .....	267
Coloured Marbles in the Neapolitan Pavements (16 <sup>th</sup> And 17 <sup>th</sup> Centuries): the Church of <i>Santi Severino e Sossio</i> <i>Roberto Bugini, Luisa Folli and Martino Solito</i> .....	275
Roman and Early Byzantine Sarcophagi of Calcitic Marble from Thasos in Italy: Ostia and Siracusa <i>Donato Attanasio, John J. Herrmann, Robert H. Tykot and Annewies van den Hoek</i> .....	281
Revisiting the Origin and Destination of the Late Antique Marzamemi 'Church Wreck' Cargo <i>Justin Leidwanger, Scott H. Pike and Andrew Donnelly</i> .....	291
The Marbles of the Sculptures of Felix Romuliana in Serbia <i>Walter Prochaska and Maja Živić</i> .....	301
Calcitic Marble from Thasos and Proconnesos in Nea Anchialos (Thessaly) and Thessaloniki (Macedonia) <i>Vincent Barbin, John J. Herrmann, Aristotle Mentzos and Annewies van den Hoek</i> .....	311
Architectural Decoration of the Imperial Agora's Porticoes at Iasos <i>Fulvia Bianchi, Donato Attanasio and Walter Prochaska</i> .....	321
The Winged Victory of Samothrace - New Data on the Different Marbles Used for the Monument from the Sanctuary of the Great Gods <i>Annie Blanc, Philippe Blanc and Ludovic Laugier</i> .....	331
Polychrome Marbles from the Theatre of the Sanctuary of Apollo Pythios in Gortyna (Crete) <i>Jacopo Bonetto, Nicolò Mareso and Michele Bueno</i> .....	337
Paul the Silentiary, Hagia Sophia, Onyx, Lydia, and Breccia Corallina <i>John J. Herrmann and Annewies van den Hoek</i> .....	345
Incrustations from Colonia Ulpia Traiana (Near Modern Xanten, Germany) <i>Vilma Ruppiniè and Ulrich Schüssler</i> .....	351
Stone Objects from Vindobona (Austria) – Petrological Characterization and Provenance of Local Stone in a Historico-Economical Setting <i>Andreas Rohatsch, Michaela Kronberger, Sophie Insulander, Martin Mosser and Barbara Hodits</i> .....	363
Marbles Discovered on the Site of the Forum of Vaison-la-Romaine (Vaucluse, France): Preliminary Results <i>Elsa Roux, Jean-Marc Mignon, Philippe Blanc and Annie Blanc</i> .....	373
Updated Characterisation of White Saint-Béat Marble. Discrimination Parameters from Classical Marbles <i>Hernando Royo Plumed, Pilar Lapeunte, José Antonio Cuchí, Mauro Brillì and Marie-Claire Savin</i> .....	379

Grey and Greyish Banded Marbles from the Estremoz Anticline in Lusitania <i>Pilar Lapuente, Trinidad Nogales-Basarrate, Hernando Royo Plumed, Mauro Brilli and Marie-Claire Savin</i> .....	391
New Data on Spanish Marbles: the Case of <i>Gallaecia</i> (NW Spain) <i>Anna Gutiérrez García-M., Hernando Royo Plumed and Silvia González Soutelo</i> .....	401
A New Roman Imperial Relief Said to Be from Southern Spain: Problems of Style, Iconography, and Marble Type in Determining Provenance <i>John Pollini, Pilar Lapuente, Trinidad Nogales-Basarrate and Jerry Podany</i> .....	413
Reuse of the <i>Marmora</i> from the Late Roman Palatial Building at Carranque (Toledo, Spain) in the Visigothic Necropolis <i>Virginia García-Entero, Anna Gutiérrez García-M. and Sergio Vidal Álvarez</i> .....	427
Imperial Porphyry in Roman Britain <i>David F. Williams</i> .....	435
Recycling of Marble: Apollonia/Sozousa/Arsuf (Israel) as a Case Study <i>Moshe Fischer, Dimitris Tambakopoulos and Yannis Maniatis</i> .....	443
Thasian Connections Overseas: Sculpture in the Cyrene Museum (Libya) Made of Dolomitic Marble from Thasos <i>John J. Herrmann and Donato Attanasio</i> .....	457
Marble on Rome's Southwestern Frontier: Thamugadi and Lambaesis <i>Robert H. Tykot, Ouahiba Bouzidi, John J. Herrmann and Annewies van den Hoek</i> .....	467
Marble and Sculpture at Lepcis Magna (Tripolitania, Libya): a Preliminary Study Concerning Origin and Workshops <i>Luisa Musso, Laura Buccino, Matthias Bruno, Donato Attanasio and Walter Prochaska</i> .....	481
The Pentelic Marble in the Carnegie Museum of Art Hall of Sculpture, Pittsburgh, Pennsylvania <i>Albert D. Kollar</i> .....	491
Analysis of Classical Marble Sculptures in the Michael C. Carlos Museum, Emory University, Atlanta <i>Robert H. Tykot, John J. Herrmann, Renée Stein, Jasper Gaunt, Susan Blevins and Anne R. Skinner</i> .....	501
<b>3. PROVENANCE IDENTIFICATION II: (OTHER STONES)</b>	
Aphrodisias and the Regional Marble Trade. The <i>Scaenae Frons</i> of the Theatre at Nysa <i>Natalia Toma</i> .....	513
The Stones of Felix Romuliana (Gamzigrad, Serbia) <i>Bojan Djurić, Divna Jovanović, Stefan Pop Lazić and Walter Prochaska</i> .....	523
Aspects of Characterisation of Stone Monuments from Southern Pannonia <i>Branka Migotti</i> .....	537

The Budakalász Travertine Production <i>Bojan Djurić, Sándor Kele and Igor Rižnar</i> .....	545
Stone Monuments from Carnuntum and Surrounding Areas (Austria) – Petrological Characterization and Quarry Location in a Historical Context <i>Gabrielle Kremer, Isabella Kitz, Beatrix Moshhammer, Maria Heinrich and Erich Draganits</i> .....	557
Espejón Limestone and Conglomerate (Soria, Spain): Archaeometric Characterization, Quarrying and Use in Roman Times <i>Virginia García-Entero, Anna Gutiérrez García-M, Sergio Vidal Álvarez, María J. Peréx Agorreta and Eva Zarco Martínez</i> .....	567
The Use of Alcover Stone in Roman Times ( <i>Tarraco, Hispania Citerior</i> ). Contributions to the <i>Officina Lapidaria Tarraconensis</i> <i>Diana Gorostidi Pi, Jordi López Vilar and Anna Gutiérrez García-M.</i> .....	577
<b>4. ADVANCES IN PROVENANCE TECHNIQUES, METHODOLOGIES AND DATABASES</b>	
Grainautline – a Supervised Grain Boundary Extraction Tool Supported by Image Processing and Pattern Recognition <i>Kristóf Csorba, Lilla Barancsuk, Balázs Székely and Judit Zöldföldi</i> .....	587
A Database and GIS Project about Quarrying, Circulation and Use of Stone During the Roman Age in <i>Regio X - Venetia et Histria</i> . The Case Study of the Euganean Trachyte <i>Caterine Previato and Arturo Zara</i> .....	597
<b>5. QUARRIES AND GEOLOGY</b>	
The Distribution of Troad Granite Columns as Evidence for Reconstructing the Management of Their Production <i>Patrizio Pensabene, Javier Á. Domingo and Isabel Rodà</i> .....	613
Ancient Quarries and Stonemasonry in Northern Choria Considiana <i>Hale Güney</i> .....	621
Polychromy in Larisaeon Quarries and its Relation to Architectural Conception <i>Gizem Mater and Ertunç Denктаş</i> .....	633
Euromos of Caria: the Origin of an Hitherto Unknown Grey Veined Stepped Marble of Roman Antiquity <i>Matthias Bruno, Donato Attanasio, Walter Prochaska and Ali Bahadır Yavuz</i> .....	639
Unknown Painted Quarry Inscriptions from Bacakale at <i>Docimium</i> (Turkey) <i>Matthias Bruno</i> .....	651
The Green Schist Marble Stone of Jebel El Hairech (North West of Tunisia): a Multi-Analytical Approach and its Uses in Antiquity <i>Ameur Younès, Mohamed Gaied and Wissem Gallala</i> .....	659
Building Materials and the Ancient Quarries at <i>Thamugadi</i> (East of Algeria), Case Study: Sandstone and Limestone <i>Younès Rezkallah and Ramdane Marmi</i> .....	673

