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TWO MILLENIA OF RURAL LIFE IN THE ALTO ALENTEJO, PORTUGAL

Stephanie J. Maloney
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Foto da capa: UL Tomb 8, on the northeast corner of the north aisle in the Eastern Basilica.
(Photograph by Don Anderson, University of Louisville, 1984).

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DIRETOR
António Carvalho

COORDENAÇÃO
Lívia Cristina Coito

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1000-042 Lisboa
Portugal
Tel.: 217 810 700
E-mail: editorial.apoiocliente@incm.pt
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Foreword

JOHN R. HALE

The site of Torre de Palma in eastern Portugal comprises an extensive villa complex from the late Roman period as well as an early Christian basilica with adjoining baptistry and cemeteries. The heyday of ancient Torre de Palma spanned the transition from the unified world of imperial Rome to the more fragmented and complex cultural matrix of early medieval Europe. Through centuries of intense agricultural, social and religious activity, the human and animal populations at this site bore witness to a series of extraordinary cultural and environmental changes.

This "Supplement" volume to *O Arqueólogo Português*, edited by Stephanie Maloney, Mary Lucas Powell, and Sarah McNabb presents reports and analyses of Torre de Palma's extensive human and animal remains, as recovered during excavations directed by Stephanie Maloney of the University of Louisville beginning in 1983. The faunal remains derive almost entirely from those excavations, as does some of the human skeletal material. However, with kind permission from the *Museu Nacional de Arqueologia* in Lisbon, it has also been possible for us to include in this report the data concerning human remains discovered during earlier excavation campaigns at Torre de Palma.

Immediately after the Roman villa's accidental discovery by farm-workers in 1947, its spectacular mosaic pavements and well-preserved architectural plan became the focus of excavations conducted by Manuel Heleno of Portugal's *Museu Etnológico Dr. José Leite de Vasconcelos*. Heleno prepared and published a detailed map of the Roman villa's extensive structures, which ranged from barns to bath-houses. He also supervised the transfer of the site's most spectacular mosaics to the museum in Lisbon, so that the architectural and artistic legacy of the site became widely known for the first time.

Even in these art-historical finds, however, the animal life of this ancient Roman villa made a prominent appearance. Mosaics showing four-horse chariot teams in the heat of the race, strenuously competing for victory, have been found throughout the late Roman world. One imposing Palma mosaic displays the portraits of five race-horses, each depicted with a palm-frond between its ears as a sign of previous victories in the popular Roman chariot-races. They may represent local Lusitanian stallions who followed victorious racing careers by standing at stud for the profit of their local Roman owner, thus adding considerably to the income and prestige of the great villa itself. The names of the individual horses were also worked into the mosaic – *Hiberus*, *Inacus*, *Leneus*, *Lenobatis*, and *Pelops*. The representations of the five Torre de Palma horses appear to be individualized portraits, varying in their physiques and color of the coat. Two of the horses display brands on their left hindquarters – in one case a large palm-like frond (some interpret this as a stalk of grain); in the other a running boar or pig. If the brand is indeed meant to be a palm frond, it suggests that the modern *herdade* of Torre de Palma or "Tower of Palm" may preserve the original Latin name of the ancient villa – *Palma*, for the classical Roman emblem of victory.

As a toponym, "Palma" (i.e. "Victory") would have been a name that advertised the owner's triumphs in the sporting world of the Roman circus, and a commemoration of those horses that had consistently "won the palm." The Alto Alentejo region around Torre de Palma is still a center for horse-breeding. An additional link to ancient Roman traditions is the modern Portuguese tradition in which bullfights are initiated by mounted "*cavaleiros*" who attack the bull from horseback. This contemporary spectacle harks back directly to the wild animal fights and similar spectacles of the Colosseum and other Roman amphitheaters.

Among the animal population of the ancient villa at Torre de Palma, horses and dogs probably took pride of place in the affections of the ancient owners, and both species are depicted in Roman art and literature as participating in the hunting of deer and other wild game. Dogs would also have played indispensable roles in the herding of livestock, and as watchdogs throughout the estate. Analysis of the faunal material unearthed at Torre de Palma was carried out by Michael Mackinnon, who has identified remains of domesticated cattle, sheep and/or goats, and pigs, all species that remain mainstays of Iberian farming. However, numerous archaeological deposits from the villa also yielded quantities of red deer and rabbit bones. The rabbits were probably trapped or hunted on foot, preparatory to serving as a source of both food and fine furs. As for the red deer, numerous Roman mosaics from other sites depict affluent hunting parties pursuing deer on horseback.

Certainly, at Torre de Palma, red deer seem to have been the game animals most regularly targeted by the local community, perhaps in part because of the damage that they could inflict on field crops. However, analysis of the deer bones from the site showed that deer-hunting had served a purpose beyond that of providing venison for the villa's table, or hides for the manufacture of buckskin. Many deer bones had been worked and shaped into pins and other small implements, perhaps not only for use within the villa community itself, but also as a profitable local industry. This intensive faunal analysis has opened up an unexpected insight into the wider economic life of Torre de Palma and its human inhabitants.

As was the case with the discovery of the Roman villa in 1947, the initial impetus for archaeological excavations at the adjoining early Christian basilica site was fundamentally architectural and art historical. When Manuel Heleno extended his original investigations from the Roman villa to this basilica, he exposed the foundations and lower walls of a well-constructed church with a longitudinal sequence of four apses. As excavations continued, the opening of early Christian or "Visigothic" tombs in the basilica and nearby cemeteries revealed numerous burials that dated to the period when the earlier Roman tradition of cremation had given way to the Christian rite of inhumation.

With the resumption of excavations in the basilica in 1983, biological evidence proved to be equally important in the archaeological interpretation of the early Christian basilica complex. The tombs within the basilica itself and in several nearby cemeteries yielded the bones of more than two hundred individuals, most of whom appear to have been local residents. These people were somewhat taller than the preceding pre-Christian inhabitants of southern Iberia, perhaps due in part to genetic contributions from the historic Visigothic invaders, and at least one individual of sub-Saharan African descent was identified in the analysis by bioarchaeologist Powell and her colleagues. In a host of unexpected ways, the human and faunal remains from Torre de Palma may continue to provide insights that both challenge and enrich our understanding of this remarkable "continuum site," which links ancient Roman civilization to the world of medieval and modern Europe.

Prólogo

JOHN R. HALE

A estação arqueológica de Torre de Palma, situada no Alto Alentejo, Portugal, inclui o complexo de uma vasta *villa* do período romano tardio, uma basílica paleocristã e, na área adjacente, um batistério e cemitérios. Os tempos áureos de Torre de Palma abrangeram a transição do mundo unificado da Roma Imperial para uma matriz mais fragmentada e, subsequentemente, mais complexa da Alta Idade Média europeia. Ao longo de séculos de intensa atividade agrícola, social e religiosa, a população e a fauna de Torre de Palma são um extraordinário testemunho das mudanças do meio e da cultura do local.

Este Suplemento a *O Arqueólogo Português*, editado por Stephanie Maloney, Mary Lucas Powell e Sarah McNabb, é o resultado do estudo dos inúmeros vestígios antropológicos e arquezoológicos recuperados durante as escavações dirigidas por S. Maloney, da Universidade de Louisville, EUA, iniciadas em 1983. Com a autorização do Museu Nacional de Arqueologia, foi possível incluir ainda dados referentes a campanhas arqueológicas anteriores.

Imediatamente após a descoberta acidental da *villa* romana por trabalhadores agrícolas em 1947, os seus espetaculares pavimentos em mosaico e a sua planta arquitetónica bem preservada tornaram-se o foco das escavações conduzidas pelo Dr. Manuel Heleno, diretor do Museu Etnológico Dr. José Leite de Vasconcelos. Manuel Heleno preparou e publicou um mapa detalhado da extensão da *villa*, desde os seus celeiros às termas. Supervisionou também a transferência dos mosaicos mais espetaculares encontrados nas escavações para o museu em Lisboa, o que permitiu que o legado arquitetónico e artístico deste núcleo se tornasse, pela primeira vez, amplamente conhecido.

Nestes achados, relevantes para a história de arte, a presença dos animais desta antiga *villa* romana teve um destaque particular. Mosaicos representando quadrigas numa corrida desenfreada para a vitória foram encontrados em todo o mundo romano tardio; neste caso, um imponente mosaico de Palma exibe cinco cavalos de corrida. Cada cavalo ostenta na cabeça um ramo de palmeira, sinal de vitórias anteriores nas populares corridas romanas. É possível que se tratem de garanhões lusitanos locais, cujas carreiras vitoriosas em corridas forneciam uma renda adicional considerável ao seu proprietário romano, conferindo prestígio e grandeza à própria *villa*. Os nomes dos cavalos foram também inscritos no mosaico: *Hiberus, Inacus, Leneus, Lenobatis e Pelops*. As representações dos cinco cavalos de Torre de Palma parecem ser retratos individualizados, com traços físicos e cores de pelagem distintas. Dois dos cavalos exibem marcas no quadril esquerdo. Num caso, a marca representa uma grande folhagem semelhante a uma palmeira (segundo algumas interpretações será um ramo de um cereal); na outra, um javali ou um porco em corrida. Se a marca pretende, de facto, representar uma folha de palma, isto indicia que a moderna Herdade de Torre de Palma ou «Torre de Palma» poderá ter preservado o nome latino original da antiga *villa*, pois a palma é o símbolo clássico romano da vitória.

O topónimo «Palma» (ou seja, «Vitória») seria indicativo dos triunfos desportivos do proprietário da herdade no mundo do circo romano e, simultaneamente, uma comemoração dos cavalos que frequentemente teriam «ganho a palma». O Alto Alentejo, onde se situa Torre de Palma, é, ainda hoje, uma região de criação de cavalos. Há ainda uma ligação destas tradições romanas com a tourada portuguesa, isto é, com a tradição de tourear a cavalo. Este espetáculo contemporâneo remonta diretamente das lutas com animais selvagens. Espetáculos semelhantes eram celebrados no Coliseu e noutros anfiteatros romanos.

É provável que os proprietários da *villa* de Torre de Palma nutrissem particular afeição por cavalos e cães, pois são retratados na arte e na literatura romanas em cenas de caça de veados e de outros animais selvagens. Os cães também teriam desempenhado um papel indispensável como animais de guarda da propriedade e na guarda de rebanhos. A análise de vestígios animais encontrados em Torre de Palma foi realizada por Michael Mackinnon, que permitiu identificar restos de bovinos, ovinos e caprinos domesticados e suínos, espécies que ainda hoje continuam a ser a base da pecuária da Península Ibérica. Por outro lado, foram encontrados na *villa* depósitos com grandes quantidades de ossos de veado e coelho. Os coelhos seriam capturados com armadilhas ou em caçadas a pé para a alimentação e para aproveitamento das peles. Quanto aos veados, são vários os mosaicos romanos de outros núcleos onde são retratadas opulentas caçadas de veado a cavalo.

O cervo vermelho terá sido certamente o principal objeto de caça da comunidade local, possivelmente motivado em parte pelos danos que causaria nos campos cultivados. No entanto, a análise dos ossos de veado do local mostrou que a caça deste animal não tinha como único propósito abastecer a *villa* de carne ou de peles para a produção de camurça. Muitos ossos de veado foram trabalhados e transformados em alfinetes e outros pequenos artefactos, talvez não apenas para uso exclusivo dos habitantes, mas seriam também a base de uma lucrativa manufatura local. A análise aprofundada dos animais revela uma faceta inesperada e uma leitura mais vasta da vida económica de Torre de Palma.

Com a descoberta da Vila romana em 1947, o entusiasmo inicial pelas escavações arqueológicas no sítio adjacente da basílica cristã primitiva centrou-se no valor arquitetónico e no contributo deste achado para a História de Arte. Quando o Dr. Manuel Heleno estendeu os trabalhos da *villa* romana a esta basílica, expôs as fundações e paredes inferiores de uma igreja bem construída com uma sequência longitudinal de quatro absides. À medida que as escavações avançaram, com a abertura da basílica e dos cemitérios adjacentes com túmulos cristãos primitivos ou «visigóticos», foram reveladas várias *sepulturas* características da tradição romana da cremação, abandonada posteriormente a favor do rito cristão da inumação.

Em 1983, com o retomar das escavações na basílica, os resultados das análises biológicas foram igualmente importantes para a interpretação arqueológica do complexo da basílica que remonta ao início da cristianização. Os túmulos integrados na própria basílica e em vários cemitérios próximos, revelaram ossos de mais de duzentos indivíduos, a maioria dos quais parecem ter sido residentes.

É possível que, graças ao aporte genético dos invasores visigóticos, estes indivíduos estabelecidos no sul da Península Ibérica se apresentem com uma estatura superior à da população anterior, pré-cristã. Pelo menos um indivíduo de ascendência africana subsariana foi identificado na análise realizada pela bioarqueóloga Mary L. Powell e pelos seus colegas. Numa sequência de descobertas inesperadas, os vestígios humanos e de animais de Torre de Palma puderam continuar a fornecer leituras que desafiam e enriquecem a nossa compreensão deste notável «centro em continuum», ao estabelecer um elo entre a civilização romana antiga e o mundo da Europa medieval e moderna.

Acknowledgements

This volume includes contributions from a host of scholars, many of them members of the University of Louisville Torre de Palma Archaeological Project (1983–2000).

Stephanie J. Maloney, the Project Director made this immense project possible. Without her efforts, it would never have happened. Work on the church and cemeteries was funded by a grant from the National Endowment for the Humanities and a match from anonymous donors in Louisville, Kentucky (USA). Those same incredibly generous donors provided almost all the support for the duration of the expanded project. Without them work would have ended in 1986.

John R. Hale, the Project Field Director, provided invaluable information regarding the Torre de Palma mortuary features described in Chapters II and III and Appendix I, the Mortuary Database.

Maia M. Langley, who was a trench supervisor on the excavations, is responsible for getting work started at the museum in Lisbon. There, she reviewed the original field journals and notes, accession records, and plan drawings from the Palma excavations conducted under the direction of Dr. Manuel Heleno (1947–1964). Chapters II and III could not have been written without the information Langley provided from the original documents. In addition, she contributed chronological data for various features based on her ongoing analysis of the ceramics from the site and invaluable information about the Iron Age occupation at Palma.

Peter Rush of Bradford University provided the first analysis of the ceramic spolia.

Mary Lucas Powell, the Project Bioarchaeologist, was ably assisted by Natalie Antunes-Ferreira in data collection during the summers of 1999 and 2000. Funds for the collection and analysis of the Torre de Palma human bone samples were provided by the University of Louisville Torre de Palma Archaeological Project.

Michael Mackinnon supervised excavation of the South Field midden and analyzed all the animal remains recovered during the UL excavations.

H. Stow Chapman was the project architect and was largely responsible for the drawing of the Church. He was assisted by students from the University of Louisville who made up the excavation crew. Field drawings of the tombs were mostly the responsibility of Beverly Atkins, Mary T. Walters, and of Victoria Robinette who drew all the infant burials in the Church.

Sarah McNabb, chief draftsperson for the project, created most of the computerized plans and drawings of artifacts that appear in this volume. She has also been essential to the editing of this volume.

Donald R. Anderson was the Project photographer during Maloney's excavations of the Church and its precinct. David Brangers took several of the photographs of artifacts and human remains.

Åsa Ringbom, Jan Heinemeier, and Alf Lindroos introduced the relatively new technique of radiocarbon dating of mortars to the Torre de Palma Project. Their analysis has provided dates for many features at the site.

Anthony O. Clarke provided geographic and geological information about the formation and taphonomy at the Palma site.

We wish to thank our colleagues in Portugal who materially and intellectually assisted the UL Torre de Palma Archaeological Project in various ways. Without their support and encouragement, this volume would not have seen the light of day.

Dr. Luis Raposo, the previous Director of the *Museu Nacional de Arqueologia in Lisbon*, graciously gave Powell permission to study the Palma human skeletal remains and associated documentation. Dra. Eugénia Cunha and Dra. Ana Luisa Santos (*Universidade de Coimbra*) generously granted Powell access to the Coimbra Identified Skeletal Collection and provided abundant information on bioarchaeological analyses of other Portuguese and Spanish human skeletal remains.

Special thanks go to the individuals and organizations from Monforte and Vaiamonte, whose help was invaluable to the project. António Canoa, the president of Monforte during the early years of the Palma Project, furnished equipment and manpower when needed. The friendship, help, and housing provided by the members of the Cooperative of Torre de Palma was invaluable and made the experience of Portugal especially wonderful for members of the crew. Sr. José Inácio Militão, Archivist at Monforte, generously shared his research on the history of Palma. Out of pure friendship, Francisco Goulão and Maria João Frazão contributed their time to translate the Forward, Achnowledgments, and Summary into Portuguese. The late António Peixe, who had worked on all the previous excavations, enthusiastically shared his prodigious memory of all the projects that preceded our own.

And we thank other colleagues who gave permission to cite their unpublished data, among them Sharla Luxton, who graciously shared with Powell portions of her 2015 Master's thesis (University of Alaska-Fairbanks, Department of Anthropology) on diet and disease at three Medieval Portuguese sites.

On a personal note, Powell would like to thank her husband, John W. Poundstone, M.D., for his unending encouragement and patience during the long process of preparing this manuscript. Maloney also wishes to thank her husband, Thomas S. Maloney, for his constant support and for his help in editing these manuscripts.

Agradecimentos

Este volume inclui contributos de uma série de investigadores, muitos deles membros do Projeto Arqueológico de Torre de Palma da Universidade de Louisville (1983-2000).

Em primeiro lugar, Stephanie J. Maloney, a Diretora de Projeto, que tornou este imenso projeto possível. Sem os seus esforços, este projeto não teria sido realizado. As escavações na igreja e nos cemitérios foram financiadas graças a um donativo da National Endowment for the Humanities, ao qual se associaram patrocínios anónimos de Louisville, Kentucky (EUA). A enorme generosidade destes patrocinadores permitiu o financiamento durante toda a duração do projeto. Sem eles, o projeto teria sido interrompido em 1986.

John R. Hale, Diretor de Campo do projeto, forneceu informações valiosas sobre as características mortuárias de Torre de Palma descritas nos Capítulos II e III e no Anexo I, «The Mortuary Database».