The Local Quarries of the Ancient Roman City of <i>Valeria</i> (Cuenca, Spain) <i>Javier Atienza Fuente</i> .....	683
The Stone and Ancient Quarries of Montjuïc Mountain (Barcelona, Spain) <i>Aureli Álvarez</i> .....	693
<i>Notae Lapidinarum</i> : Preliminary Considerations about the Quarry Marks from the Provincial Forum of <i>Tarraco</i> <i>Maria Serena Vinci</i> .....	699
The Different Steps of the Rough-Hewing on a Monumental Sculpture at the Greek Archaic Period: the Unfinished Kouros of Thasos <i>Danièle Braunstein</i> .....	711
A Review of Copying Techniques in Greco-Roman Sculpture <i>Séverine Moureaud</i> .....	717
Labour Forces at Imperial Quarries <i>Ben Russell</i> .....	733
Social Position of Craftsmen inside the Stone and Marble Processing Trades in the Light of Diocletian's Edict on Prices <i>Krešimir Bosnić and Branko Matulić</i> .....	741
<b>6. STONE PROPERTIES, WEATHERING EFFECTS AND RESTORATION, AS RELATED TO DIAGNOSIS PROBLEMS, MATCHING OF STONE FRAGMENTS AND AUTHENTICITY</b>	
Methods of Consolidation and Protection of Pentelic Marble <i>Maria Apostolopoulou, Elissavet Drakopoulou, Maria Karoglou and Asterios Bakolas</i> .....	749
<b>7. PIGMENTS AND PAINTINGS ON MARBLE</b>	
Painting and Sculpture Conservation in Two Gallo-Roman Temples in Picardy (France): Champlieu and Pont-Sainte-Maxence <i>Véronique Brunet-Gaston and Christophe Gaston</i> .....	763
The Use of Colour on Roman Marble Sarcophagi <i>Eliana Siotto</i> .....	773
New Evidence for Ancient Gilding and Historic Restorations on a Portrait of Antinous in the San Antonio Museum of Art <i>Jessica Powers, Mark Abbe, Michelle Bushey and Scott H. Pike</i> .....	783
Schists and Pigments from Ancient Swat (Khyber Pukhtunkhwa, Pakistan) <i>Francesco Mariottini, Gianluca Vignaroli, Maurizio Mariottini and Mauro Roma</i> .....	793
<b>8. SPECIAL THEME SESSION: „THE USE OF MARBLE AND LIMESTONE IN THE ADRIATIC BASIN IN ANTIQUITY”</b>	
Marble Sarcophagi of Roman Dalmatia Material – Provenance – Workmanship <i>Guntram Koch</i> .....	809

Funerary Monuments and Quarry Management in Middle Dalmatia <i>Nenad Cambi</i> .....	827
Marble Revetments of Diocletian's Palace <i>Katja Marasović and Vinka Marinković</i> .....	839
The Use of Limestones as Construction Materials for the Mosaics of Diocletian's Palace <i>Branko Matulić, Domagoj Mudronja and Krešimir Bosnić</i> .....	855
Restoration of the Peristyle of Diocletian's Palace in Split <i>Goran Nikšić</i> .....	863
Marble Slabs Used at the Archaeological Site of Sorna near Poreč Istria – Croatia <i>Đeni Gobić-Bravar</i> .....	871
Ancient Marbles from the Villa in Verige Bay, Brijuni Island, Croatia <i>Mira Pavletić and Đeni Gobić-Bravar</i> .....	879
Notes on Early Christian Ambos and Altars in the Light of some Fragments from the Islands of Pag and Rab <i>Mirja Jarak</i> .....	887
The Marbles in the Chapel of the Blessed John of Trogir in the Cathedral of St. Lawrence at Trogir <i>Đeni Gobić-Bravar and Daniela Matetić Poljak</i> .....	899
The Use of Limestone in the Roman Province of Dalmatia <i>Edisa Lozić and Igor Rižnar</i> .....	915
The Extraction and Use of Limestone in Istria in Antiquity <i>Klara Buršić-Matijašić and Robert Matijašić</i> .....	925
Aurisina Limestone in the Roman Age: from Karst Quarries to the Cities of the Adriatic Basin <i>Caterina Previato</i> .....	933
The Remains of Infrastructural Facilities of the Ancient Quarries on Zadar Islands (Croatia) <i>Mate Parica</i> .....	941
The Impact of Local Geomorphological and Geological Features of the Area for the Construction of the Burnum Amphitheatre <i>Miroslav Glavičić and Uroš Stepišnik</i> .....	951
Roman Quarry Klis Kosa near Salona <i>Ivan Alduk</i> .....	957
Marmore Lavdata Brattia <i>Miona Miliša and Vinka Marinković</i> .....	963
Quarries of the Lumbarda Archipelago <i>Ivka Lipanović and Vinka Marinković</i> .....	979

Island of Korčula – Importer and Exporter of Stone in Antiquity <i>Mate Parica and Igor Borzić</i> .....	985
Faux Marbling Motifs in Early Christian Frescoes in Central and South Dalmatia: Preliminary Report <i>Tonči Borovac, Antonija Gluhan and Nikola Radošević</i> .....	995
<b>INDEX OF AUTHORS</b> .....	1009

# THE VALUE OF MARBLE IN ROMAN *HISPALIS*: CONTEXTUAL, TYPOLOGICAL AND LITHOLOGICAL ANALYSIS OF AN ASSEMBLAGE OF LARGE ARCHITECTURAL ELEMENTS RECOVERED AT N° 17 GOYENETA STREET (SEVILLE, SPAIN)

Ruth Taylor<sup>1</sup>, Oliva Rodríguez<sup>1\*</sup>, Esther Ontiveros<sup>2</sup>, María Luisa Loza<sup>2</sup>, José Beltrán<sup>1\*\*</sup> and Araceli Rodríguez<sup>3</sup>

<sup>1</sup> Universidad de Sevilla, Seville, Spain (ruth.taylor@hotmail.com; orodriguez@us.es; jbeltran@us.es)

<sup>2</sup> Instituto Andaluz del Patrimonio Histórico, Junta de Andalucía, Seville, Spain  
(esther.ontiveros@juntadeandalucia.es; marial.loza@gmail.com)

<sup>3</sup> Arqueología & Gestión, S.L., Seville, Spain (araceli\_azogue@hotmail.com)

\* PI of *La construcción en el Valle del Guadalquivir en época romana. Tradición e innovación en las soluciones arquitectónicas y los procesos tecnológicos, económicos y productivos* (HAR2015-64392-C4-4-P)

\*\* PI of *Proyecto Marmora. Innovaciones en el estudio arqueológico y arqueométrico del uso de los marmora en la Baetica: Arquitectura, Escultura, Epigrafía* (HAR2013-42078-P)

## Abstract

The archaeological excavations carried out at n° 17 Goyeneta Street (Seville, Spain) have provided new insights into the urban layout of Roman *Hispalis* and into the existence of a monumental complex in the northern sector of the city during the 2<sup>nd</sup> to 4<sup>th</sup> centuries AD. The contextual and typological study of the assemblage of large architectural elements enables a reconstruction of the building to which they belonged, while the lithological study provides important information on the materials employed in its construction. The visual and petrographic analysis of 13 elements, representative of the typological and lithological diversity of the assemblage, has enabled the identification of 10 different ornamental stones from 7 regional, super-regional and foreign quarry districts. The evidence of the use of these materials together in a large public building in the 2<sup>nd</sup> century AD constitutes a significant contribution to the understanding of the value of marble in the ancient city.

## Keywords

Roman *Hispalis*, monumental building, marble identification

have successfully reached and documented Roman levels and have generally encountered poorly preserved remains beneath a sequence of intermittent alluvial episodes and intense occupation. General functional areas have, however, been defined (Fig. 1; BELTRÁN, RODRÍGUEZ 2014, pl. III) and recent studies have stressed the great influence of the palaeomorphology of the ancient *Baetis* – the Guadalquivir River – and of the *Lacus Ligustinus* – the gulf that existed in Antiquity between the Atlantic coastal cities of *Onoba* and *Gadir* – in the life and development of the Roman city (BORJA 2014). The historical reconstruction of Roman *Hispalis* must therefore take into consideration the existence of a thriving fluvial and maritime port (ORDÓÑEZ, GONZÁLEZ 2011).

Evidence of the monumental areas of the heart of the Roman city is scarce and generally constituted by *disiecta membra* (for example the remains of Calle Mármoles, MÁRQUEZ 2003; with a review of the recent proposals in GARCÍA VARGAS 2014: 194-195), often integrated in later buildings and uninformative about their original contexts. The assemblage of large architectural elements, recently documented *in situ* during preventive excavations at n° 17 Goyeneta Street, in Seville's historical city centre, is, therefore, quite unique.

The find spot is located within the Northern *intra-muros* sector of the Roman city. The structural remains belong to a partially preserved building which, on the basis of its layout and dimensions and the nature of the architectural elements, can best be described as part of a monumental building or complex. Given the scarcity of this type of archaeological find, the structures and

## Introduction

Despite the large number of preventive archaeological excavations carried out in recent decades in the historical city centre of Seville (Andalusia, Spain), knowledge of Roman *Hispalis* remains very incomplete. Few excavations

assemblage of architectural elements under study here are particularly relevant for the reconstruction of the spatial and functional organisation of Roman *Hispalis* and provide a rare insight into one of the monumental areas of the city (Fig. 1).

The archaeological excavation of nº 17 Goyeneta Street was not without difficulties due to the complexity of the stratigraphic sequence and the practical complications caused by the high water table. A sequence of intense occupation and use of the area was established, spanning from Roman times to the present day. Table 1 presents an overview of the main characteristics of the phases documented from the late 1<sup>st</sup> to the 5<sup>th</sup> century AD.

The earliest documented Roman phase is dated in the late 1<sup>st</sup> century AD. However, the date and possible function of the structures belonging to this phase are imprecise due to the damage caused by later constructive phases. At an unknown date in the 2<sup>nd</sup> century AD, a large building was constructed. Two parallel walls, 1.20 m thick, are documented at a distance of approximately 15

Phase	Archaeological description – interpretation
Late 1 <sup>st</sup> century AD	Earliest evidence of occupation of the area Structures of imprecise function
2 <sup>nd</sup> century	Construction of a large building Interpreted as part of a monumental complex
3 <sup>rd</sup> –4 <sup>th</sup> century	Continuance of the building-complex into the 4 <sup>th</sup> century Reuse of some large architectural elements
5 <sup>th</sup> century	Abandonment of the building Shift in the usage of the area

Table 1. Synthesis of the Roman phases documented during the preventive archaeological excavation of nº 17 Goyeneta Street