Maia M. Langley, outrora supervisora das valas mortuárias nas escavações, foi a responsável pelo arranque dos trabalhos no Museu de Lisboa, onde procedeu à revisão dos diários de campo e das notas originais, registos de receção e desenhos dos planos das escavações de Palma conduzidas sob a direção do Dr. Manuel Heleno (1947-1964). Realizou ainda a digitalização dos planos originais das áreas escavadas da Capela, do Cemitério ao pé das Ermidas, do Cemitério da Vila Lusitano-Romana e do Cemitério do Pombal. Os Capítulos II e III não teriam sido possíveis sem as informações nos documentos originais fornecidas por Langley, contribuindo ainda na determinação cronológica de vários achados com base na análise consistente da cerâmica do local e fornecendo valiosas informações sobre a ocupação de Palma na Idade do Ferro.

Peter Rush, da Bradford University, forneceu a primeira análise do espólio cerâmico.

Mary Lucas Powell, a bioarqueóloga do projeto, recebeu, nos verões de 1999 e 2000, o prestimoso auxílio de Natalie Antunes-Ferreira na recolha de dados. Os fundos para a recolha e a análise das amostras de ossos humanos de Torre de Palma foram fornecidos pela Universidade de Louisville, Projeto Arqueológico de Torre de Palma.

Michael Mackinnon supervisionou os trabalhos de escavação da lixeira Sul e analisou todos os vestígios animais recuperados durante as escavações da Universidade de Louisville.

Sarah McNabb criou a maioria dos planos digitalizados e desenhos de artefactos que aparecem neste volume. H. Stow Chapman, o arquiteto do projeto, foi também essencial para a edição deste volume e o grande responsável pelo desenho da igreja, tendo sido auxiliado pelos alunos da Universidade de Louisville na equipa das escavações. O desenho de campo dos túmulos, designadamente dos túmulos infantis da igreja, foi principalmente da responsabilidade de Beverly Atkins, Mary T. Walters e de Victoria Robinette.

Donald R. Anderson foi o fotógrafo do projeto durante as escavações conduzidas por Maloney na igreja e na área envolvente. David Brangers fotografou vários artefactos e vestígios humanos.

No projeto Torre de Palma, Åsa Ringbom, Jan Heinemeier e Alf Lindroos recorreram à técnica relativamente nova da datação por radiocarbono, cuja análise permitiu determinar as datas de muitos dos elementos das escavações.

Anthony O. Clarke forneceu informações geográficas e geológicas sobre a formação e tafonomia de Palma.

Gostaríamos de agradecer aos nossos colegas em Portugal que ajudaram material e intelectualmente o Projeto Arqueológico da Universidade de Louisville, Torre de Palma. Sem o seu apoio e entusiasmo este volume não teria sido possível.

O Dr. Luís Raposo, anterior Diretor do Museu Nacional de Arqueologia de Lisboa, que deu graciosamente a Powell a autorização para o estudo dos vestígios dos esqueletos humanos de Palma e da documentação associada. A Dr.ª Eugénia Cunha e a Dr.ª Ana Luísa Santos (Universidade de Coimbra) facultaram gentilmente a Powell o acesso à Coleção de Esqueletos Identificados de Coimbra e forneceram informação abundante sobre as análises bioarqueológicas de outros esqueletos humanos portugueses e espanhóis.

Agradecimentos especiais para as entidades e pessoas de Monforte e Vaiamonte, cuja ajuda para o projeto foi inestimável. António Canoa, o Presidente da Câmara de Monforte, que durante os primeiros anos do Projeto de Torre de Palma, forneceu equipamentos e mão de obra quando necessário. A assistência prestada e o alojamento fornecido, bem como o inexcedível acolhimento manifestado pelos membros da Cooperativa de Torre de Palma, foram preciosos e tornaram a experiência em Portugal especialmente gratificante para os membros da equipa. O Sr. José Inácio Militão, Arquivista de Monforte, partilhou generosamente a sua investigação sobre a história de Palma. Francisco Goulão traduziu a título gracioso este volume. O saudoso António Peixe, que trabalhou em todas as escavações anteriores, ajudou com a sua prodigiosa memória, partilhando com entusiasmo as suas recordações de todos os projetos que antecederam o nosso.

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A título pessoal, Powell agradece ao seu marido, John W. Poundstone, M.D., pelo seu apoio e paciência inesgotável durante o longo processo de preparação deste volume. Maloney agradece também ao seu marido, Thomas S. Maloney, pelo seu apoio e ajuda na edição e revisão deste material.

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List of Authors / Lista de Autores

Della Collins COOK, Faculty, Department of Anthropology, Indiana University, Bloomington, Indiana 47405, USA; cook@indiana.edu

Abby CRAWFORD, Archaeological Graphics, Riverdale, New Jersey 07675; crawford.abby@gmail.com

John R. HALE, Director, Program of Liberal Studies, University of Louisville, Kentucky 40292 USA; jrhale@louisville.edu

Sarah Berrigan HOLT, Instructional Designer, The Ohio State University, 210 Mount Hall, 1050 Carmack Ave, Columbus OH, 43210; holt249@osu

Maia M. LANGLEY, Director, Early Colleges, and Dual Credit, Shelby Campus, Jefferson Community and Technical College, 1361 Frankfort Road, Shelbyville, Kentucky 40065 USA; maia.m.langley@gmail.com

Michael MACKINNON, Professor, Departments of Classics, University of Winnipeg, 515 Portage Avenue, Winnipeg, Manitoba, R3B 2E9 CANADA; m.mackinnon@uwinnipeg.ca

Stephanie J. MALONEY, Professor Emerita, University of Louisville, 140 Masonic Home Drive, Apt 1203, Masonic Home, KY 40041, USA; stephaniejmaloney@gmail.com

Sarah MCNABB, Retired, University of Louisville, 416 La Fontenay Court, Louisville KY, 40223, spmcnabbky@gmail.com

Mary Lucas POWELL, 130 Hamilton Park, Lexington, KY 40504-1313, USA; paleomary@twc.com

Karimah O. Kennedy RICHARDSON, Staff Archaeologist, Autry Museum of the American West, 4700 Western Heritage Way, Los Angeles, CA 90027-1462

Åsa RINGBOM, Professor emerita, Åbo Akademi University, aringbom@abo.fi, Ekstigen 6, dag. 10, AX-22100 Mariehamm, Åland, Finland

Mark R. SCHURR, Faculty, Department of Anthropology, University of Notre Dame, Notre Dame, Indiana 46556, USA; Mark.R.Schurr.1@nd.edu

I. Introduction

STEPHANIE J. MALONEY, ÅSA RINGBOM

1. Location

The site of Torre de Palma is located in eastern Portugal (fig. 1.1) in the *freguesia* of Vaiamonte (*concelho* of Monforte, district of Portalegre, province of Alto Alentejo, Portugal). The Roman villa at Torre de Palma was located on or very near two major Roman roads, one from modern-day Lisbon (*Olisipo*) to Mérida (*Augusta Emerita*), capital of Roman Lusitania, and another running from Évora (*Ebora*) northward and connecting with the road to Mérida (fig. 1.2) (Solana Sainz and Sagredo San Eustaquio, 2006). It is a region replete with Roman remains from villas to bridges, roads, *necropoli*, and isolated finds found built into later buildings or turned up by the plough. It was the latter that occurred at Palma.

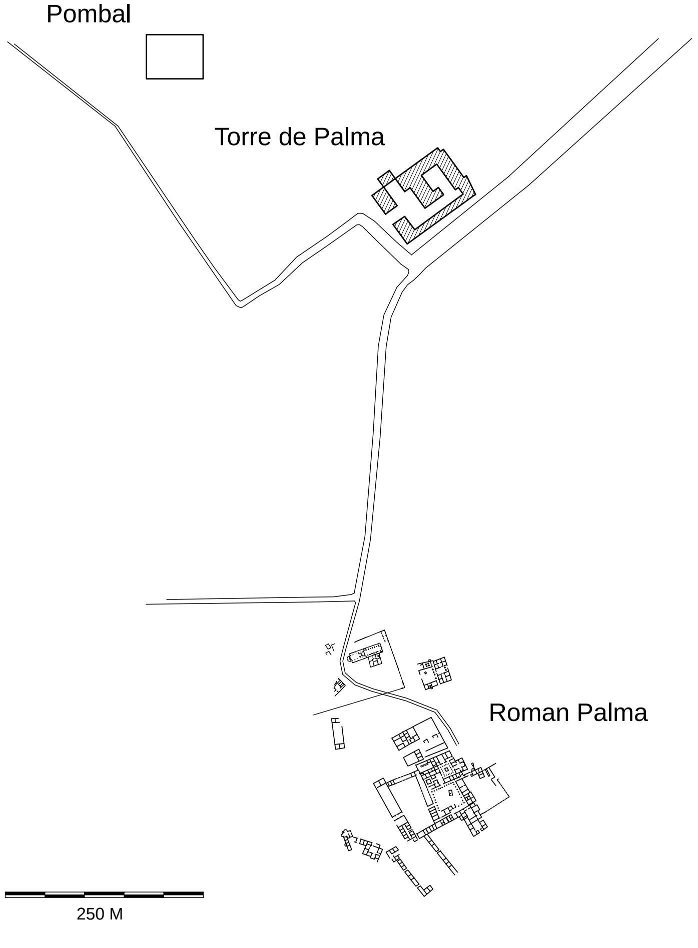


Fig. 1.1 — The location of the Roman site of Palma and the *Cemitério do Pombal*.

2. Discovery of the Site

In March, 1947, a young farmhand named Joaquim Militão drove his team of oxen to one of the distant pastures on a large farm called Torre de Palma, to begin plowing this previously untilled area. Very soon, his plow struck the base of a marble column, the first evidence of the large Roman villa that lay buried underneath the grass. Fortunately, he notified the local schoolmaster of his surprising discovery which ultimately led to a decades-long program of excavations. The site, named after the property on which it was discovered, contains the largest villa uncovered to date in Portugal, with a luxurious *pars urbana* and extensive *pars rustica* which formed the center of a large agricultural estate (Heleno, 1962; Maloney and Hale, 1996; Maloney, 1999/2000).

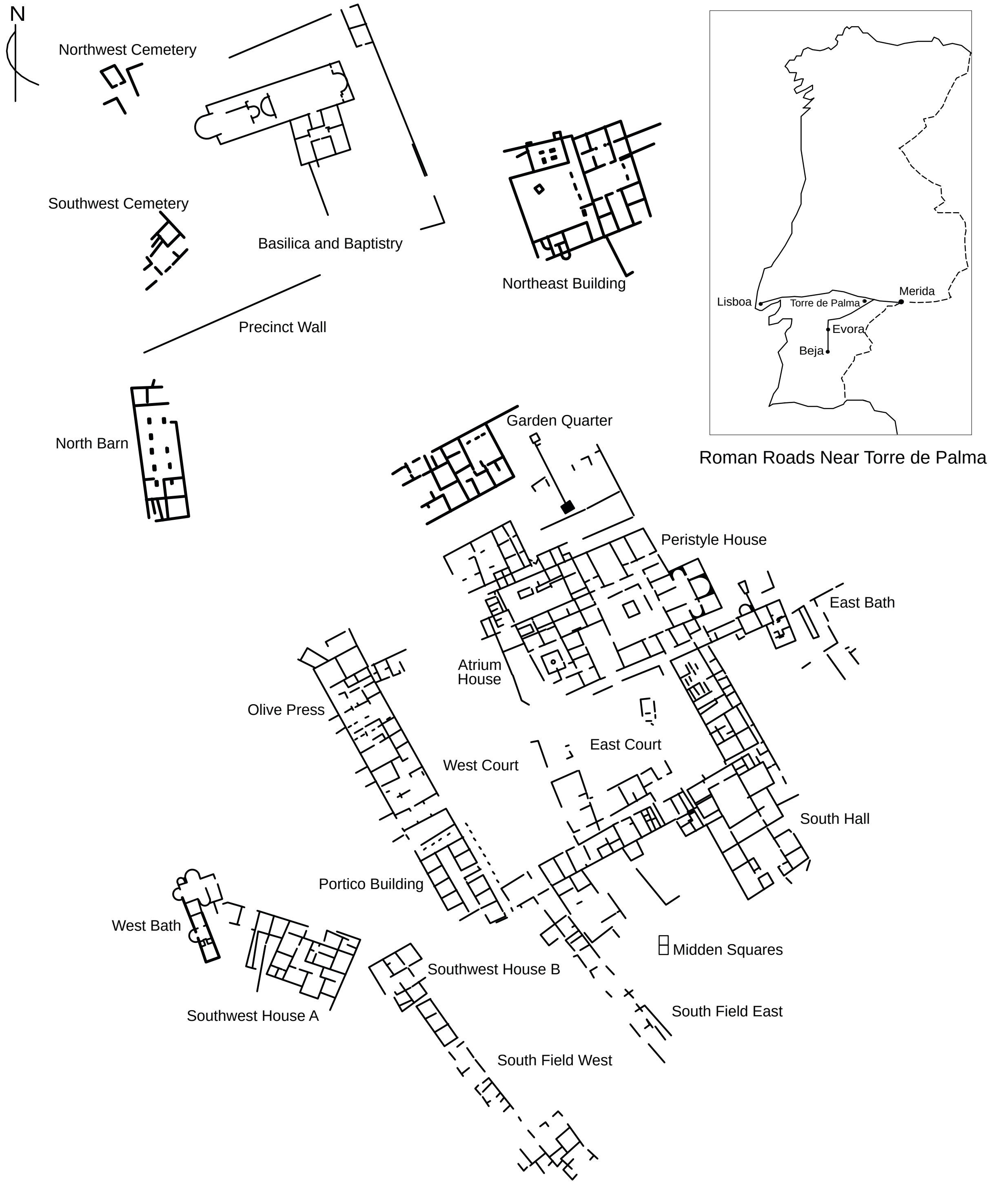


Fig. 1.2 — Plan: of the Torre de Palma Site. Inset: Roman roads passing near Palma. (Drawn by S. McNabb)

3. History of Excavation

Soon after the discovery of the site, Manuel Heleno, director of the *Museu Etnológico Dr. José Leite de Vasconcelos* in Lisbon realized its importance and began a program of excavation that would last until 1964. During that time work in the field was guided by João Lino da Silva who sent countless letters and plans to Heleno in Lisbon. Most of the documentation for the site was removed from the museum by Heleno when he retired but it has now been reacquired by the *Museu Nacional de Arqueologia* (MNA) and has proved invaluable to researchers, including those involved in the current bioarchaeological work.

When Heleno published the excavations, he included very little about the religious complex, concentrating rather on a discussion of the *pars urbana* and the mosaics found there. The only thing he included from the area of the Church was a drawing of the elaborate baptismal font (Heleno, 1962). In 1971, F. de Almeida, Heleno's successor as director of the MNAE, conducted further excavations at Palma. In 1974 he published the first official plan of the Church (Almeida, 1974). Questions remained, however, concerning the date, growth, and stylistic features of this unique building.

In 1983, Stephanie J. Maloney initiated the University of Louisville (Kentucky, USA) Torre de Palma Archaeological Project (abbreviated henceforth as UL) with John R. Hale as field director. The original project (1983–1986) concentrated on re-excavation of the Church and the surrounding cemeteries with the aim of thoroughly documenting the remains, obtaining datable material, and determining phases of construction. In the process human remains were discovered, adding to the already extensive amount of material available for the current study. The Project, which was concluded in 2000, was expanded to include re-excavation of the entire villa as well as the excavation of areas never previously explored.

4. Dating

Structures in the villa of Torre de Palma have been dated by several methods, some traditional and some more recent. Traditional methods include the study of the ceramics and the coins recovered during excavation. Less-well-known is the radiocarbon dating of mortars.

Compared to dating methods dependent upon the interpretation of artifacts, mortar dating has an advantage. Mortar is usually found in sufficient quantities from every stage of construction at most sites to permit samples to be taken. Therefore, if successful, mortar dating has the potential to provide the key to the chronology of a particular building or of an entire site. Mortar is not an organic material. Yet mortar dating is based on ^{14}C analysis of organic materials. The analysis provides the date at which the mortar hardened. That is, when burned and slaked lime, mixed with sand and water, hardens in the building process, the mortar absorbs carbon dioxide from the atmosphere. Thereafter it behaves like an organic material and can be dated accordingly.

An Accelerator Mass Spectrometer (AMS) is used in the ^{14}C analysis. The dating procedure requires careful chemical preparation to eliminate any possible contamination from unburned fossil limestone. In the chemical preparation phosphoric acid is used to separate the mortar sample into several successive fractions, forming an age profile which will show the dissolution process of the sample. These age profiles reveal the age of the samples, which can be interpreted according to certain reliability criteria formulated on our experience from Torre de Palma.

The International Mortar Dating project started at Åbo Academy University, Turku, Finland, in 1994. This is also where all the preparatory work was done, at the Institute of Geology and Mineralogy. The actual ^{14}C analysis was performed in the AMS Dating Laboratory, University of Århus, Denmark. The members of the team involved at Torre de Palma, art historian Åsa Ringbom, physicist Jan Heinemeier, and geologist Alf Lindroos, are crucial members of the International Mortar Dating Project. Today the international framework is much wider, and mortar samples are analyzed at several different laboratories worldwide. (See the bibliography for additional reading on the dating of mortars.)

5. Chronology and Development

Torre de Palma represents more than two millennia of human occupation in east-central Portugal. A small Iron Age settlement established around 300 BC was followed sometime in the 1st century AD by a Roman villa. Christianity spread to the area by the latter part of the 4th century when a small pagan temple (fig. 1.3) was replaced by an early Christian church that was in use at least until the late 7th or early 8th century (fig. 1.4). The region was under Muslim control from the 8th until the mid-12th century when it was retaken by the Portuguese.

At some point after the reconquest of the area by the Christian forces a medieval manor was established a short distance to the east of the Roman villa. The first recorded evidence of this estate, then called Palma, is a document from 1277 regarding the acquisition of the property by Simão Soares, Master of the Order of Avis (*Ordem de São Bento de Aviz*). (Ordem de Avis, Maço 2, Doc. 139; Refª: PT/TT/OACSB/001/000200139) The date of the construction of the still-extant tower house is uncertain, but by 1338 Palma is referred to in a letter of donation by King João I (reigned 1385-1433) as the "*Quinta de Palma*" which implies the existence of a substantial residence by that time (Marques and Rodrigues, 1992). That Palma remained important is attested by its inclusion on published maps until the early 19th century (based on the Maloney collection of early maps).