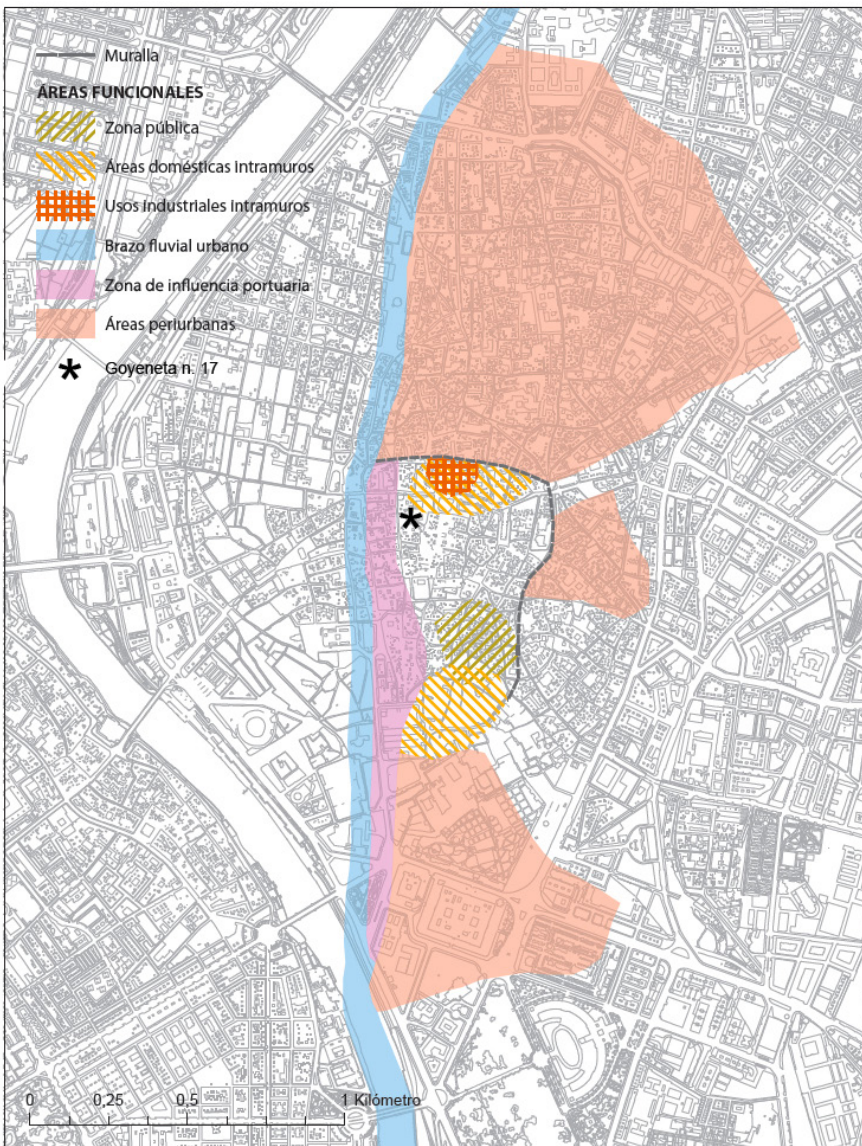


Fig. 1. Map of the functional areas identified in Roman *Hispalis* and the location of nº 17 Goyeneta Street (Seville, Spain)



m. These constitute the outer walls of the building which were lined by a colonnade creating a porch 3 m wide [with white marble pilaster bases, white and pink-white column bases, and column shafts in different coloured stones] opening onto an open air patio [paved with greenish grey and multicolour limestone flagstones] (Figs. 2 and 3).

The continuance of this building, at least structurally if not also functionally, into the 4<sup>th</sup> century is evidenced by a number of elements documented *in situ*, in positions considered to be consistent with their original function and first use. This is the case of the pilaster bases (327 and 328) preserved in wall 239, a column base (384), a fallen column (383) and the paved stone floor 323. Other elements were found in contexts of reuse yet still within the chronological scope of the building (2<sup>nd</sup>–4<sup>th</sup> centuries) and often with physical signs of having been modified and/or downsized in order to be used for new purposes. The abandonment of the building and the shift in the usage of the area in the 5<sup>th</sup> century AD are consistent with

the changes in the patterns of occupation of other urban spaces documented within Roman *Hispalis*. At present, the best documented areas of the Roman city are La Encarnación (AMORES *et al.* 2009; GONZÁLEZ ACUÑA 2011; GARCÍA VARGAS 2014) and Patio de Banderas (TABALES 2015), which may serve as future points of comparative reference, beyond the scope of this paper, for both the functional characterization of the archaeological finds under study here and for the patterns observed in the use of marbles and other decorative stones in different spatial, social and chronological contexts of Roman *Hispalis*.

### Materials and methods

A total of 13 architectural elements made out of different varieties of true marble and other coloured stones (*marmora*) were selected for study (Table 2). This selection aimed to be representative of both the typological and the lithological diversity of the overall

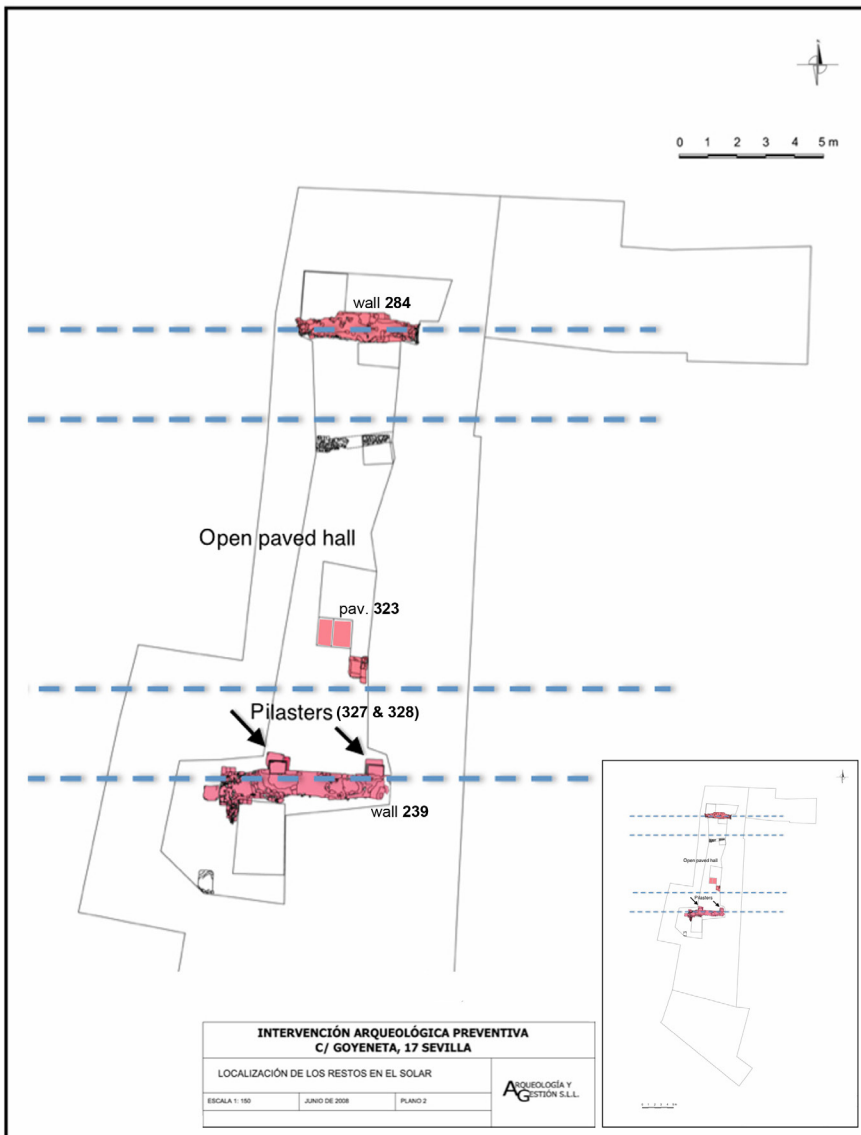


Fig. 2. General plan of the structures belonging to the second phase of the site (2<sup>nd</sup> century AD) and possible reconstruction of the main walls of the building



Fig. 3.  
Detail of the pilasters of the porch documented *in situ* during the excavations

assemblage of large architectural elements recovered during the excavations of the structures best described as part of a monumental building or complex. The pilaster bases 327 and 328, mentioned above, could not be sampled due to their consolidation and sealed packaging in polyurethane, along with the brick wall 239, in view of a rehabilitation project that never took place (Fig. 3). Column 383, also mentioned above, was visually identified as the same material as column 398 (sample G-10) and therefore was not selected for analysis.

Each element was first inventoried and cross-referenced with the information provided by the excavation log (identification, location, spatial and stratigraphic relationships). Each element was then fully described following the standard nomenclature for Roman architectural elements, and measured. Typologically, the architectural elements selected for this study correspond to 4 smooth column shafts with simple imo- and sumoscapo mouldings; 3 attic column bases; 3 pilaster bases with mouldings; and 3 paving slabs.