Whatever its original date, the tower house, along with numerous later additions, still stands today. It was recently transformed into an elegant resort, the Torre de Palma Wine Hotel. Of all the periods represented at Torre de Palma, the Roman villa and the early Christian and Medieval religious complexes are the most relevant to the present study.

Ceramics found in the Roman villa indicate the earliest datable buildings were erected in the late 1st or early 2nd century. Vestiges of even earlier structures have been found but these are too fragmentary to permit identification of the form of the buildings. These remains suggest isolated structures.

Study of the construction of the walls indicates the builders of the different periods had unique styles in terms of the size and placement of stones and the use of mortar. One could argue that the basic technique is the same throughout, that is, outer surfaces of stones were laid and rubble was used to fill the space between those surfaces. There are, however,

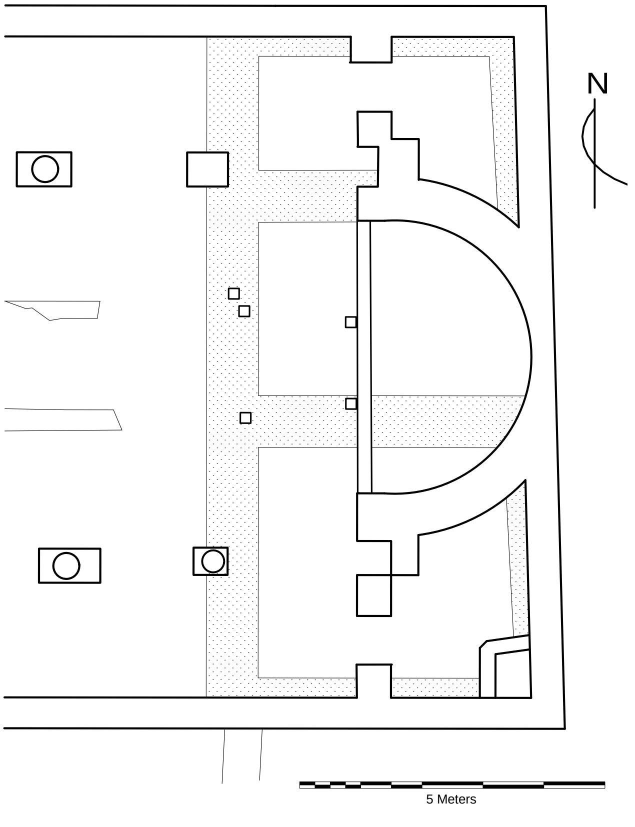


Fig. 1.3 — Plan of the pagan temple beneath the east end on the Church. (Drawn by S.J. Maloney)

Fig. 1.4 — The religious precinct from the air. (Photo MNA)

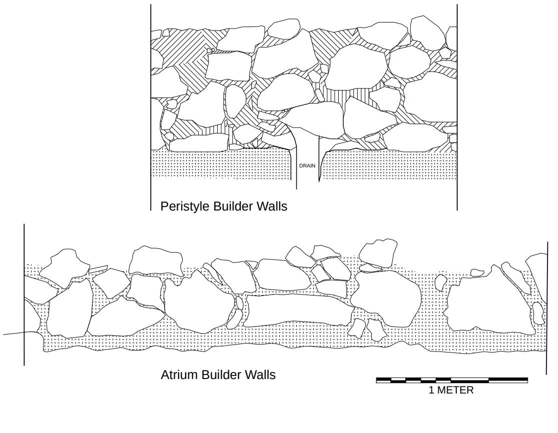


Fig. 1.5 — Comparison of Atrium builder and Peristyle builder walls. (Drawn by S.J. Maloney)

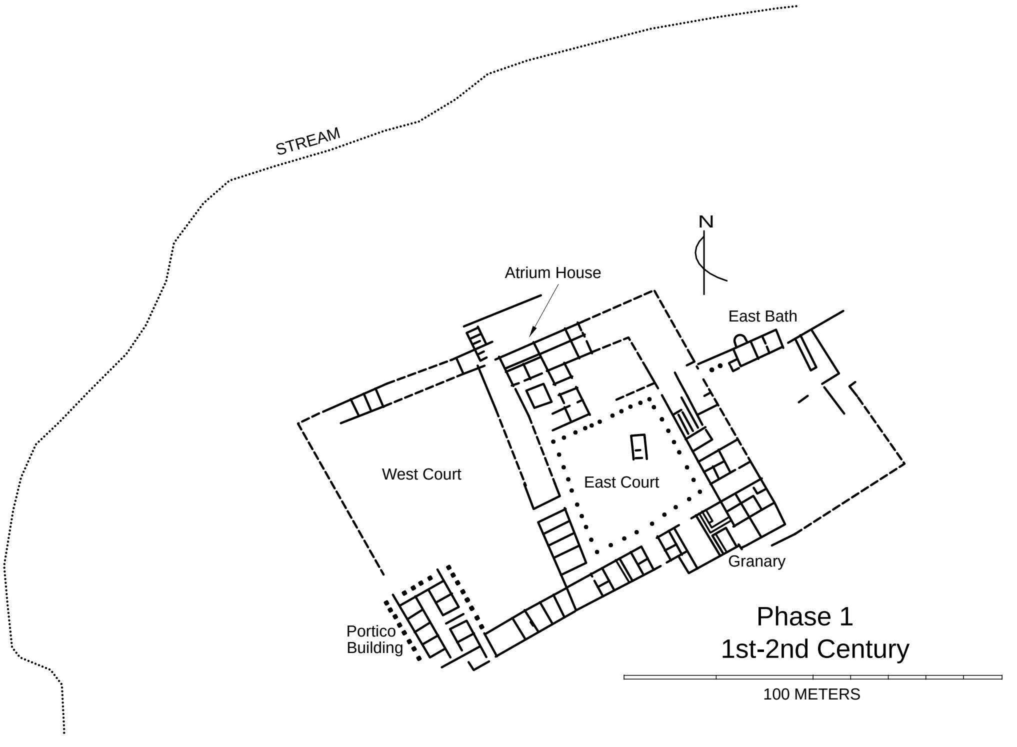


Fig. 1.6 — Phase 1 of the villa. (Drawn by S.J. Maloney)

major differences between the choices made by the builders in different periods. Those who constructed the Atrium Builder Villa (Phase 1), for example, chose large flat field stones placed upright for the outer surfaces of the walls and eschewed the use of mortar. Those who erected the Peristyle Builder Villa (Phase 3), on the other hand, used slightly smaller stones and plentiful mortar (fig. 1.5). These preferences on the part of the builders are especially helpful in sorting out major phases of development.

The study of architectural features, construction techniques and the ^{14}C dating of mortars discussed above, as well as the study of the ceramics, has permitted identification of two well-developed villas, the second incorporating most of the first. It is the earliest of these, Phase 1, the Atrium Builder Villa, that dates to the late 1st and 2nd centuries. The second, Phase 2, the Peristyle Villa, belongs to the early 4th century with changes and additions well into the 5th.

Already old-fashioned when built, the Phase–1 villa (fig. 1.6) has, at its heart, a residence with rooms arranged around what Vitruvius called a tetrastyle atrium (*Vitruvius*, VI.2.2). The Atrium House (fig. 1.7) occupies the northwest corner of a complex with various agricultural and small residential buildings that form the perimeter of a large courtyard to the east and south (East Court). The agricultural complex includes two granaries with raised floors, several identifiable small residences and numerous rooms of indeterminate use. The main gateway to the courtyard was on the southwest. Passages on the northeast and southeast sides provided egress for foot traffic. There were two entryways into the Atrium House itself, a large one on the northeast side and a secondary one on the opposite side of the atrium. A small building, probably a temple, oriented almost exactly north-south, lies in the East Court. Evidence for dating this structure is scant, but what little there is suggests it belongs to the late 1st-early-2nd century phase.

Fig. 1.7 — The Atrium House, detail of the atrium from the south. (Photo by Wesley Kent)

Fig. 1.8 — The stable (Portico Building) from the southeast. (Photo by Wesley Kent)

Fig. 1.9 — Partial view of the East Bath from the northwest. (Photo MNA)

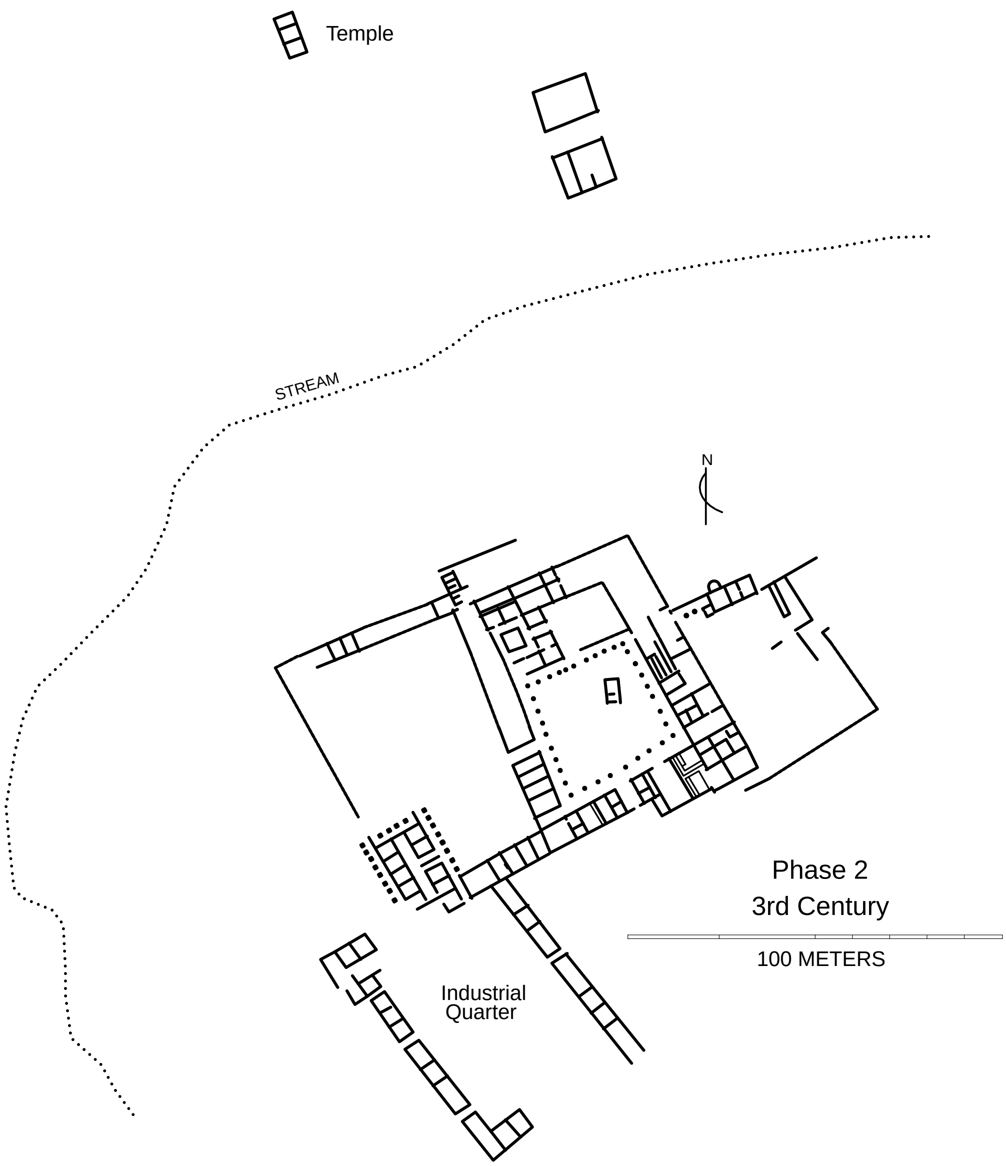


Fig. 1.10 — Phase 2 of the villa. (Drawn by S.J. Maloney)

The 2nd century appears to have been a prosperous time in the life of the villa resulting in an expansion including addition of a second courtyard to the west of the first (West Court), a substantial stable (fig. 1.8) in the southern corner of the new court, and a small bath just outside the eastern side of the East Court (fig. 1.9).

In some parts of the Roman Empire the 3rd century was one of economic crisis. Such hard times are not reflected at Torre de Palma (Phase 2) (fig. 1.10). While the main block of the villa remained essentially unchanged, additions are notable to both the north and the south. North of the stream cutting through the site a small temple and two agricultural buildings were constructed. To the south, a significant industrial quarter was developed. This southern area included a smithy as well as additional small residences. The two ranks of rooms making up this quarter probably flanked a road, the remains of which have been identified to the west of the main gateway to the western courtyard.

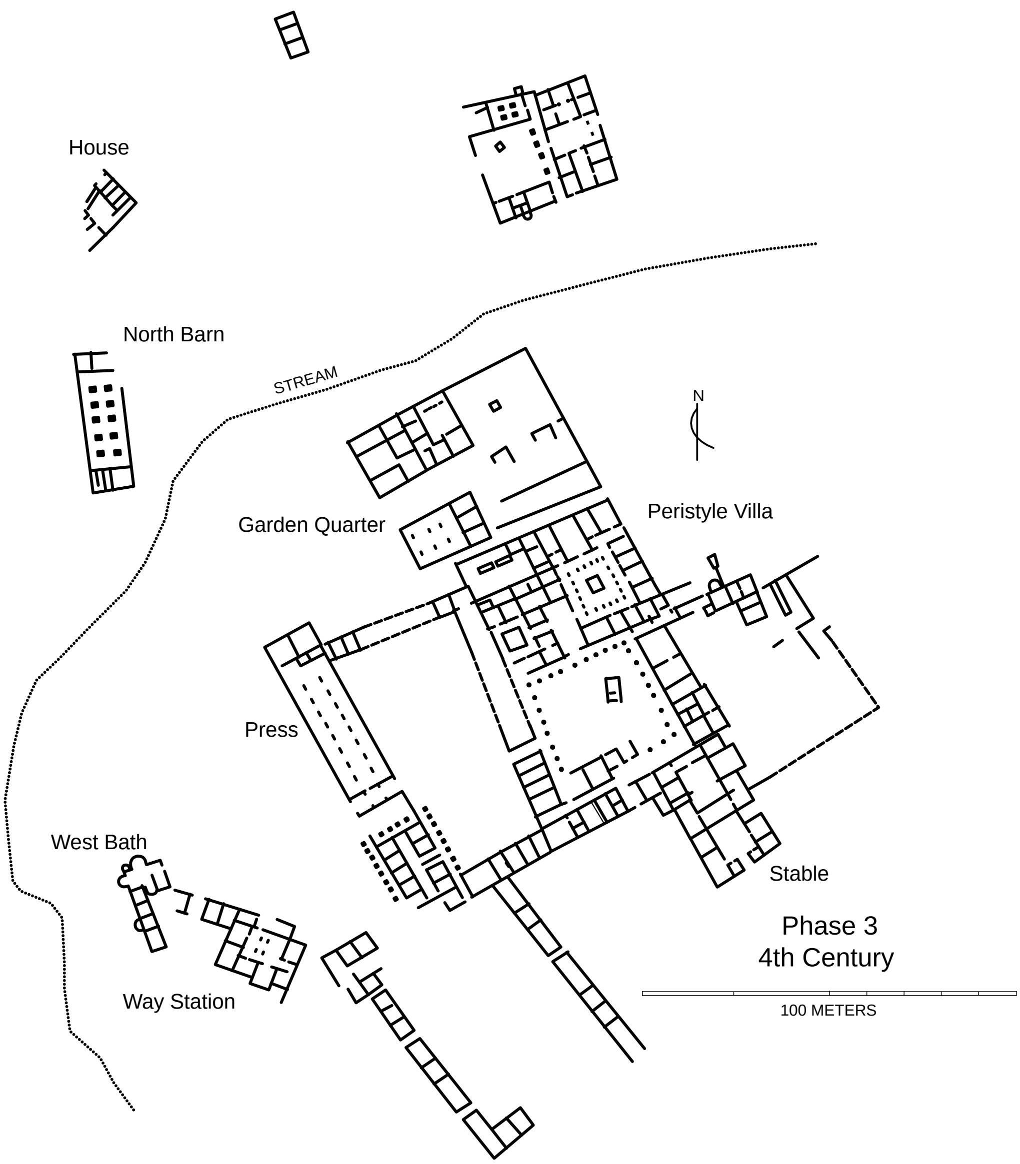


Fig. 1.11 — Phase 3 of the villa. (Drawn by S.J. Maloney)

Early in the 4th century an earthquake damaged parts of the Atrium Builder Villa. This damage is especially evident on the east and south sides of that villa. Perhaps as a result of a need to rebuild after this damage, as well as increased prosperity, the Peristyle House (Phase 3; fig. 1.11), with a large peristyle and a central tank to catch rainwater was constructed (fig. 1.12). Far more opulent than the earlier Atrium House, the new residence was decorated with wall paintings and mosaics in the peristyle and in several of the flanking rooms (Maloney and Hale, 1996; Lancha and André, 2000). The badly-damaged east side of the East Court was modified significantly. The original east wall was abandoned and a new eastern wall erected, a change which eliminated the small residences along that side of the villa. What was a granary in the southeast corner of the East Court was altered to function probably as an administrative and possibly also as a residential area. A stable was added to the south of the original granary. The original bath building was also expanded southward during the 4th century.

Fig. 1.12 — The Peristyle house from the east. (Photo by Kirsten Martin)

a

b

Fig. 1.13 — The West Bath. a) Furnace, caldarium and frigidarium from the north; b) Frigidarium and apodyterium from the west. (Photos by Marc Tasman)

On the west side of the West Court a large press and storage building was constructed and the position of the main gate was moved a few meters northward. Outside the gateway an elaborate bath (fig. 1.13 a, b) together with a residential building was added to the villa complex. The large group of rooms outside the gate probably functioned as a way station for travelers. Whether it was an official government *mansio* or a private establishment cannot be determined. Since this section of the villa was built after the compilation of the so-called *Antonine Itineraries* it is not surprising that no stopping point that can positively be identified with Palma is in that work (McNabb, 2009).

A significant group of buildings was also added to the north of the Peristyle Villa residence. This complex includes a house and several agricultural buildings, both large and small. A cistern and an aqueduct were also found in this area. The nature of these buildings has led to the nickname "The Garden Quarter."

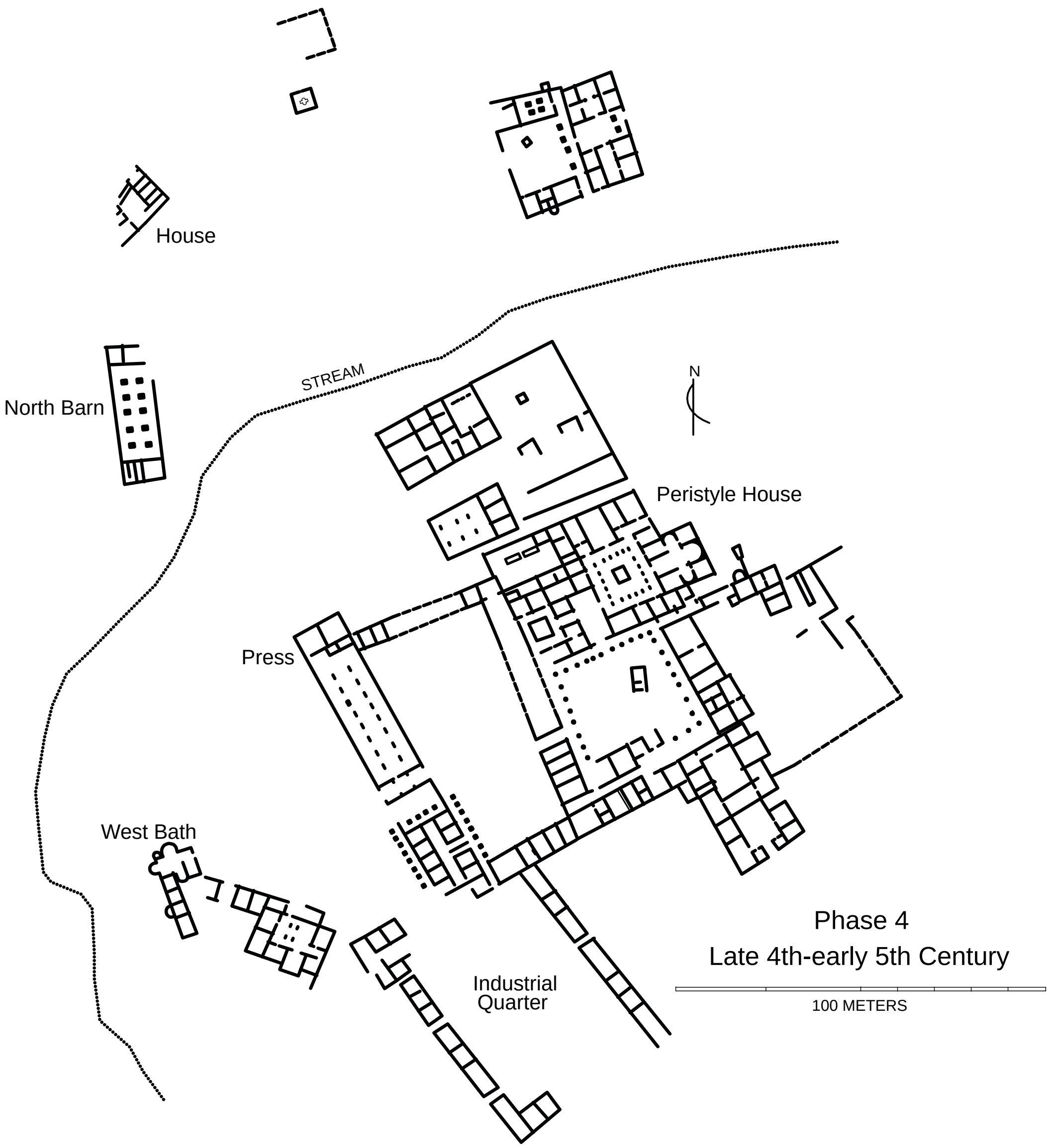


Fig. 1.14 — Phase 4 of the villa. (Drawn by S.J. Maloney)

Fig. 1.15 — Detail of the oldest baptismal font. (Photo by Don Anderson)

The very prosperous 4th century also saw additional building to the north of the small stream that runs through the site. A large barn and/or granary replaced the original 2nd century granaries, a residence was constructed to the north of the barn, and the two agrarian buildings built in the 3rd century were significantly modified and enlarged.

Although there were a few modifications, such as the triconch added to the east side of the Peristyle House, most of the activity during the later 4th and early 5th century at Palma (Phase 4; fig. 1.14) took place north of the stream. It was at this time that the earlier pagan temple was demolished and the first Christian structures were erected. The mortars of the original baptismal font (fig. 1.15) and parts of a fine white floor in the basilica have been dated to this period. It is impossible to determine the precise form of this early church. However, since the foundations of the earlier Roman temple formed the foundations for the east end of the later church, the width of the first church was probably similar. The late 4th-5th-century church may also have been an aisled basilica. The early existence of a church at Palma is reinforced by the presence of 5th-century Christian burials in the Northwest Cemetery. Whether or not there were burials inside this earliest church has not been determined.

Parts of houses used for Christian worship or small chapels are not unusual in rural early Christian Iberia. However, few are as large or complex as that at Palma. A curious feature of the baptistry may help account for such development. In the spring of normally wet years, as the water table rises, the font fills with sparkling clear water just in time for the normal baptismal season at Easter. Such an apparently miraculous event could have drawn people from surrounding areas to be baptized in this extraordinary font.

Whatever the reason, be it deterioration of the original church, a need for more space to accommodate pilgrims, or simply a change in fashion, the Church was rebuilt in the 6th century (fig. 1.16). The rebuilt church was definitely basilican in form with a wide central nave, two side aisles, and semi-circular apses at both the east and west ends of the nave. As was customary at that time, the altar was in the east. The original baptistry was not changed in any significant way but, perhaps as an indication of the special importance of the rite of baptism at Palma, an additional baptismal font was included in the south sacristy of the rebuilt church (fig. 1.17).

Fig. 1.17 — The font in south sacristy of the 6th-century Church. (Photo by Don Anderson)

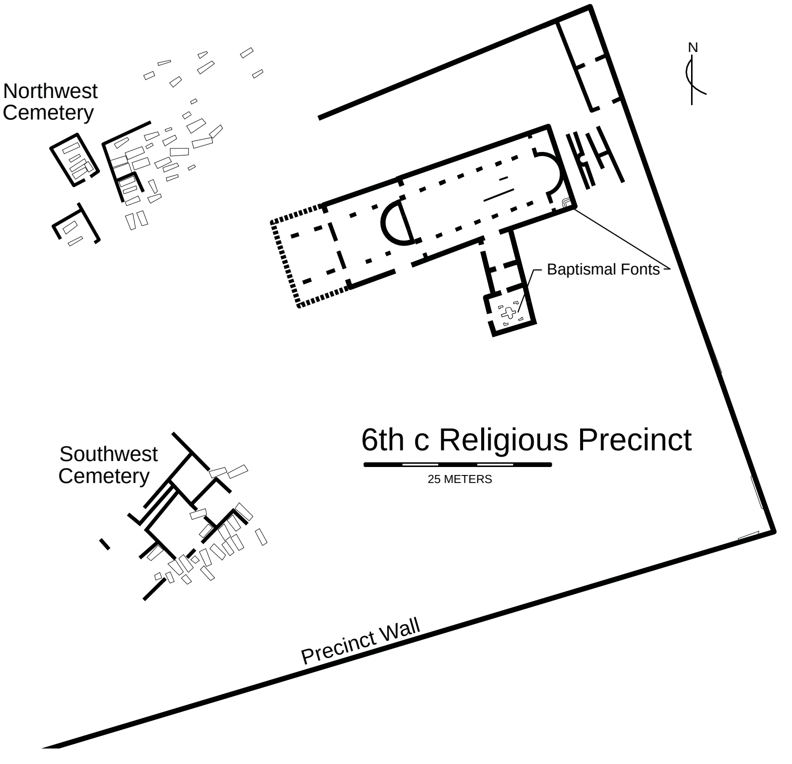


Fig. 1.16 — The religious precinct in the 6th century. (Drawn by S.J. Maloney)

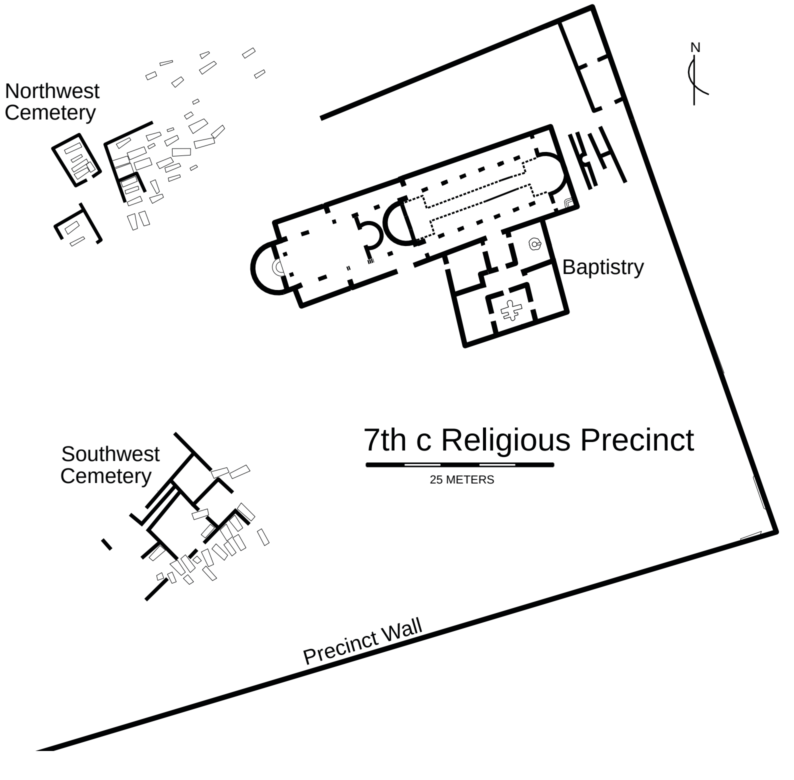


Fig. 1.18 — The religious precinct in the 7th century. (Drawn by S.J. Maloney)

It was important in churches of this period to have a place for the catechumens to retire once the readings and sermons were complete as they were not permitted to take part in the eucharistic celebration. At Palma a rather large aisled narthex behind the western apse would have provided ample space to which those yet to be baptized could retire during that celebration. There they could hear, but not actually see, the mass. The architectural evidence is ambiguous, but it is possible a small atrium preceded the church on the west. There were entrances on both the west end and on the south side of the building.

By the 7th century the villa no longer functioned as it had in earlier centuries. Many buildings were abandoned and others, such as the large press building, were subdivided into small residences. Nevertheless, the Church at Palma thrived. The fact that it was enlarged and lavishly decorated in this period attests to its continued importance (fig. 1.18). Burial within and surrounding the church undoubtedly continued the custom already begun by the 6th century and possibly before. This is also the time during which the Southwest Cemetery was developed in the area once occupied by an earlier domestic building.

Clearly baptism was still an important function of the Church at Torre de Palma, corroborated by the addition of a second font, both larger and deeper than the original (fig. 1.19). The original font was not abandoned but was incorporated into the new design, that of a double-armed cross. The room surrounding the enlarged font was also expanded and the whole, including font, walls and floor, were covered with slabs of pink, gray, and white marble. The main entrance was on the north while other doors on the east and west led to auxiliary rooms.

The Church, too, was modified significantly during the 7th century. In the original basilica a marble pavement like that in the baptistry was laid in the area in front of the eastern apse. About this time a tomb was excavated into the bedrock in front of the western apse, surely a place of great honor, perhaps providing the resting place of someone very important to the Palma community. This tomb is discussed in detail in Chapter II. The floor in front of the western apse was raised above this tomb and the *solea* or walkway leading from the eastern to the western apse was extended. The narthex was eliminated and a third apse was constructed in that space. Probably about the same time a fourth apse was added at the extreme west end of the building. Thus, a second, though smaller, double-apsed basilica was created end to end with the first. (fig. 1.20)

The Church was abandoned sometime in the 8th century falling into ruin during the Muslem occupation of the region. The Church at Palma was resurrected on a much smaller scale after the Christian forces retook the area in the mid-12th century. This chapel, dedicated to St Dominic, incorporated the very-well-built 7th century eastern apse of the Eastern Basilica.

It is difficult to reconstruct the form of that chapel with any certainty (fig. 1.21). Based on the remains surviving in 1983 (solid black in the plan), a sketched plan of the western end of the Church drawn during the earlier Portuguese excavations, and photographs in the MNA, it included a squared-off apse, a small nave, a tiny narthex and a side chamber on the south. All the floors were raised and the nave and apse were paved with brick. The floors of the other chambers cannot be determined. During the University of Louisville excavations, a number of burials of infants and children were found in the fill beneath the remains of the brick floor in the nave and the apse. UL excavators also found another tomb resting on the bedrock in the nave of the area of the medieval chapel. All these burials are discussed in Chapter II. According to Antonio Peixe, who had worked on the earlier excavations and was unofficial caretaker of the site he loved, three additional tombs were found to the west of the third apse.

Fig. 1.19 — The baptismal font after the 7th-century additions. (Photo by Don Anderson)

Fig. 1.20 — The western smaller basilica from the west. (Photo by Don Anderson)

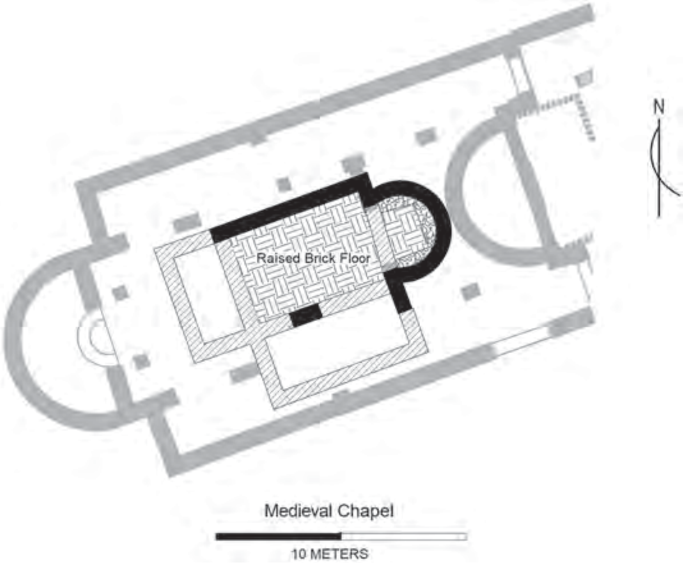


Fig. 1.21 — Hypothetical plan of the medieval chapel (*Capela de São Domingos*). (Drawn by S.J. Maloney)

6. Summary

Excavated remains at the site of Torre de Palma cover about 8 hectares or nearly 20 acres. Much of that was uncovered during the earlier Portuguese campaigns. Although much data was lost, or perhaps not even recorded, during the earlier excavations, the fact that such an extensive area was uncovered has made it possible to study the growth and development of this large agricultural and religious complex in a way not possible in many other places. Styles of wall construction, which would probably not be so easily recognized in smaller scale excavations, are especially helpful in sorting out major building phases for the greater part of a large agricultural establishment. Baths and residential buildings located outside the main enclosed part of the villa tell us something of the value of the site to strangers and can be reasonably assumed to be a way station of some kind to serve the needs of travelers and, perhaps, pilgrims.

Work in the religious complex increases the understanding of religious development in this region. By using the remains of a temple for the foundation of the east end of the Christian church demonstrates the concept of continuity of cult but also the apparent desire on the part of Christian builders to obscure evidence of the earlier, pagan worship. The date of the first baptistry indicates Christianity was strong in the area at a date earlier than generally thought. That Christianity thrived in this region even during the unsettled period of the Germanic invasions of the 5th and 6th centuries and probably up until the time of the Muslem invasions of the early 8th century is indicated by the rebuilding of the Church in the 6th century and its modification in the 7th. Enlargement of baptismal facilities in both the 6th and 7th centuries, long after the Roman villa fell into disuse, is testimony to the importance of baptism at Torre de Palma. Indeed, pilgrims might have come to be baptized in the "miraculous" font, providing a reason for this elaborate sanctuary to have been maintained in this relatively isolated region of Lusitania.

II. Dimensions of Death at Palma: Tombs, Saints and the Community of the Dead

MARY LUCAS POWELL, MAIA M. LANGLEY, STEPHANIE J. MALONEY, JOHN R. HALE, DELLA COLLINS COOK, ABBY CRAWFORD AND KARIMAH K. RICHARDSON

1. Introduction

One of the most valuable aspects of the Torre de Palma archaeological collections in the Museu Nacional de Arqueologia (MNA) in Lisbon is the *spolia* from the large number of mortuary features discovered at the site over a half-century of archaeological excavations. These features represent four consecutive periods of occupation:

– The Iron Age settlement at Torre de Palma (c. 600-300 BC). Four tombs with diagnostic ceramic and metal artifacts and two burial urns with cremated remains date to this period.
– The Era of the Romans (1st-4th-centuries AD). Two infant burials, one urn containing cremated remains of a child, and an isolated tomb northeast of the Church complex date to the early centuries AD.
– The Early Christian Era (Early 5th-7th-centuries AD). These burials were identified in four areas of the site:
  . The partially walled cemetery (the Northwest Cemetery/*Cemitério ao pé das Ermidas*),
  . The Church-Baptistry complex (the *Capela*),
  . The cemetery (the Southwest Cemetery/*Cemitério de Villa Romano-Lusitano*) lying southwest of the Church; and
  . The Pombal farmstead.
– The post-Reconquest (Medieval) re-occupation of the site (12th-16th-centuries AD). These tombs are concentrated within the small chapel (*Ermida de São Domingos*) constructed within the eastern end of the Western Basilica.

The term "tomb" as used here refers to an identifiable constructed locus for human remains whether or not defined by a casket or other structure. Many of the tombs at Palma had been disturbed at some time in the past; some of these still contained human remains when they were discovered. The excavators also discovered several deposits of human remains that appeared to be random assortments of skeletal elements from disturbed tombs in the vicinity; these deposits could not be associated with identifiable mortuary structures and they are not classified here as formal tombs. In a few cases, features originally identified as tombs were later determined not to be tombs.