The detailed macroscopic description of the materials under study is complemented, at this stage of our work, by the petrographic analysis of each lithotype. One to three samples were taken from each element depending of the degree of homogeneity of their material. Thin sections were prepared following the standard procedures for geological materials. Petrographic analysis was carried out using a Leica DMLP polarising optical microscope, with a Leica DFC 280 digital camera, at the Andalusian Institute for Historical Heritage (IAPH).

Both the macroscopic and the petrographic characterisations of the materials under study enabled their comparison with the reference collection of decorative

stone materials of the Southwest of the Iberian Peninsula created and expanded during the research projects *Marmora de la Hispania meridional* (HAR2009-11438) (2010-2012) and *Proyecto Marmora* (HAR2013-42078-P) (2014-2016), financed by the competitive research programs of the Spanish government (BELTRÁN *et al.* 2011). Additional literature data was consulted for other geographical regions and for the main Mediterranean white and coloured marble varieties (ANTONELLI, LAZZARINI 2015; GORGONI *et al.* 2002; LAPUENTE *et al.* 2014). The visual and petrographic examination and classification of the materials enabled the identification of 10 lithotypes (Table 3). The coloured *marmora* identified at nº 17 Goyeneta Street are illustrated in Figure 4.

## Discussion

Based on the visual and petrographic characteristics of the 10 lithotypes documented in the assemblage of large architectural elements recovered from nº 17 Goyeneta Street, Seville, Spain, and their comparison with the type-materials of known source areas, we have been able to assign a probable provenance to most of the materials present. The identification of well documented marbles (for instance, *Luni*) and other ornamental stones on which we have worked extensively (Almadén de la Plata), as well as visually very characteristic regional materials (the colourful 'Peñaflor' and Sintra limestones) was possible without any great difficulties. The determination of the precise geographical areas of origin of other types may, on the other hand, require further fieldwork and comparative analyses of both regional and Mediterranean reference samples.

Sample (*)	Inventory ID	Basic typological description	Dimensions (cm) in brackets incomplete
G-01	347.1	Plain column shaft	Ø 59-61, length (253)
G-02	348.1	Plain column shaft	Ø 57, length 124
G-04	283.4	Pilaster base	24,5 x 70 x 77
G-06	248.1	Pilaster base	25,5 x 78 x 82
G-07	Floor 323	Paving slab	-
G-08	282.86	Plain column shaft	Ø 50, length (43)
G-09	303.9	Pilaster base	10 x (36,5) x 97
G-10	398.1	Plain column shaft	Ø 42-48, length (222)
G-11	-	Attic column base	Ø 62, plinth 72, height 24
G-13	Floor 323	Paving slab	30 x 81 x 148
G-14	Floor 323	Paving slab	20 x 85 x 130
G-15	-	Attic column base	Ø 69, plinth 80, height 38
G-16	-	Attic column base	Ø 62, plinth 68, height 25,5

(\*) Samples G-03, G-05 and G-12 of the correlative series of samples are not included in this study.

Table 2. Sample list

Marbles	
01. Fine grained white marble	Pilaster bases G-04 and G-06
02. White marble with red hairline veins	Pilaster base G-09
03. Pinkish white marble	Attic column bases G-15 and G-16
04. White and grey veined marble	Column shaft G-08
05. Grey marble	Attic column base G-11
Marmora (Fig. 4)	
06. Multicolour compact microcrystalline limestone	Paving slab G-13
07. Greenish-grey foliated microcrystalline limestone	Paving slabs G-07 and G-14
08. White (clasts) and red (matrix) limestone breccia	Column shaft G-02
09. Fossiliferous crystalline limestone	Column shaft G-10
10. Compact banded crystalline travertine	Column shaft G-01

Table 3. Lithological classification of the materials under study

Lithotype	Provenance
01. Fine grained white marble	Carrara - Luni, Italy
02. White marble with red hairline veins	Almadén de la Plata, Seville province, Spain
03. Pinkish white marble	Almadén de la Plata, Seville province, Spain
04. White and grey veined marble	Almadén de la Plata, Seville province, Spain
05. Grey marble	Almadén de la Plata, Seville province, Spain
06. Multicolour compact microcrystalline limestone	'Peñaflor stone', Seville province, Spain
07. Greenish-grey foliated microcrystalline limestone	'Tarifa stone', Cadiz province, Spain
08. White (clasts) and red (matrix) limestone breccia	Antequera, Malaga province, Spain
09. Fossiliferous crystalline limestone	Sintra, Lisbon region, Portugal
10. Compact banded crystalline travertine	Aïn Tekbalet, Tlemcen province, Algeria

Table 4. Provenance determinations

The provenance determinations of the 10 lithotypes are summarised in Table 4. The lithological and the typological information provided by the archaeological elements under study are presented together in order to highlight the different uses of the different materials within the architectural program. The historical and archaeological implications of the provenance identifications established in this study in the context of Roman *Hispalis* are noted in the conclusions.

#### 01. Fine grained white marble

Marble from Carrara, Italy, was imported from Luni to the Iberian Peninsula from Augustan times onwards (GUTIÉRREZ, RODÀ 2012) and used in a wide range of architectural and epigraphic elements, especially in public contexts. It is widely documented in the cities of the Guadalquivir Valley, for instance at *Italica* (RODRÍGUEZ 2008) and *Astigi* (ORDOÑEZ *et al.* 2015).

Two pilaster bases, samples G-04 and G-06, are identified as white Carrara marble. The two elements share similar dimensions: 24,5 x 70 x 77 cm (G-04) and 25.5 x 78 x 82 cm (G-06). The same material was also identified visually in a pair of twin pilaster bases (inventory ID 327 and 328, with the same dimensions 63 x 57 x 37 cm) discovered in their original position against the brick wall 329 (Fig. 3). Unfortunately, it was not possible to sample these elements, due to their casing in polyurethane. Three identical calcarenite base blocks (inventory ID 336, 341 and 342) for a further three pilasters were documented during the excavation, devoid of their marble elements. Assuming that their pilasters were made

of the same marble, an interesting hypothesis emerges regarding the important role of Carrara marble in the architectural program of the porch.

We may note that a fine grained white marble, similar to that of Carrara, was exploited in Antiquity in the Estremoz Anticline, in the Portuguese region of Alentejo (LAPUENTE 1999). A recent overview of the available archaeometric identifications of Portuguese marbles in Baetica (TAYLOR *et al.* 2016) has shown that marbles from Lusitania are in fact quite scarce in Roman *Hispalis*, especially in architectural programs created by matching elements in white marble. Therefore, both the analytical and the archaeological information available for the elements included in this study support their provenance from the Carrara quarries.

#### 02. White marble with red hairline veins

White marble with red hairline veins is one of the most typical varieties of the Almadén de la Plata quarries, located approx. 70 km to the North of Seville. It is identified in sample G-09, a moulded base with a *cyma recta* between two flat fillets. Incomplete, the dimensions of this element are 10 x (36.5) x 97 cm.

#### 03. Pinkish white marble

Another characteristic variety of marble from the quarries of Almadén de la Plata is pinkish white, generally heterogeneous in colour and texture. Recent literature has stressed the existence of some degree of overlap between the physical characteristics of this type and those of visually similar marbles from the Estremoz Anticline

(see, for instance, LAPUENTE *et al.* 2014). In recent years, we have worked extensively on the marbles of the Metamorphic Band of Aracena (BELTRÁN *et al.* 2015) and the Estremoz Anticline, and the quarries of Almadén de la Plata have been the focus of detailed study, including the archaeological description of the ancient quarry works and the archaeometric analysis of a large number of reference samples (TAYLOR 2015), thus providing a strong base for our identifications. In this case, the chromatic, structural, textural and mineralogical parameters in the hand specimens and thin sections of two samples are consistent with the pinkish white marble from Almadén de la Plata. This material is identified in two attic column bases, G-15 (max. 68 cm) and G-16 (max. 80 cm). We may add that the dimensions of these elements match those of the preforms recently documented at the quarry of Los Covachos.

#### 04. White and grey veined marble

A section of a plain column shaft (G-08) corresponds to an intensely banded white and grey marble from the quarries of Almadén de la Plata, possibly from Loma de los Castillejos (ONTIVEROS *et al.* 2012). The diameter of the column from Goyeneta (Ø 47 cm) matches that of the abandoned columns documented *in situ* at this quarry and in its immediate surrounding area (TAYLOR 2015). The length of the columns identified in the quarry district does not exceed 230 cm, thus providing a probable indication for the missing measurement.

#### 05. Grey marble

G-11, an attic column base (max. 72 cm), has been identified as a homogenous grey marble from Almadén de la Plata. While this chromatic variety may be less appealing than other materials in this assemblage, it is noteworthy that this column base is of similar dimensions as those described above in pinkish white marble from the same quarry district. This observation, along with the evidence already discussed in relation to the abandoned preforms at the ancient quarries, appears to indicate some degree of standardization in the products of the Almadén de la Plata district, regardless of the specific chromatic characteristics of the stones (TAYLOR 2015).

#### 06. Multicolour compact microcrystalline limestone (Fig. 4, 06)

Sample G-13 corresponds to a highly ornamental variety of polychrome compact microcrystalline limestone. This type has been identified previously in a number of contexts of the Lower Guadalquivir Valley, from Corduba to Hispalis (RODRÍGUEZ 2008: 251-253), and has become known as 'Peñaflor stone' (PENSABENE 2013). The origin of the type-name is the modern town of Peñaflor, close to the Roman town of Celti (KEAY *et al.* 2000), where the material appears to have first been

identified. In Roman archaeological contexts, this material is commonly, but not solely, identified in paving slabs, some of considerable size, that provide an insight into the characteristics of the extraction and distribution of this material. The location of the quarries remains unknown and is the aim of ongoing fieldwork.

#### 07. Greenish-grey foliated microcrystalline limestone (Fig. 4, 07)

A second type of microcrystalline limestone (G-07 & G-14) was used in the stone pavement, alongside the polychrome variety described above. This material displays a homogenous greenish-grey colour and a characteristic foliated structure. It is crossed by occasional straight veins filled with pinkish white calcite. These characteristics match those of the material known regionally as 'Tarifa stone', from the southern tip of the province of Cadiz.

#### 08. White (clasts) and red (matrix) limestone breccia (Fig. 4, 08)

This breccia of white clasts and red matrix is visually very similar to the classical type known as *breccia corallina*, habitually associated with the Bilecik region of Turkey. However, the petrographic characteristics of sample G-02 appear to be different from those of the reference material described by Lazzarini (2002). Sample G-02 displays angular clasts of primarily oolitic white limestone set in an intense red matrix. The clasts are very variable in size (some larger than 20 cm). Based on our present knowledge, this material may be correlated to the brecciated levels of oolitic limestone found in the Subbaetic System of the Baetic Cordillera, and may correspond to the material quarried in Antiquity in the area of Antequera (BELTRÁN *et al.* 2012). This lithotype has been identified in the upper section, including the sumoscapo moulding, of a smooth monolithic column shaft (Ø 56 cm). The most noteworthy feature of this shaft is that it has been recut to a length of 124 cm, creating a flat surface with no evidence of sockets for a possible fixture or assembly.

#### 09. Fossiliferous crystalline limestone (Fig. 4, 09)

The material known in the literature as *lumachella carnina*, originally described as an oriental or Turkish variety (GNOLI 1971: 171-183) and more recently ascribed to an indeterminate origin in the Iberian Peninsula (BORGHINI 2004: 240), has become associated with the Portuguese quarries of Sintra, in the Lisbon region (MAÑAS, FUSCO 2008). Sample G-10 and a second non-analysed column shaft (inventory 383) correspond to this type of fossiliferous crystalline limestone. The columns are cut carefully following the preferred orientation of the sedimentary material. The incomplete length of column 398 is 222 cm. The preliminary petrographic observation suggests that the columns from *Hispalis*

are similar although perhaps less crystalline than the known reference types (RODRÍGUEZ *et al.* 2012: 132-134), which may be due to intraquarry variation. However, the columns are visually a complete match to the variety known as *encarnadão chainette* included in the Catalogue of Portuguese Ornamental Stones (online database of the Portuguese Instituto Nacional de Engenharia, Tecnologia e Inovação, <http://rop.lneg.pt/rop>).

10. Compact banded crystalline travertine (Fig. 4, 10)

Similar materials are described in the literature as ‘calcite alabasters’ but we have opted for the term compact banded crystalline travertine. The calcite bands in

G-01 are approximately parallel or slightly undulated, generally less than 2 cm but up to 7 cm, and in a wide range of colours (white, cream, pink, yellow, orange), often separated by thin chromatically intense bands. The crystalline texture is variable between bands. The stone is overall very compact despite the banding, but displays some continuous dissolution lines (between bands) along which the stone tends to break. Further analysis is required (including geochemical and isotopic analysis), but this material may have been procured in the region of Tlemcen, Algeria, at the quarries of Aïn Tekbalet (HERRMANN *et al.* 2012). It will be of great interest to follow it up in future work on the patterns of distribution and use

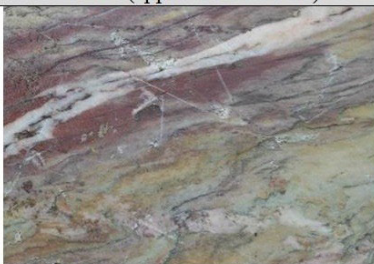
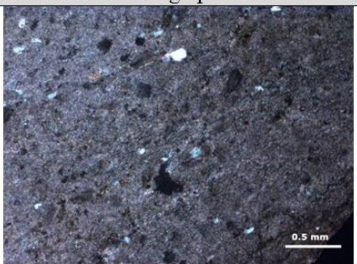


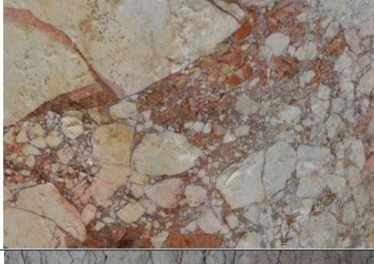
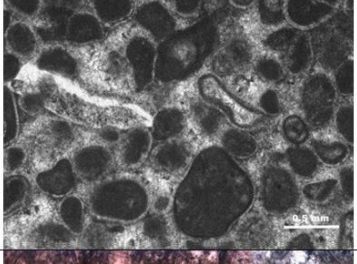