The descriptions of the tombs excavated at Torre de Palma from 1947 to 1971 are based on the original field notes, plans, and photographs curated at the Museu Nacional de Arqueologia (MNA). During Manuel Heleno's time as Director, this museum was called the *Museu Etnológico Dr. José Leite de Vasconcelos*. Work at the site conducted between 1947 and 1971 will henceforth be referred to as the MNAE excavations. The locations of most of these tombs are depicted on the plans drawn by Heleno's field director, João Lino da Silva, and Fernando de Almeida, Heleno's successor as director of the MNAE: the *Cemitério Villa Lusitano-Romano* (MNA Plan 5), *Cemitério ao pé das Ermidas* (MNA Plan 6), the *Capela* (MNA Plans 7, 8, and 9), and the *Cemitério do Pombal*.

Beginning in 1983 the UL archaeological team conducted excavations at the site for two months each summer through 2000. It was conducted jointly by the University of Louisville, the Universidade de Évora, and the Serviço Regional de Arqueologia, Região Sul (Maloney and Hale, 1996). The locations and descriptions of the tombs excavated by UL archaeologists are taken from the field notes, photographs, and plans of that Project's Director, Stephanie J. Maloney, and Field Director, John R. Hale, and from Maloney's unpublished 2002 report to the *Instituto Português de Arqueologia*. The biological data on the human skeletal remains were provided by Mary Lucas Powell, who began analyzing the Palma human remains in 1996 and continued this research until the end of the final American field season in 2000.

In 2000, Maia M. Langley enrolled as a PhD student in the Archaeology program at the *Universidade de Lisboa*, Portugal, and began her analysis of the ceramic materials from the site at MNA. Her work included cataloging the *spolia* from both the Portuguese and the American excavation projects as MNA Accession #243. During the summers of 2005–2009 Langley directed a series of Bioanthropology Laboratory Workshops at the MNA, aimed at cataloging the human skeletal remains recovered at Palma into the museum's current catalog system. Cristina Cruz and Cristina Pombal, recent graduates of the *Departmento de Antropologia, Universidade de Coimbra*, were employed by Langley to teach the workshop students appropriate methods of age and sex determination and the collection of metric, morphological, and paleopathological data from human skeletal remains. Powell attended portions of the workshops in 2006, 2007, and 2008 as a visiting researcher, working with the students alongside Cruz or Pombal, and collecting additional bioarchaeological data.

During the 17 UL field seasons at Palma (1983–2000), the Americans documented numerous mortuary features originally excavated by the MNAE archaeologists. They also discovered tombs in areas of the site not previously excavated by MNAE (e.g., NW 34 in the Northwest Cemetery). During that time, the original MNAE field documents were not archived at the Museu Nacional de Arqueologia (MNA) in Lisbon, so the American archaeologists could not link their specific tomb discoveries to the previous tomb identifications. UL cataloged *spolia* from mortuary features the same way as they did non-mortuary features or artifacts: each catalog number includes the year of discovery, e.g., TP.119.84. As a result of these multiple excavation programs, many of the Palma tombs have multiple designations because they were successively assigned different designations by the Portuguese and the American researchers. MNAE Director Heleno had ordered his field directors to begin a new tomb numbering sequence at the beginning of each field season, with the result that there was more than one "Tomb 1", with no clear indication of the exact location of each one at Palma – whether it was within the *Capela* or from one of its two associated cemeteries. Langley began her cataloging work by dividing the site into several different Complexes (Figure 2.1). This chapter focuses on the three areas that contain major mortuary areas: the Church or *Capela* (Complex B) and its two associated western cemeteries, Northwest Cemetery (Complex A) and Southwest Cemetery (Complex D). Langley added a new identification number, "LC xx" to each mortuary feature. To clarify the relationship between these multiple numbering systems, during the MNA workshops Langley and Powell constructed a master concordance of all the mortuary features discovered to date at Palma, listing each one with reference to the identifying names and/or numbers previously used by the UL and MNAE archaeologists for each feature and the new LC number and Site Complex. For example, "LC 1" refers to the first tomb in the mausoleum located in the northeast section of the *Cemitério ao pé das Ermidas* (the MNAE designation), also known as the Northwest Cemetery (UL designation), in Complex A. Unfortunately, due to restrictions on time, she was not able to assign LC numbers to all the tombs identified in the MNAE field records, nor to the tombs dated to the Iron Age or the pagan Roman era.

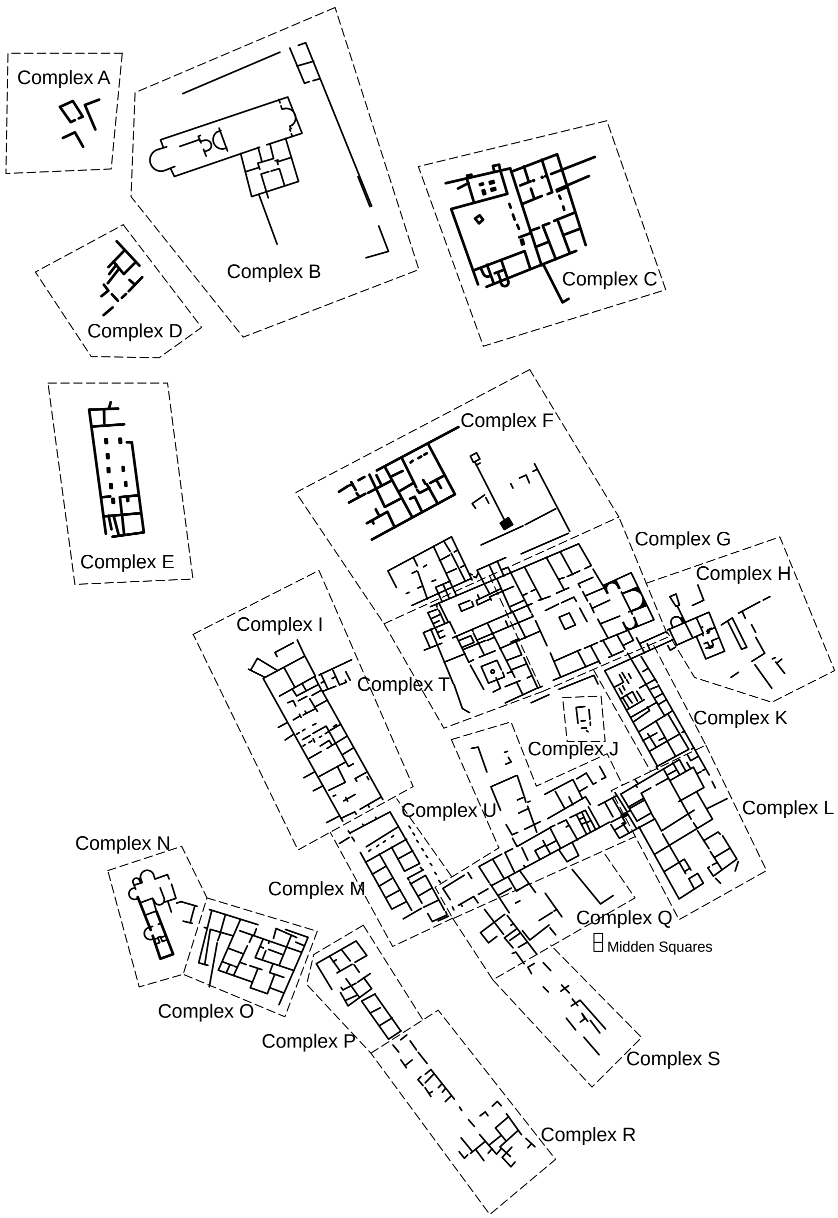


Fig. 2.1 — Plan of the Torre de Palma site, with the Langley Complexes labeled. (Drawn by S. McNabb)

For each area which contained tombs, a table in this chapter lists summary information for each tomb: the UL tomb number, the LC number, and the original MNAE designation, the number of individuals represented by skeletal material, and the associated artifacts. Detailed text descriptions of the individual tombs and their contents, along with plan and profile drawings and photographs of skeletal remains *in situ*, appear in Appendix I, the Mortuary Database. Henceforth, in this chapter the UL tomb designations will be used and, when available, MNA *sepultura* numbers. Tombs in the Church will be referred to as Tomb # or letter; those from the Northwest and Southwest Cemeteries as NW # and SW # respectively.

2. The Mortuary Features at Palma

2.1. The Iron Age Tombs

The pre-Roman Iron Age occupation at Torre de Palma is represented primarily by ceramic vessels, sherds, and metal artifacts recovered throughout the site from the MNAE excavations (1947–1964), as well as by additional artifacts uncovered by the American excavations (1983–2000) (Langley et al., 2007). Initially, the proveniences for some of the materials recovered by MNAE archaeologists were unclear, as the notes from the excavations at Palma and from the concurrent MNAE excavations at Cabeço de Vaiamonte and other regional sites had all been removed from the Museu by Heleno. The artifacts from these excavations had been boxed and curated (though unstudied) in the museum for decades, but the importance of these finds went unnoticed because researchers assumed that they had not come from Torre de Palma but were instead from Cabeço de Vaiamonte, a known Iron Age site (Fabião, 1996).

In 2008, it was discovered that the cemeteries and the entire archaeological site were under threat of being damaged, as evidenced by car tracks running over the tombs. A crew of students under the direction of Langley cleaned, photographed, and re-mapped the areas of Complexes A-D. During these operations, numerous Iron Age ceramic sherds were recovered from several areas. After the journals, letters, notes and plans of this area were purchased from a private collector by the MNA and returned to its archives, Langley began her examination of these documents to extract information regarding the provenience of finds as well as the methods of excavation.

Evidence of the Iron Age presence at Palma was recovered from several different areas of the site. However, the nature of the pre-Roman occupation in this area remains unclear. While cataloging the artifacts from the MNA and the American excavations at Palma, Langley realized that two particular areas of the site yielded the largest number of Iron Age mortuary features: the Northwest Cemetery (*Cemitério ao pé das Ermidas*, Langley Complex A) and the Southwest Cemetery (*Cemitério da Villa Lusitano-Romano*, Langley Complex D) Four of the numbered tombs recorded by the Portuguese excavators in the Northwest Cemetery (Complex A) contained whole or almost complete ceramic vessels that date stylistically from the end of the 7th Century BC to the beginning of the 5th Century BC : "... *Sepulturas* XVI (2000.419.1), XVII (2000.420.1; 2000.420.2), XVIII (2000.421.18) e XXX (2000.426.01;

2000.426.03; 10 002/5/78; 10 002/6/78; 10 002)" (Langley et al., 2007, p. 242). Unfortunately, no specific locations were recorded for these tombs. Cremated human remains were recovered from vessels 2000.405.7 (Urn 5152, Complex D, an infant 12–24 months) and 2000.421.18 (Complex A, Tomb XVIII; probably adult).

2.2. The Pre-Christian Roman Tombs

Pagan Roman custom and laws regarding burials dictated that the dead be strictly segregated from the living. This proscription of burial and cremation within a city's walls was codified in Rome's Law of the Twelve Tables and generally observed throughout the Late Empire (Toynbee, 1971, p. 48). There were two reasons for this spatial segregation: to avoid physical contamination of living areas by decomposing human bodies, and to avert the menace of spiritual invasion by *lemures* and *larvae*, malicious spirits of the dead, particularly those dead whose kin neglected their memory (Toynbee, 1971, p. 35). In actual practice, however, certain exceptions were made: neonates could be buried beneath the floors of domestic dwellings, and emperors and their immediate family members were sometimes buried in splendid monuments within the city's walls (e.g., Hadrian's tomb, the Mausoleum of Augustus, etc.).

José Remesal Rodríguez noted in his thoughtful discussion of the legal aspects of Roman mortuary traditions, "The tomb was a *locus religiosus*. It was enough to bury a cadaver in a particular place to convert it automatically into a sacred place." (Rodríguez, 2002, p. 371) Toynbee adds, in her extensive survey of death and burial in the Roman world, "To disturb in any way the last resting place of human relics that had been finally and solemnly buried was a criminal offense." (Toynbee, 1971, p. 51) Numerous rites and rituals were developed to propitiate the spirits of the dead through ancestral memorial shrines, offerings made during regular visits to tombs on the Kalends of certain months, and specific festivals dedicated to the memory of the dead (the Parentalia and the Lemuria).

Recent scholarship has stressed the variability in Roman mortuary practices. Inhumation was the antique form of burial preferred by the Romans, but cremation gained in popularity by the 1st century AD (Morris, 1992, p. 42). Carbonized bones (typically, but not invariably, contained in ceramic urns) and unburned bodies alike were placed in individual or collective constructed tombs or in graves dug directly in the earth far away from habitations and areas of daily activities. The poor and slaves were buried in informal mass graves and urns. Tombs and grave goods were available to the more privileged. Cremation became fashionable and then declined at different times in different regions, reflecting both the adoption of Roman practices and the persistence of local practices. Urn burial of cremations is particularly common in the 1st century BC in Iberia (Morris, 1992).

Toynbee (1971, p. 101) describes the tremendous range of inhumation tomb types in the Roman world: "The simplest tombs of the Roman world were holes in the ground, unadorned by any form of structure, in which were placed either the receptacle containing the deceased's burnt bones and ashes or his or her unburnt skeleton. It is likely that above such burials there was always once, at ground level, some kind of marker, which, in the case of the humblest graves, took the form of a plain standing stone or even of a large clay pot." She notes that the upper portions of broken amphoras often marked the poorest burials, serving as conduits for libations poured out to honor the dead at memorial events. No grave markers were discovered in the two cemeteries adjacent to the western end of the Early Christian Church. However, the fact that none of these graves appear to cut into earlier graves suggests that the tombs were indeed visibly marked during the period of use of the cemeteries. It is possible that the large coarseware ceramic sherds associated with some of the simpler burials in the Northwest Cemetery (Complex A) and the Southwest Cemetery (Complex D) may represent large ceramic vessels that marked these graves. The earliest tombs in these cemeteries may have served non-family villa servants and laborers.

Other tomb types include graves lined with bricks, broken tiles or stones; graves covered by flat *tegulae;* amphoras cut in half and laid horizontally; and stone sarcophagi, sometimes decorated with scenes in relief (Toynbee, 1971, p. 101-102, 270).

What about pre-Christian burials at Palma? (Table 2.1) In 1992-1993 the UL archaeologists excavated various squares on the east and south sides of the Colonnaded Court (Complexes K and L). While working in those areas excavators discovered two tombs that could be securely dated to the pagan Roman occupation: the graves of two very young infants buried beneath the floors of rooms in the Atrium Builder's Villa (fig. 2.2). In addition, the UL team found the cremated remains of a child in a ceramic urn in the Northwest Cemetery (Complex A), and cleaned an isolated tomb (N-1) located to the north of the Church precinct wall that might have once contained pre-Christian remains.

Almost all the graves at Palma fall into Toynbee's first category, with the second and third categories not identified at the site. The granite lid of a tomb of some kind, perhaps a sarcophagus lay to the south of Tomb F in the Eastern Basilica, but no actual sarcophagus was ever found.

Toynbee notes (1971, p. 49), "A common custom in the case of inhumations was to place a coin – the traditional Charon's fee – in the mouth of the deceased" to pay for the soul's transport across the River Styx to the Underworld. We do not know if any of the pre-Christian inhabitants of the villa were buried with coins, but this custom persisted for centuries after the demise of the Late Roman Empire: two of the young children in the *Ermida de São Domingos*, buried in the medieval chapel constructed sometime after the 12th century in the eastern apse of the Western Basilica, were buried holding coins in their hands – a striking illustration of this enduring funerary tradition through time.

Location	Tomb #	MNA Catalog #	N inds
Iron age			
SW Cemetery	Urn 5152	2000.405.7	infant
NW Cemetery	*Sepultura* XVI	2000.419.1	?
NW Cemetery	*Sepultura* XVII	2000.420.1; 2000.420.2	?
NW Cemetery	*Sepultura* XVIII	2000.421.18	Adult?
NW Cemetery	*Sepultura* XXX	2000.426.1; 2000.426.3;10 002/5/78; 10 0002/6/7; 10 002; 10 0002/6/7; 10 002	?
Pagan roman			
Complex G, Colonnaded Court, Room XIII	TP.113.93	none	infant
Complex G, Colonnaded Court, Room LC	TP.109.92	none	infant
NW Cemetery	TP.66.95	none	child
North of the Church	N-1	none	?

Table 2.1 — Iron Age and Pagan Roman Tombs.

Fig. 2.2 — Plan of the Atrium Builder's Villa, showing locations of the two infant burials. (Drawn by S.J. Maloney)

2.3. From *extra muros* to *ad sanctos*: The Early Christian Tombs

The spread of Christianity in the western part of the Roman Empire brought significant changes in the treatment of the dead and the location of burials, readily apparent in the archaeological record. The Christian doctrine of physical resurrection of the dead at the Last Judgment promoted the abandonment of cremation in favor of inhumation (Toynbee, 1971; Fabião et al., 2008). The dead were no longer so far removed from the living: in the words of the French historian Philip Aries (1982, p. 29-30), "around the 5th century AD... [there began] the rapprochement between the living and the dead, the invasion of the town and villages by cemeteries, which were henceforth surrounded by the habitations of men." He notes that "this aversion to the proximity of the dead soon gave way among the early Christians, first in Africa and later in Rome. The change is remarkable, for it reflects a profound difference between the old pagan attitude and the new Christian attitude toward the dead ... the dead ceased to frighten the living, and the two groups coexisted in the same places and behind the same walls." And he continues (1982, p. 31): "How did people move so quickly from the old repugnance to the new familiarity? Through faith in the resurrection of the body, combined with worship of the ancient martyrs and their tombs."

Not only did the dead "invade" the space of the living, but a new spiritual (and spatial) association arose between tombs and Christian churches, a sharp contrast to the older pagan proscription of burials in the vicinity of temples. Aries traces this association from the early construction of small memorial chapels (*martyria*) over the tombs of Christian martyrs in pagan communal cemeteries. He notes, "This custom is generally believed to have originated in Africa and spread to Spain…" In his view, these small chapels were gradually replaced by "basilicas with several naves and preceded by a very large atrium… to accommodate the large crowds of pilgrims attracted by the celebrity of the saint." These "extraurban" basilicas were distinct from the *episcopia*, or cathedrals, situated within the walls of cities; these functioned as seats of the highest local ecclesiastical authorities, the bishops, and (at this early time) "contained no tombs. The basilicas, on the other hand, were filled with the dead …" (Aries, 1982, p. 35), the tombs of the martyrs (whether *in situ* or imported from other sites) attracting the tombs of the faithful who sought the spiritual protection of their illustrious Christian predecessors.