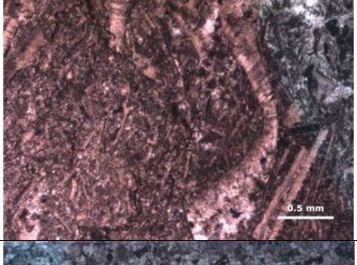

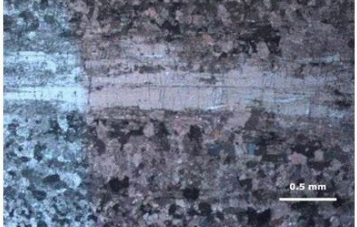
Lithotype	Visual (approx. 15 x 21 cm)	Petrographic
06		
07		
08		
09		
10		

Fig. 4. Visual and petrographic characteristics of the coloured *marmora* documented at nº 17 Goyeneta Street, Seville, Spain

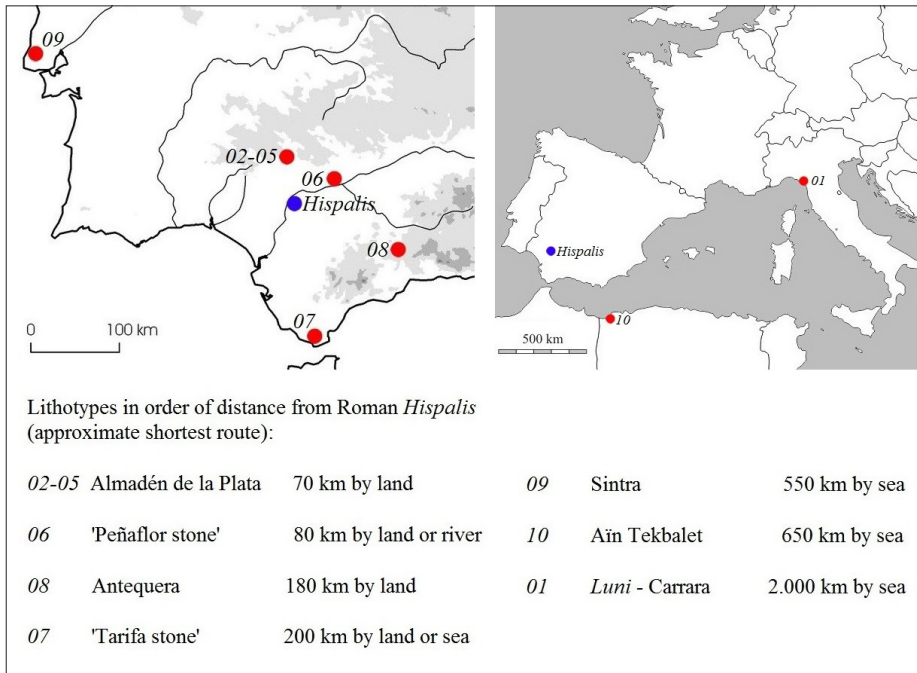


Fig. 5. Distribution map of the lithotypes identified at n° 17 Goyeneta Street (Seville, Spain), in order of distance from Roman *Hispalis*

of this lithotype, as well as on the possible existence of outcrops with similar characteristics in the Baetic Cordillera.

The fragments recovered at n° 17 Goyeneta Street belong to at least two column shafts, judging by the evidence of the imoscapo mouldings. The better preserved shaft displays an incomplete length of 253 cm. Its diameter varies between 62 cm at the imoscapo and 59 cm in the central section of the shaft.

## Conclusions

At present, the remains documented at n° 17 Goyeneta Street constitute the most significant assemblage of monumental architectural elements recovered in Roman *Hispalis*. Indeed, the number, the diversity of the lithotypes and, particularly, the monumental dimensions of these elements are not equalled by any of the assemblages documented by any of the preventive archaeological excavations within the historical city centre of Seville, including the nearby 6000 m<sup>2</sup> site of La Encarnación.

The find spot of this assemblage is located within the Northern sector of the Roman city and indicates the existence of an important monumental complex in this area. The morphology of the building under study - rooms organised around an open central patio monumentalised by large supporting elements - and its location near to the historical margin of the Guadalquivir River, suggests a possible function as part of the infrastructures of the port services and administration. It is interesting to note that many of the structures identified at La Encarnación indicate the existence of a thriving port district in this area of the Roman city in the 2<sup>nd</sup> century AD (GONZÁLEZ ACUÑA 2011).

The date of the construction of the building and, particularly, its long period of use from the 2<sup>nd</sup> to the 4<sup>th</sup> century AD provide two interesting chronological references. The building also underwent remodelling and transformations that affected some of the architectural elements themselves. The sequence documented at n° 17 Goyeneta Street is documented at nearby contexts, including La Encarnación, that reinforce the continuity of the urbanistic development throughout these centuries and the appearance of important changes in the use of this area of the city from the early 5<sup>th</sup> century onwards (GARCÍA VARGAS 2014). This is the date around which the building under study fell into disuse and may have been partially dismantled, although many of its larger architectural elements were left *in situ*.

The assemblage of large architectural elements analysed in this paper corresponds to 13 individual items belonging to a single building program: 4 smooth column shafts, 3 attic column bases, 3 pilaster bases with mouldings and 3 paving slabs. Within this group we have identified 10 different lithotypes, from 7 different quarry districts, which provided the necessary stones for a monumental and strikingly chromatic architectural program.

Four of these are regional, from within the territory of the Roman province of *Baetica*. Almadén de la Plata is located approximately 55 km from Seville as the crow flies, or 70 km by land. The quarries of 'Peñaflor stone' may be traced to an area at a distance of approximately 65 km as the crow flies, or 80 km by land or river. Antequera, in the hinterland of the present day province of Malaga, is approximately 130 km as the crow flies, 180 km by land or using the *Singilis-Baetis* river system or 370 km by sea from *Malaca*. The distance between Tarifa, on

the southern tip of the Atlantic coastline, near the Strait of Gibraltar, and Roman *Hispalis* is approximately 150 km as the crow flies, and 200 km by land or by sea (Fig. 5).

One of the identified materials can be characterised as superregional, from the quarries of Sintra, located in Roman *Lusitania*, located approximately 350 km as the crow flies, or 550 km by sea, from Seville. The remaining two lithotypes are not from the Iberian Peninsula but from Italy (*Luni*), and most probably Algeria (the banded crystalline travertine from Aïn Tekbalet), and must have arrived at Roman *Hispalis* by sea, either directly from their quarries of origin or redistributed from another centre.

The diversity of lithotypes outlined above indicates the use in Roman *Hispalis* of a wide range of materials from regional, superregional and extra-peninsular quarry areas. The distances from and the means of transportation to *Hispalis* by land, by river and by sea would have been different in each case, as would the characteristics of the systems of exploitation and distribution. However, we may conclude that all of these different materials were present and available in *Hispalis* in the 2<sup>nd</sup> century AD for the construction of the monumental building identified at n° 17 Goyeneta Street in Seville's historical city centre. The assemblage under study not only provides new data on the monumental areas of the Roman city of *Hispalis*, located in this case in the Northern intramural sector of the city, but also constitutes an important case study for the reconstruction of the value of regional and imported marbles in the Southwest of Roman Hispania between the 2<sup>nd</sup> and 4<sup>th</sup> centuries AD.

## REFERENCES

- AMORES F., BELTRÁN J., GONZÁLEZ D. 2009: “*Marmora de Hispalis*. Estudio de los materiales pétreos recuperados en las excavaciones arqueológicas de La Encarnación (Sevilla)”, in T. NOGALES, J. BELTRÁN (eds.): *Marmora Hispana*, L'Erma, Rome, 211-227.
- ANTONELLI F., LAZZARINI L. 2015: “An updated petrographic and isotopic reference database for white marbles used in Antiquity”, *Rendiconti Lincei* 26, 399-413.
- BELTRÁN J., LOZA L., ONTIVEROS E., PÉREZ J. A., RODRÍGUEZ O., TAYLOR R. 2015: “Marbles of the Aracena Massif (Ossa Morena Zone, Spain): aspects of their exploitation and use in Roman times”, in *ASMOSIA X*, 437-456.
- BELTRÁN J., LOZA L., ONTIVEROS E., RODRÍGUEZ O., TAYLOR R. 2011: “La explotación y el empleo de *marmora* en la *Baetica*. Un proyecto de investigación de base arqueométrica”, *Itálica. Revista de Arqueología Clásica de Andalucía* 1, 51-75.
- BELTRÁN J., ONTIVEROS E., LOZA L., ROMERO M. 2012: “Roman use, petrography and elemental geochemistry of the Surco Intrabético limestones (western region of Malaga province, Spain)”, in *ASMOSIA IX*, 500-510.
- BELTRÁN J., RODRÍGUEZ O. 2014: “*Hispalis* republicana y altoimperial a través de los datos arqueológicos”, in J. BELTRÁN, O. RODRÍGUEZ (eds.): *Sevilla arqueológica*, Universidad de Sevilla, Seville, 140-181.
- BORJA F. 2014: “Geoarqueología urbana en Sevilla”, in J. BELTRÁN, O. RODRÍGUEZ (eds.): *Sevilla arqueológica*, Universidad de Sevilla, Seville, 276-303.
- GARCÍA VARGAS E. 2014: “La Sevilla tardoantigua”, in J. BELTRÁN, O. RODRÍGUEZ (eds.): *Sevilla arqueológica*, Universidad de Sevilla, Seville, 184-205.
- GNOLI R. 1971: *Marmora Romana*, Edizioni dell' Elefante, Rome.
- GONZÁLEZ ACUÑA D. 2011: *Forma Urbis Hispalensis*. El urbanismo de la ciudad romana de *Hispalis* a través de los testimonios arqueológicos, Universidad de Sevilla, Seville.
- GORGONI C., LAZZARINI L., PALLANTE P., TURI B. 2002: “An updated and detailed mineropetrographic and C-O stable isotopic reference database for the main Mediterranean marbles used in Antiquity”, in *ASMOSIA V*, 115-131.
- GUTIÉRREZ A., RODÀ I. 2012: “El mármol de *Luni*-Carra en la fachada mediterránea de *Hispania*”, in S. KEAY (ed.): *Rome, Portus and the Mediterranean*. British School at Rome, London, 293-312.



- HERRMANN J. J., VAN DER HOEK A., TYKOT R. 2012: "Alabastro a pecorella, Aïn Tekbalet and Bou Hanifia, Algeria: a preliminary report", in ASMOSIA IX, 463-470.
- KEAY S., CREIGHTON J., REMESAL J. 2000: "Celti (Peñaflor): the archaeology of a Hispano-Roman town in Baetica. Survey and excavations 1987-1992", Oxford: Oxbow Books – University of Southampton.
- LAPUENTE P. 1999: "Problemas petrográficos en la identificación de mármoles clásicos: diferenciación de Carrara y Borba", *Caesaraugusta* 73, 279-288.
- LAPUENTE P., NOGALES T., ROYO H., BRILLI M. 2014: "White marble sculpture from the National Museum of Roman Art (Mérida, Spain): sources of local and imported marbles", *European Journal of Mineralogy* 26, 333-354.
- LAZZARINI L. 2002: "The origin and characterization of *breccia nuvolata*, *marmor Sagarium* and *marmor Triponticum*", in ASMOSIA V: 58-67.
- MAÑAS I., FUSCO, A. 2008: "Canteras de Lusitania: un análisis arqueológico", in T. NOGALES, J. BELTRÁN (eds.): *Marmora Hispana*, L'Erma, Roma, 419-458.
- MÁRQUEZ C. 2003: "Los restos romanos de la calle Mármoles en Sevilla", *Romula* 2, 127-148.
- ONTIVEROS E., BELTRÁN J., TAYLOR R., RODRÍGUEZ O., LÓPEZ P. 2012: "Petrography and elemental geochemistry of the Roman quarries of Los Castillejos and Los Covachos (Almadén de la Plata, Seville, Spain). Outcrops and semielaborated products", in ASMOSIA IX, 407-418.
- ORDÓÑEZ S., GONZÁLEZ D. 2011: "*Horrea* y almacenes en *Hispalis*. Evidencias arqueológicas y evolución de la actividad portuaria", in J. ARCE, B. GOFFAUX (eds.): *Horrea d'Hispanie et de la Méditerranée romaine*, Casa de Velázquez, Madrid, 159-184.
- ORDÓÑEZ S., TAYLOR R., RODRÍGUEZ O., GARCÍA-DILS S., BELTRÁN J., SAQUETE J. C. 2015: "A *uotorum nuncupatio* from *Colonia Augusta Firma*. An analytical approach", in ASMOSIA X, 263-268.
- PENSABENE P. 2013: *I marmi nella Roma antica*, Carocci, Rome.
- RODRÍGUEZ O. 2008: "Los *marmora* en el programa arquitectónico y decorativo del teatro romano de Itálica: antiguas hipótesis, nuevas propuestas y posibles certezas a la luz de las aportaciones de los análisis de microscopía óptica de polarización", in T. NOGALES, J. BELTRÁN (eds.): *Marmora Hispana*, L'Erma, Rome, 231-259.
- RODRÍGUEZ O., MAÑAS I., ONTIVEROS E. 2012: "The *opus sectile* of the curia of Ilipa (Alcalá del Río, Seville). Considerations on the use of stone in public architecture from Roman Baetica", in ASMOSIA IX, 127-135.
- TABALES M. A. (dir.). 2015: *Excavaciones arqueológicas en el patio de Banderas, Alcázar de Sevilla. Memoria de Investigación 2009-2014*, Patronato del Real Alcázar Casa Consistorial de Sevilla, Seville.
- TAYLOR R. 2015: *Las canteras romanas de mármol de Almadén de la Plata (Sevilla, España): un análisis arqueológico*, PhD Thesis, University of Seville.
- TAYLOR R., ONTIVEROS E., LOZA M. L., BELTRÁN J. 2017: "*Marmora Lusitana* en la Bética romana", *Revista DigitAR* 4 (online): 29-39.