Echoing Aries, Enrique Cerrillo Martín de Cáceres (1995) argues in his discussion of the early Christianization of rural Lusitania that most, if not all, of the large urban basilicas (Aries' *episcopia*) and the smaller rural *edificios cultuales* that appeared throughout this region in the 5th and 6th centuries AD marked the burial place (*martyium*) of some local early Christian figure of importance. The concentration of Christian tombs in and around the religious buildings reflected the desire of the faithful to be buried *ad sanctos* to await eternity as close as possible to these holy figures. A prime example is the large urban basilica in Mérida, whose chapel dedicated to the Early Spanish martyr Santa Eulalia, was claimed as the most desirable burial location for the Archbishops of Mérida from the 6th to the 8th centuries AD until the Muslim invasion of Iberia (Cáceres, 1995, p. 372), and the same pattern is observed in suburban and rural *iglesias* and *ermidas*.

Almost all the early Christian tombs at Palma lie in three contiguous areas: the Church (*Capela*/Complex B), the Northwest Cemetery (*Cemitério ao pé das Ermidas*/Complex A), and the Southwest Cemetery (*Cemitério da Villa Lusitano-Romano*/Complex D), near its western end. A small group of tombs from this era were also excavated at the small Pombal farmstead.

2.3.1. The Northwest Cemetery (Complex A, *Cemitério ao pé das Ermidas*)

Excavation by the Museu Etnológico Dr. José Leite de Vasconcelos

The Northwest mortuary complex was excavated in 1962 during the Portuguese campaigns directed by F. de Almeida. It was named the *Talhão ao pé das Ermidas* or the *Cemitério ao pé das Ermidas* (literally, 'the cemetery at the foot (i.e., the western end) of the church). On F. de Almeida's plan of the cemetery (MNA Plan 6), 23 unnumbered tombs appear (fig. 2.3), including a large mausoleum that dominates the western border of the cemetery area. The mausoleum contained discrete spaces for five tombs, but no human remains were recovered from them. Of the 23 tombs depicted, 15 include schematic drawings of human remains. At MNA, 15 sets of human remains from this cemetery are identified as coming from *Sepulturas* 1–11 and 25–28; however, since the tombs on the plan are not numbered, no key exists to link specific tombs with specific sets of human remains.

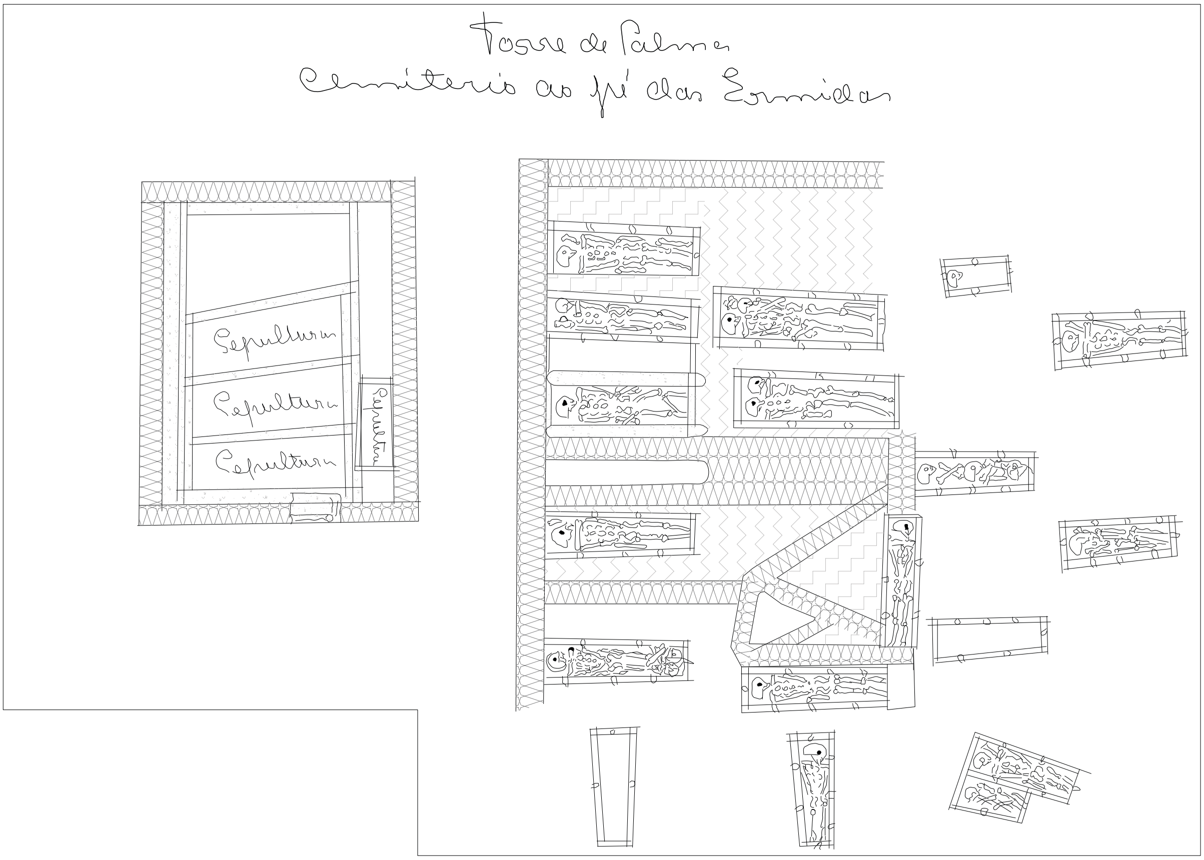


Fig. 2.3 — Plan of the *Cemitério ao pé das Ermidas* (Northwest Cemetery/Complex A). (Original plan drawn by João Lino da Silva, attached to the letter send in 18/8/1960, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S.J. Maloney)

Excavation by the University of Louisville

In 1985 the University of Louisville excavators re-examined this area of the site, recovering fragmentary human remains from some of the previously-excavated tombs. They discovered one undisturbed (NW 34) and mapped several tombs not previously identified. A sample of brownish-yellowish mortar with fine aggregate (TP.036.2) was removed as one piece from joints between the two upper layers of the interior of the east wall of the mausoleum for radiocarbon dating. The calibrated result was 410–610 AD (Maloney and Ringbom, 2000).

The American archaeologists identified a total of 36 individual tombs (fig. 2.4). They also uncovered two deposits of human remains with no identifiable tomb structures, TP.20.85 (inside the enclosure around NW 34) and TP 21/85, and noted a number of disturbed depressions in the ground north of the modern road that runs to the south of the cemetery, suggesting that more tombs (now destroyed) had originally existed there.

When Langley began her cataloging of the human remains from the Northwest Cemetery (Complex A), she assigned Langley Complex numbers to the tombs, beginning with the mausoleum in the northwest corner of the cemetery. Fortunately, F. de Almeida's plan included schematic drawings of a few identifiable artifacts in some of the tombs mapped by MNAE (*Sepulturas* 5, 6, 7 and 8) and these details eventually provided a means for Langley to link some of the catalogued artifacts with specific tombs on the plan. She was able to match 12 of the UL tombs with MNAE *Sepulturas* (Table 2.2).

Remains of 58 individuals were recovered from the 39 tombs recorded in the Northwest Cemetery. An additional 11 individuals are represented in two deposits of human skeletal remains that were not classified as tombs. The total for the Northwest Cemetery is 69 individuals (18 subadults and 51 adults).

UL Tomb/MNA *Sepultura*	LC #	MNA #	N Inds	UL Tomb Type	Associated Artifacts
NW 1 (a – e)	1 thru 5	none	none	Mausoleum	none
NW 2/*Sepultura* 9	7	2005,215	2F, M, i	II brick box	1.TP.85, iron belt buckle; TP.40.85, 4 sherds
NW 3/*Sepultura* 6	12	2007,63	F	IV granite slab	ceramic vessels (MNA 2412.1)
NW 4/*Sepultura* 5	13	2005,212	M	IV granite slab	none
NW 5/*Sepultura* 3	16	2005,209	F, A, i	II brick box	none
NW 6/*Sepultura* 1	17	2005,205	3F, 2M, A	I brick wall	none
NW 7	20	none	A,c	V stone kerbs	none
NW 8	21	none	unknown	I brick wall	none
NW 9/*Sepultura* 2	19	2005,208	2F, M	V stone kerbs	none
NW 10/*Sepultura* 4	18	2005,21	F?, M	I/II combination	2.TP.85, Bronze belt buckle; TP.5.85, 1 sherd
NW 11/*Sepultura* 7	14	2005,213	F, 2M	VII stone block	TP.06.85, 11 ceramic sherds
NW 12/*Sepultura* 8	10	2005,214	F, M, a, 2j, c	IV stone block	TP.41.85, 7 sherds
NW 13	8	2005,241	F, M, c	II brick box	TP.07.85, 6 sherds
NW 14/*Sepultura* 10	11	2005,216	M	II brick box	none
NW 15	25	none	A	IV granite slab	TP.8.85, 1 sherd
NW 16	24	none	M, A, i	II brick box	TP.42.85, 1 sherd
NW 17	22	none	M	II brick box	TP.9.85, 10 sherds, brick fragment
NW 18/*Sepultura* 11	26	2005,217	M, j	III stone block	3.TP.85, a pair of bronze earrings; TP.10.85, 3 sherds
NW 19/*Sepultura* 27	27	none	M	V stone kerbs	4.TP.85, 5 iron nails; 7 or 8 vessels
NW 20	28	none	no bones	VIII destroyed	none
NW 21	30	none	M	I brick wall	5.TP.85, iron nail; TP.13.85, 1 sherd
NW 22	32	none	no bones	VIII destroyed	none
NW 23	37	none	no bones	II brick box	TP.14.85, 17 sherds (parts of 1 amphora
NW 24	34	none	no bones	VIII destroyed	none
NW 25	33	none	no bones	VIII destroyed	none
NW 26	38	none	no bones	II brick box	none
NW 27	35	none	no bones kept	VI marble slabs	none
NW 28	29	none	no bones	VIII destroyed	none
NW 29	31	none	no bones	II brick box	TP.16.85, 5 sherds
NW 30	36	none	no bones	VIII destroyed	none
NW 31	40	none	no bones	VIII destroyed	none
NW 32	39	none	no bones	VIII destroyed	none
NW 33	15	none	no bones	VIII destroyed	TP.17.85, 23 pottery fragments
NW 34	6	none	2F, 2M, c, j	II brick box	6.TP.85, bronze earring near skull 5
NW 35	23	none	no bones	II brick box	none
NW 36	9	none	F, M, a	VIII destroyed	7.TP.85, iron nail
None/*Sepultura* 25	none	2005,218	F,M	unknown	unknown
None/*Sepultura* 26	none	2005,244	M	unknown	unknown
None/*Sepultura* 28	none	2005,22	2M	unknown	unknown
Human remains whose original tomb association is uncertain					
TP.20.85	none	none	M,A	none	none
TP.21.85, Small Reburial	none	none	3F, 3M,A, a, c	redeposited bones	none

Table 2.2 — The Northwest Cemetery (*Cemitério ao pé das Ermidas*), Complex A.

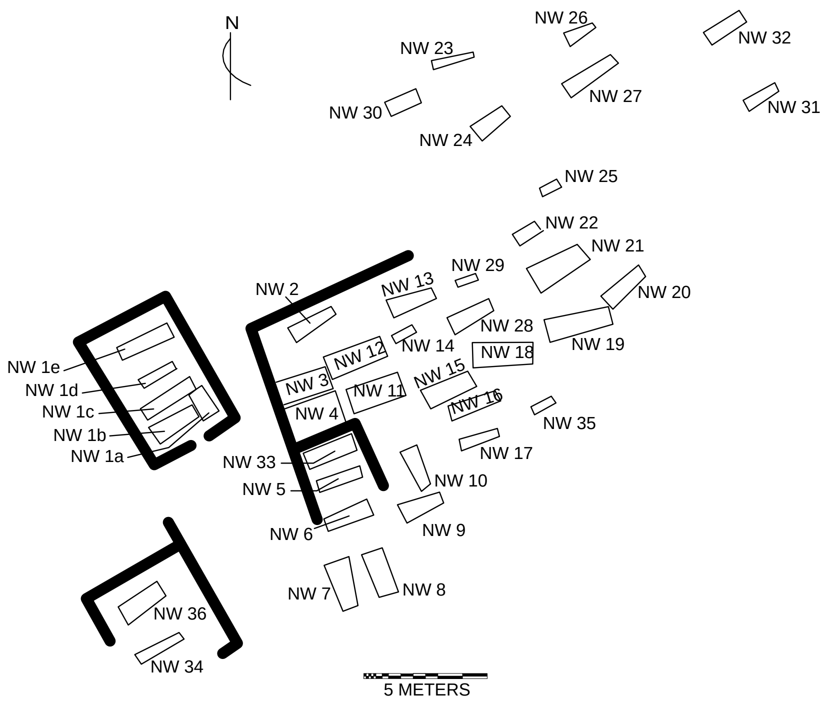


Fig. 2.4 — The Northwest Cemetery (*Cemitério ao pé das Ermidas* / Complex A): Plan with UL tomb numbers. (Field drawings by Beverly Atkins and Mary T. Walters; digitized by S. McNabb)

2.3.2. The Church (Complex B, *Capela*)

Excavations by the Museu Nacional de Arqueologia e Etnologia

Even before the discovery of the villa in 1947, one ancient feature nearby was already well known: a small chapel known as the *Ermida de São Domingos* (1758, A.N.T.T.; Azevedo, 1896), marked by a portion of the semi-circular apse wall clearly visible above ground (fig. 2.5). Heleno referred in his journals to this feature located near the villa and the Herdade de Torre de Palma, but he never made the connection between the church complex and the life span of the Roman villa. This area of the site was first explored in 1955 by Heleno's campaigns; J. Lino da Silva's plan drawings of the Basilica show numerous tombs, several of which were apparently empty at the time of excavation (fig. 2.6 and fig. 2.7). Discrepancies exist between the depiction of bones within some of the tombs and sets of human remains at MNA labeled for those features. In the late 1960's, when F. de Almeida was excavating in this area, four otherwise undocumented tombs (LC 105, 106, 107, and 108) in the western portion of the smaller basilica were drawn on the 1969 plan prepared by an illustrator contracted by the museum. Unfortunately, no materials curated at MNA have been identified with these four tombs. F. de Almeida never formally reported excavating in the *Capela* itself, although one of his workmen, Antonio Peixe, confirmed in a personal interview with Hale that he had witnessed work in the Western Basilica by F. de Almeida as well as an excavation

Fig. 2.5 — The wall of Apse 3 of the Church (*Capela* / Complex B) visible above ground at the start of Heleno's excavations. (Photo MNA 92)

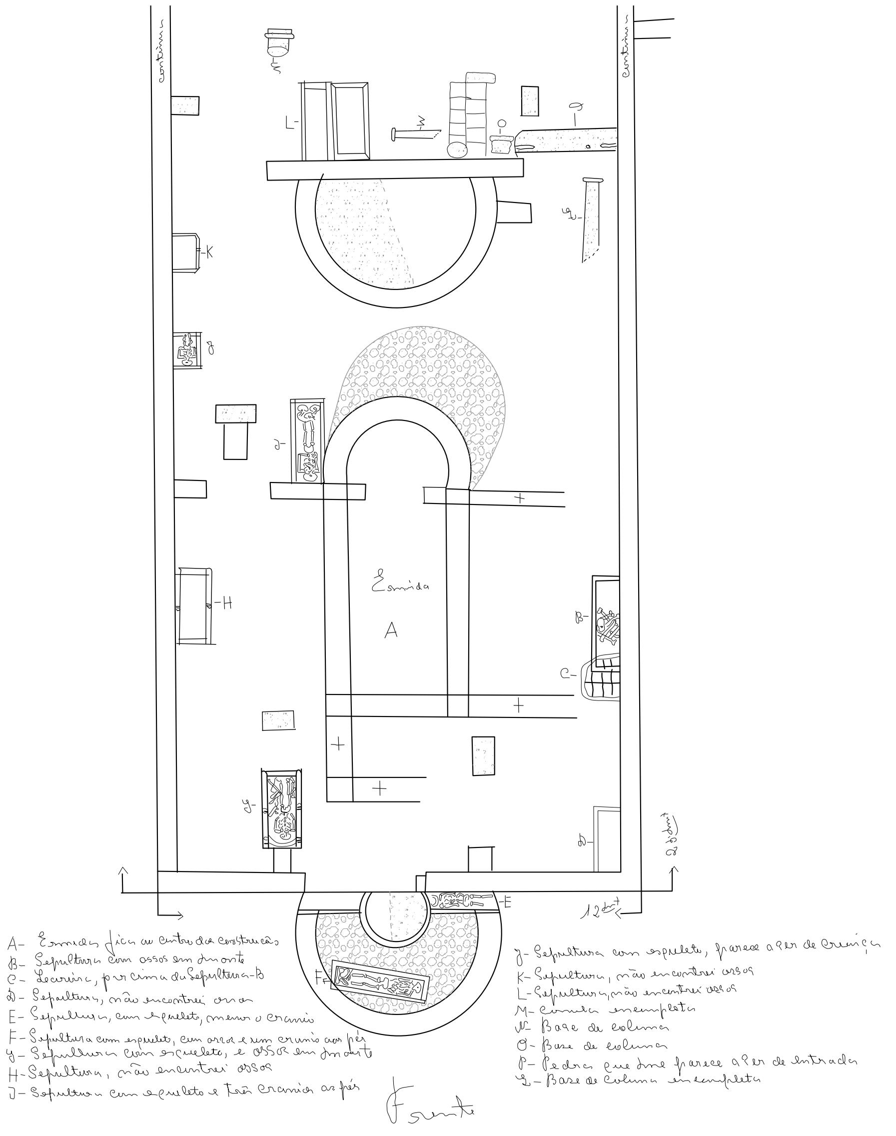


Fig. 2.6 — Plan of the *Capela* (the Church / Complex B) showing *sepulturas*. (Original plan drawn by João Lino da Silva, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S.J. Maloney)

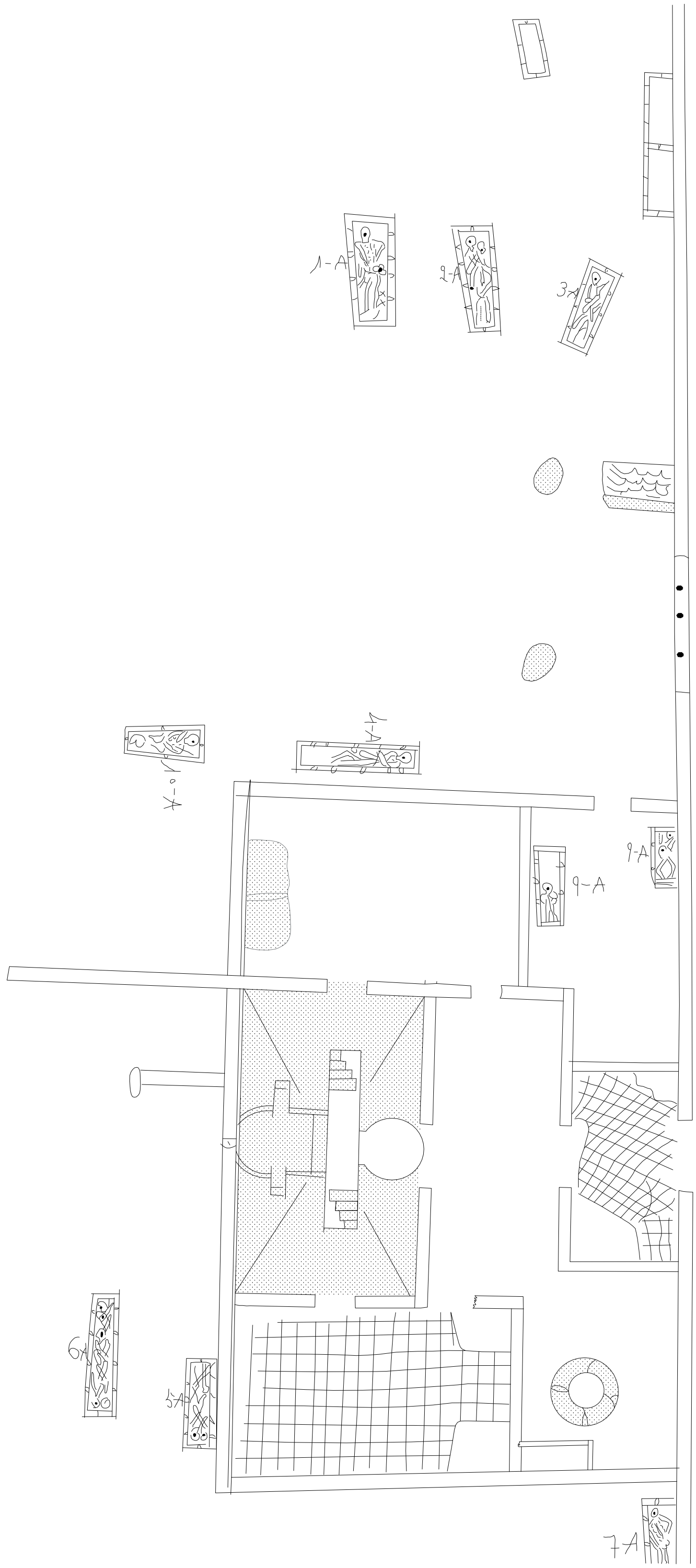


Fig. 2.7 — Plan of the Baptistry (the Church / Complex B) showing *sepulturas.* (Original plan drawn by João Lino da Silva, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S. McNabb)

in the *apodyterium* of the East Baths (Complex H), sometime in the late 1960's (Hale, Personal communication, 2006). There exist more plans from the area around the Church than from any other area (MNA Plans 7, 8, and 9) although the numerical and alphabetic designations for various features and tombs are never repeated from one plan to another. As a result, some of the human remains were mixed between graves during transport to the museum.

Excavations by the University of Louisville

The American excavation campaigns began in 1983 in the Church, dedicated to gathering chronological data and materials that would better elucidate the functions and artistic styles present in the church. Re-excavation of all of the tombs in the Church complex and proper documentation of the architectural features was the primary focus, resulting in the discovery of 11 additional subfloor tombs plus several deposits of remains with no associated identifiable tomb structures and a cache of 4th century coins sealed in the 5th-century floor, discovered beneath the marble slabs laid down in the 7th century at the eastern end of the Church. The implementation of the ^{14}C mortar dating technique has revealed chronological information about the successive construction campaigns (Maloney and Ringbom, 2000).

The remains of 59 individuals (Table 2.3) were recovered from 38 early Christian tombs in the Church (fig. 2.8), located in three separate areas: the larger Eastern Basilica (N=7), the smaller Western Basilica (N=17), inside the baptistry and the area immediately south of the Church and baptistry (N=36). Remains representing an additional 31 individuals were discovered in several locations that were not identifiable as tombs. The Church yielded, therefore, remains representing a total of 90 individuals (29 subadults and 61 adults).

2.3.3. The Southwest Cemetery (*Cemitério da Villa Lusitano-Romana*/Complex D)

This complex was discovered by F. de Almeida in 1962. In his notes and plan (MNA Plan 5) curated at MNA, only two of the four tombs (2, and 3) drawn as containing human remains are numbered; 11 tombs (empty of remains) are drawn but not numbered, nor were tomb numbers ever assigned (fig. 2.9). Human remains from six tombs associated with this cemetery are curated at MNA; five are designated by letters (A, B, E, F, and M) and one more is labeled '*tumba imperceptivel*' (tomb not recognizable). These remains probably came from the unnumbered *sepulturas* on F. de Almeida's plan, but no key exists to link specific sets of remains with specific *sepulturas*. The human remains from this area were accidentally confused in the MNA collections with those from the cemetery at the Monte do Pombal, but during the 2008 session of the Torre de Palma Osteological Project, these burials were carefully distinguished and reassigned to their appropriate cemeteries.

In 1985, 1999 and 2000, the American campaigns revealed 10 additional tombs in the Southwest Cemetery and further defined the boundaries of the cemetery as well as the function of the house. In total, this cemetery included 27 identified tombs, containing remains representing 36 individuals (10 subadults and 26 adults), plus one adult with no identified tomb (fig. 2.10) (Table 2.4). Both cremation and inhumation burials hail from this complex.

UL Tomb/MNA *Sepultura*	LC #	MNA #	N Inds	UL Tomb Type
Western basilica tombs				
Tomb R	41	none	no bones	II, brick box
Tomb Q	42	none	no bones	II, brick box
Tomb M/*Sepultura* H	44	none	no bones	VII, small flat stones
Tomb N/*Sepultura* G	43	none	unknown	IV, granite slab
Tomb O	45	none	no bones	IV, granite slab
Tomb P/*Sepultura* F	46	2005,224	M, A	IV, granite slab
Tomb S/*Sepultura* E	47	2005,223	2F, M, j, a	IV, granite slab
Tomb T/*Sepultura* D	48	none	unknown	V, stone kerbs
Tomb U/*Sepultura* B	49	2005,221	M	VI, marble slabs
Tomb L/*Sepultura* J	50	none	no bones	IV, granite slab
Tomb J (east)/*Sepultura* K	51A	none	no bones	V, stone kerbs
Tomb J (west)/*Sepultura* K	51B	none	no bones	V, stone kerbs
Tomb K/*Sepultura* I	52	none	unknown	V, stone kerbs
Tomb 3	111	none	3M, F, A, j	no formal tomb structure
Eastern basilica tombs				
Tomb I	54	none	no bones	V, stone kerbs
Tomb GG/*Sepultura* L	55	none	no bones	VII, only irregular slab of lid
Tomb G	56	none	no bones	VII, fine slab at head, frags at foot
Tomb H	57	none	no bones	III, stone blocks with brick cap
Tomb A	59	none	no bones	IV, granite slabs
Tomb B	60	none	no bones	IV, granite slabs
Tomb D	61	none	no bones	II, brick box
Tomb E	62	none	i	II, brick box
Tomb 8	104	none	F, i, c	II, brick box
Tomb 1	109	none	F	no formal tomb structure
Tomb 3	111	none	3M, F, A, j	no formal tomb structure
Tomb 11	112	none	M	VII, unique
Tombs in the baptistry and south of the church wall				
Tomb C/*Sepultura* 7A	63	2005,231	F, i	VII, concrete slabs below
Tomb FF	64	none	no bones	VII, hybrid between Types IV/VI
Tomb Y/*Sepultura* 8A	65	2005,232	c	V, stone kerbs
Tomb Z	66	none	no bones	V, stone kerbs
Tomb AA/*Sepultura* 9A	67	2005,233	j	I, tiles laid flat
Tomb BB/*Sepultura* 4A	68	2005,227	F, M, A	I, brick wall
Tomb CC/*Sepultura* 10A	69	2005,234	A, 3c	II, brick box
Tomb DD/*Sepultura* 6A	70	2005,229	F, 2M, a, j	I, brick and stone frags
Tomb EE/*Sepultura* 5A	71	2001,79	F, 2M, A, j	I, stone slabs, brick lining
Tomb V/*Sepultura* 3A	72	2005,226	F, 2M, 2A, j, a	II, upright tiles form sides
Tomb W/*Sepultura* 2A	73	2005,78	F, M, A, a	I, layers of tiles laid flat
Tomb X/*Sepultura* 1A	74	2005,204	F, 2M, a	IV, granite slabs
Tomb F	none	none	no bones	V, stone slab or kerb
Human remains whose original tomb association is uncertain				
TP.1.86 (no UL tomb #)	102		M	unknown
TP.119.84; Large Reburial	53		4F, 7M, 3A, i, 3c, a	N/A
TP.83.84	none		A, i, c	N/A
TP.84.84	none		c	N/A
Sepultura A		2005.225	3F, M	
Sepultura D		2005.222	F, M, A	
Sepultura P		2005.235	F, M, I	

Table 2.3 — Early Christian Tombs in the Church (*Capela*), Complex B.

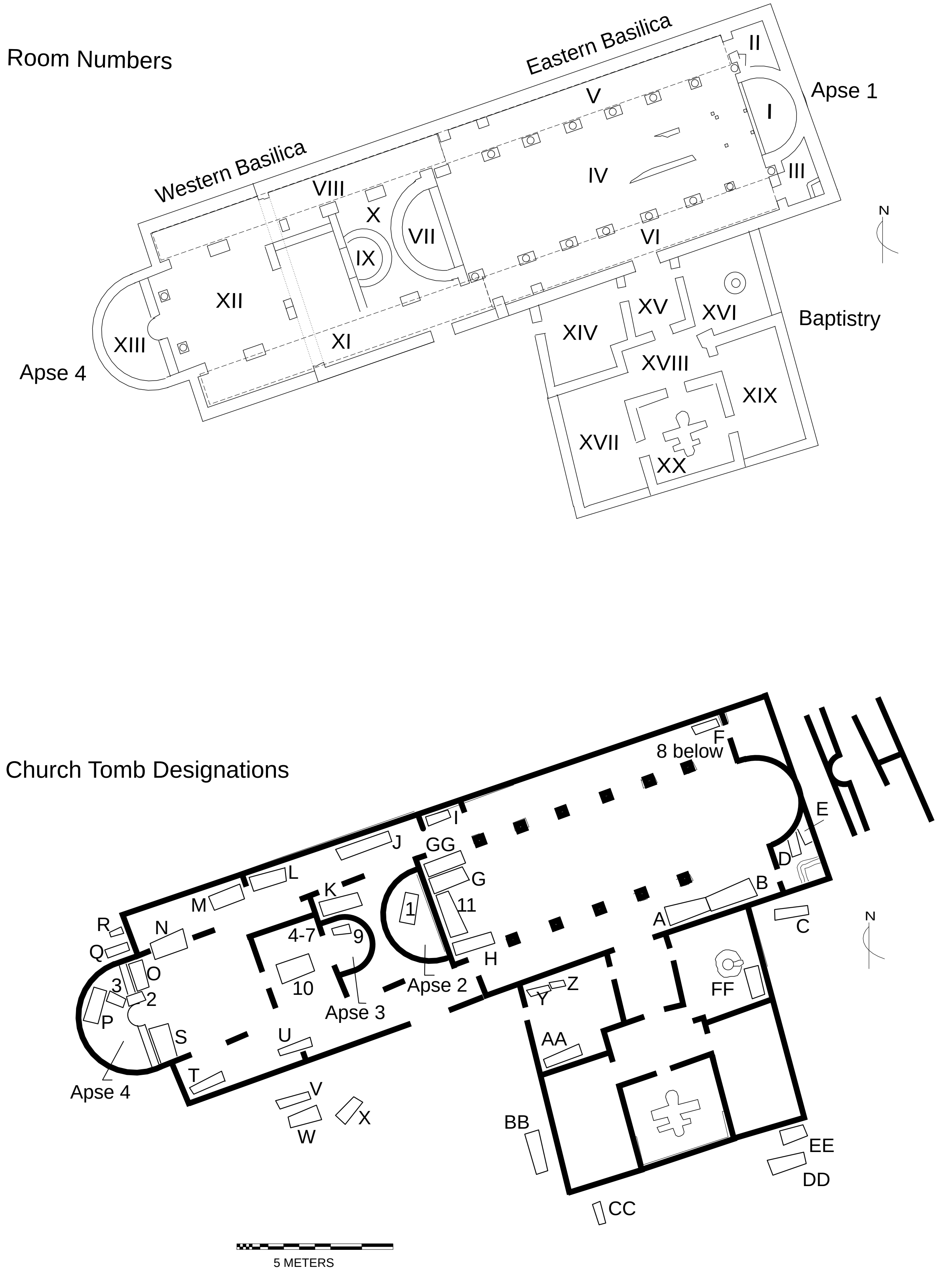


Fig. 2.8 — Plan of the Church (*Capela* / Complex B) with UL tomb designations. (Field drawings by H. Stow Chapman and crew members; digitized by S.J. Maloney and S. McNabb)

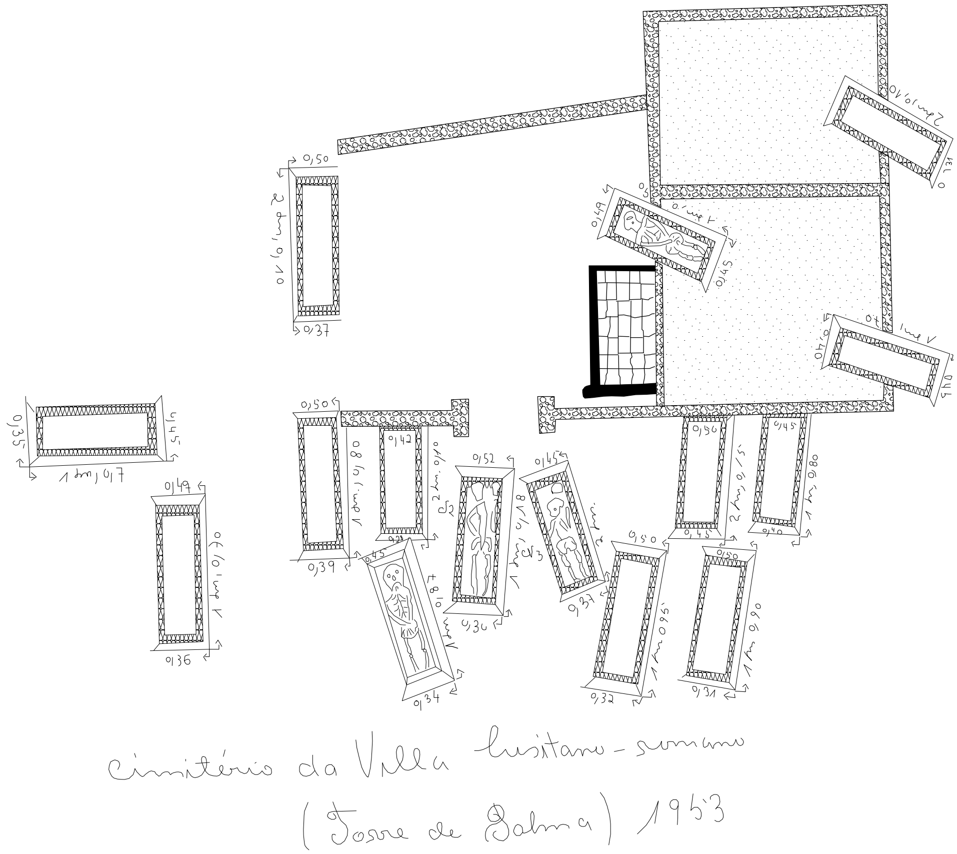


Fig. 2.9 — Plan of the *Cemitério da Villa Lusitano-Romana* (Southwest Cemetery / Complex D). (Original plan drawn by João Lino da Silva, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S.J. Maloney)

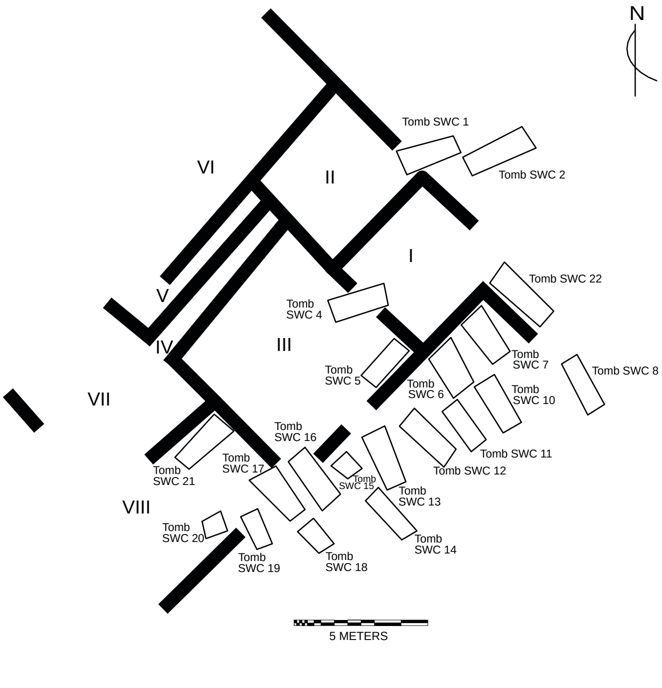


Fig. 2.10 — UL Plan of the Southwest Cemetery. (Field drawings by Christopher Miller and Carrie Boone; digitized by S. McNabb)

UL Tomb/MNA *Sepultura*	LC #	MNA #	N inds	UL Tomb Type	Associated Artifacts
Tomb SW 1	77	none	F	V stone kerbs	none
Tomb SW 2	76	none	F, a	V stone kerbs	none
Tomb SW 3	79	none	no bones	IV granite slab	none
Tomb SW 4/*Sepultura* 7	78	2005,24	M, j	VII unique	1 ceramic sherd, TP.25.85
Tomb SW 5	95	none	A	VII unique	1 ceramic sherd, TP.26.85
Tomb SW 6	84	none	no bones	IV granite slab	none
Tomb SW 7	81	none	F	V stone kerbs	none
Tomb SW 8	82	none	F, M, a	V stone kerbs	5 ceramic sherds, TP.29.85
SW 9 (not a tomb)	none	none	none	N/A	none
Tomb SW 10	83		M, a	IV granite slab	5 ceramic sherds, TP.30.85
Tomb SW 11	85		M	V stone kerbs	2 ceramic sherds, TP.31.85
Tomb SW 12/*Sepultura* 3	86	2005,239	F?, M	V stone kerbs	8.TP.85, one iron nail
Tomb SW 13/*Sepultura* 2	87	2005,238	F, M, a	VII unique	9.TP.85, 1 iron nail; 1 ceramic sherd, TP.24.85
Tomb SW 14/*Sepultura* 1	88	2005.237, 2005.358	A, a	V stone kerbs	none
Tomb SW 15	95	none	M	II brick box	3 ceramic sherds, TP.35.85
Tomb SW 16	89	none	no bones	IV granite slab	1 ceramic sherd, TP.35.85
Tomb SW 17	91	none	no bones	IV granite slab	none
Tomb SW 18	92	none	A	V stone kerbs	1 ceramic sherd, TP.37.85
Tomb SW 19	93	none	A	IV granite slab	none
Tomb SW 20	94	none	no bones	V stone kerbs	none
Tomb SW 21	99	none	no bones	unknown	1 complete bowl, TP.39.85; 2 ceramic sherds; 3 tile fragments
Tomb SW 22	80		F	no tomb evident	none
none/*Sepultura* A	116	2005,236	M,A,j	unknown	none
none/*Sepultura* B	117	none	F,c	unknown	1 coarse-temper thick-walled sherd (MNA)
none/*Sepultura* E	118	2005,241	M	unknown	none
none/*Sepultura* F	119	none	M?	unknown	2 sherds, coarse paste (MNA)
none/*Sepultura* M	120	none	F,M,c	unknown	none
none/'*Sep. imperceptível*'	121	none	A,j	unknown	none
Human remains whose original tomb association is uncertain					
TP.22.85	none	none	M	not a tomb	none

Table 2.4 — The Southwest Cemetery (*Cemitério da Villa Lusitano-Romana*), Complex D.

2.3.4. Formal Features of the Early Christian Tombs

Tomb Type and Location

Eighty percent of the early Christian tombs were assigned to six specific structural types by Hale (Hale, 1995).

The early Christian tombs were constructed above or just below ground level, as is natural in a site where the bedrock lies so near the surface. A few of the largest of the elevated tombs (e.g., Tomb P in the Western Basilica) approach the status of architectural features. Only a few of these tombs are free-standing; the majority of them were constructed with the sides supported by pre-existing walls of the basilicas, the baptistry, or the surrounding precinct wall (for those built above ground level) or by the surrounding earth (in the case of those dug down into the ground in the Church and in the two cemeteries). Many of these tombs were probably covered by flat stone lids, almost all of which were robbed in antiquity.

A ready source of building materials for these tombs was the Roman villa complex to the south. Favored materials include brick and tile, blocks and slabs of marble, granite, and schist (including lintels and thresholds), and broken sections of concrete floors and gutters. Tiles were especially popular in the construction of small tombs for infants. The following are John Hale's classification of tomb types.

I. Brick wall tombs. The sides of the tomb have been built up in courses of bricks or tiles, after the fashion of a free-standing wall. The fragments of ceramics associated with these tombs were insufficient to suggest a date.

II. Brick/tile box tombs. The sides are built of tiles set upright on edge. Associated ceramics suggest that the majority of these tombs were constructed in the 5^{th} century AD.

III. Stone block walls with a tile cap.

IV. Granite slab tombs. The sides, head, and foot are constructed of massive granite blocks: slabs, thresholds, and lintels removed from the Roman villa. These tombs were found inside the Church, its Baptistry, and in the two cemeteries. Associated ceramics suggest construction during the 6^{th} century AD.

V. Stone kerb tombs. The shallow grave is outlined with an irregular border of stones, which may include both dressed masonry blocks and undressed fieldstones. No definite dates can be assigned. This is the most common tomb type.

VI. Marble slab tombs. The sides of these tombs are formed of thin sheets of white marble veneer. This is the rarest type.

A few tombs featured unique combinations of materials and/or construction techniques (VII. Unique Construction). Others (VIII. Destroyed tombs) had been so altered by ancient looting, by excavation, or by taphonomic factors that their original construction types could not be determined. Toynbee (1971, p. 101-103) describes "boxes" for cremated remains constructed of large clay tiles (*tegulae*) and/or flat bricks or stone slabs, and she cites cprovincial" examples of these from Roman colonies of Trier and Bingen in Germany and Colchester in Britain. The cemeteries at Torre de Palma do include numerous tombs constructed of these materials (Hale types I, II, and III), but they typically contained inhumations, not cremations. Hale noted that one of the commonest types of Roman inhumation graves, with what he calls "'lean-to' lids, triangular in cross-section" do not appear at Torre de Palma; these correspond to Toynbee's "pairs of flat *tegulae* set gable-wise and generally with *imbrices* (curved and hollow roofing tiles) along the ridge" (1971, p. 101-102). Toynbee noted that some of these had covered wooden coffins. Iron nails in some of the cemetery tombs at Torre de Palma suggest coffined burials. Toynbee (1971, p. 102) describes another type of simple tomb as "inhumations in the bodies of huge amphoras cut in half and laid on their sides. One half served as a receptacle, sunk in the ground, for the corpse, the other as a barrel-vault-like covering projecting above the surface." These do not appear at Torre de Palma.

A third type of Roman inhumation tomb type, the sarcophagus, is represented only by an isolated granite sarcophagus lid lying to the southwest of Tomb F in the northeast corner of the Eastern Basilica. Langley observed in the course of her regional surveys (Langley, 2006) several carved stone receptacles that appear to be re-used sarcophagi employed as troughs for feeding and watering domestic animals at several modern farmsteads in the vicinity of Torre de Palma; this pattern of re-use may explain the absence of the body of this sarcophagus.

Tombs built solely of bricks (Hale Types I and II) are least common inside the church (3/27 tombs, 11.1%). They are most common in the Church precinct in or near the Baptistry, or outside the outer walls of the basilicas (10/16 tombs, 62.5%) (Appendix I, Section 4) and in the Northwest Cemetery (16/39 tombs, 41.0%). NW 6 and NW 34 are good examples of Hale Type I (Appendix I, Section 3), and NW 2 (Appendix I, Section 3) is a good example of Hale Type II. These two types together account for almost one-third of the tombs (30/100, 30.0%), with the second type twice as frequent as the first. One Type II tomb (SW 15, Appendix I, Section 5) also appeared just south of the southern wall of the Southwest Cemetery (5/18, 27.8%). The associated ceramic sherds found in the Southwest Cemetery tombs suggest that they are somewhat later (6th century) than the Northwest Cemetery tombs.

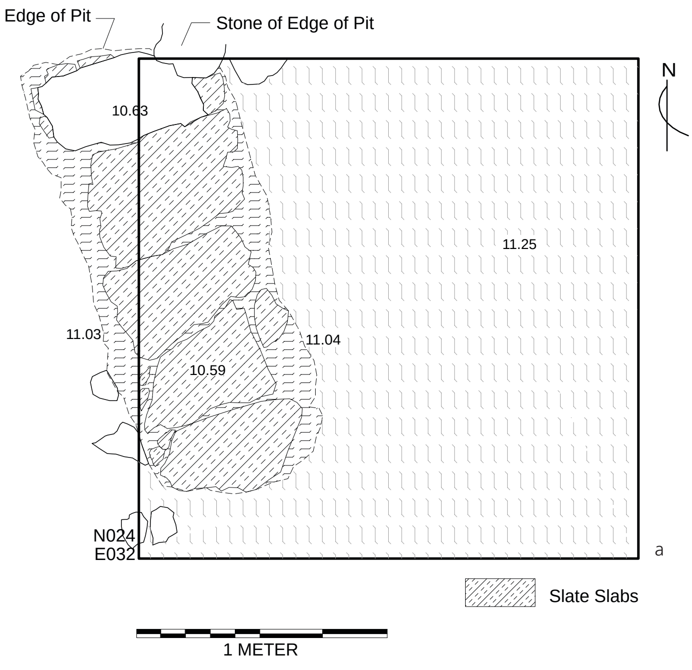
Tombs with stone block walls capped by tiles (Hale Tomb Type III) are uncommon: one each in the Church (1/27, 3.7%) and the Baptistry (1/16, 6.2%) and two in the Northwest Cemetery (2/39, 5.1%). The plan drawings of NW 11 and 12 illustrate this Hale Tomb Type (Appendix I, Section 3).

Tombs built with walls of massive granite slabs, thresholds, and lintels from the Roman villa (Hale Tomb Type IV) are most common in and around the basilicas (7/27, 26.0%), the highest-status place of burial for early Christians. The MNA field photograph and UL plan drawing of Tomb P (Appendix I, Section 4.1) illustrate Hale Type IV.

Shallow graves outlined by irregular borders of stones (both dressed masonry blocks and undressed fieldstones) characterize Hale Tomb Type V, which comprises one fifth (21/100, 21.9%) of all tombs with identifiable types of construction. They are most common both inside the church (7/2726.0%) and in the Southwest Cemetery (9/21, 42.9%) but are found also in low numbers in the Northwest Cemetery (3/39, 7.7%) and in the Church precinct (2/16, 12.5%). Tombs Y and Z in the Church precinct exemplify Hale Type V (Appendix I, Section 4.3).

Not surprisingly, the tombs constructed with the most expensive material, marble slabs (Hale Tomb Type VI), are the rarest type of all: one in the Church (1/27, 3.7%) and two in the Northwest Cemetery (2/39, 5.1%), one of them inside the mausoleum (Tomb 1e, Appendix I, Section 3).

Ten of the remaining tombs are of unique construction (Hale Tomb Type VII), being composites of the materials listed above; none of them consists only of bricks, and half of them occur in the Church complex. They probably postdate the simpler brick wall/box tombs. One of these unusual tombs, Tomb 11, was dug below the level of the floor of the nave of the larger (eastern) basilica just east of the raised floor of Apse 2, oriented north-south (fig. 2.11a; Appendix I, Section 4.2). It was covered with a slate slab and the walls were formed by the natural bedrock. The bottom of the tomb was formed of slate slabs laid over a drainage channel (25cm wide throughout, dug down the center of the grave pit



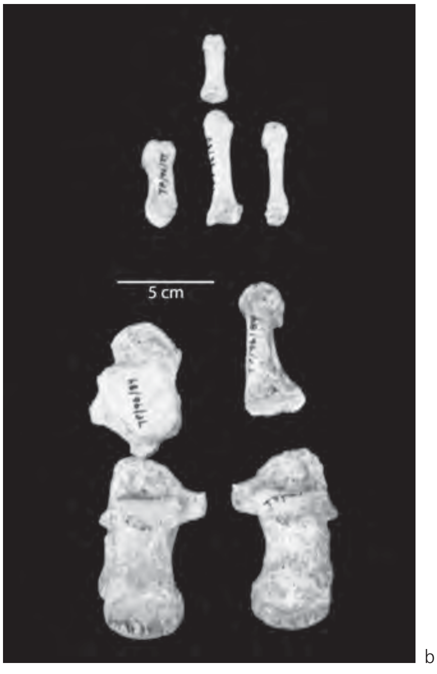


Fig. 2.11 — Tomb 11 in the Church, Hale Tomb Type III: a) excavated tomb (Plan by S. McNabb); b) hand and foot bones. (Photo by David Brangers)

and running approximately north-south) cut into the bedrock, running parallel to the east wall of Apse 2. Many large fragments of tiles were found in the fill. The human remains recovered from this tomb consisted solely of hand and foot bones from a large adult male (fig. 2.11b); he was promptly dubbed 'St. Achilles' by the American excavators. A radiocarbon date obtained from a phalanx places his death sometime between 620 and 670 AD (2 sigma calibration). The location and construction of his tomb suggests that he was a prominent figure in the church, and his tomb may have become a focus of pilgrimage.

The Northwest Cemetery demonstrates the greatest variety of tomb construction, all eight of Hale's types being represented, and the Southwest Cemetery displays the least variety, containing only Hale Types II, IV, V, and VII. Hale classified 12 tombs, all in the Northwest Cemetery, as "destroyed" (Type VIII) during the earlier MNAE excavations. To this number we should add the three large above-ground tombs constructed in the Middle Ages that were dismantled by MNAE archaeologists, according to Hale's interviews with several workmen from those excavations.

Single vs. Multiple Occupancy in Tombs

Some of the simple tombs that Toynbee describes were designed to hold more than one inhumation, as indicated by their large size and/or internal divisions. Almost without exception, the early Christian tombs at Torre de Palma take the form of rectangular boxes of a size to accommodate one extended adult corpse. However, over half (49/87, 56.3%) of the tombs that yielded human remains at Palma contained more than one individual: in the Northwest Cemetery (Complex A; 15/23, 65.2%); the Church complex (Complex B;

22/43, 51.2%); and the Southwest Cemetery (Complex D; 12/21, 57.1%). Only in the *Cemitério do Pombal* was this proportion reversed: 3 of the 5 (60.0%) graves contained only one individual.

Many of the multiple-occupant tombs in the Church and its two associated cemeteries contained the incomplete remains of five or six individuals, and the largest of them (Tomb V/*Sepultura* 3-A) housed seven. The ratio of relatively complete to incomplete individuals in these tombs suggests that their high occupancy resulted from sequential re-use of these tombs (probably for related individuals), not from multiple simultaneous interments. The drawings of the individual tombs on the MNAE plans of these cemeteries confirm this hypothesis, as they often show one articulated skeleton surrounded by neatly stacked skulls and long bones, presumably from earlier interments. In the Church complex, the same pattern holds true: the plan drawings show the same pattern of one articulated skeleton (presumably the last addition to the tomb) accompanied by stacks of disarticulated bones. For example, *Sepultura* I (Tomb K) on fig. 2.6, located on the north side of Apse 3 of the Church, is depicted as containing one complete skeleton extended with its head to the west, and a cluster of three additional skulls placed neatly at its feet in the eastern end (fig. 2.12a). MNA photograph 041 shows Tomb 1-A (*Sepultura* X), discovered just south of the Western Basilica, with multiple individuals and a *terra sigillata* vessel (fig. 2.12b).

The reutilization of tombs for subsequent interments is seen at many Portuguese necropoli of this period. At Alpendre dos Lagares (Serpa), only one of the seven tombs contained multiple individuals (Cunha, 2001), but at Silveirona, a small early Christian/Visigothic necropolis (6th-7th centuries AD) excavated in 1936 near Estremoz, not far to the south of Palma, 31% (10/32) of the tombs contained the remains of more than one individual (Lopes and Cunha, 2000), and Soares, Santos, and Umbellino (1997) reported that two-thirds of

a

b

Fig. 2.12 — Multiple individuals in a single tomb. a) Tomb K / *Sepultura* I, the Church (Photo MNA 233); b) Tomb X / *Sepultura* 1-A, containing multiple individuals and a *terra sigillata* vessel. (Photo MNA 041)

the tombs in the early Christian necropolis at Assento do Chico Roupa contained multiple individuals. Support for the hypothesis that the multiple occupants of at least some of the tombs at Torre de Palma were biologically related is offered by the presence of a rare epigenetic skeletal trait (internal division of the foramen on the lateral aspect of the mandible, near the chin) in four of the five individuals from one of the tombs in the Church complex, MNA *Capela Sepultura* 3A (LC 72); this trait appears in no other individuals at the site.

Tomb Orientation

The orientation of the early Christian tombs in the Church/Baptistry (Complex B) is predominantly east-west, following the long axis of the Church. The head was placed at the western end of the tomb so that on Judgement Day the risen corpse would be facing the sunrise, the altar at the eastern end of the Church, and the Holy City of Jerusalem. However, nine of the 41 tombs in the Church are oriented northwest-southeast: three tombs in the Eastern Basilica (Tombs D, E, and Tomb 11); three tombs in the Baptistry (Tombs FF, BB, and CC); and 3 tombs in the Western Basilica: (Tombs O, P, and S). Six of these tombs were constructed immediately adjacent to the interior room walls of the Church: Tombs D and E in Room III of the Eastern Basilica, Tomb FF in the southeastern corner of Room XVI in the Baptistry, Tombs O and S against the north-south wall separating Room XII from Apse 4 (Room XIII) in the Western Basilica, and Tomb P against the western curved wall of Room XIII. Tombs BB and CC are located just outside the southwestern corner of the Baptistry, about one meter away from the walls, and Tomb 11 is a subfloor tomb immediately east of the north-south wall that separates Apse 2 from the nave of the Eastern Basilica (Room IV). Tomb N-1, north of the Eastern Basilica, is also oriented north-south, but as it is probably a pagan Roman tomb, that orientation is not unusual.

In the Northwest Cemetery (Complex A), all but four of the 39 tombs excavated by MNAE and/or the American excavations are oriented east-west or southwest-northeast, with the corpse's head placed at the western end, as in the Church complex. Tombs NW 1-a, NW 10, NW 7, and NW 8 (Table 2.2) are oriented north-south. There is no apparent patterned difference between these four east-west oriented tombs and the other 35 from this cemetery regarding tomb form, number of occupants, demography, or associated artifacts. Two additional tombs (LC 96 and 97), about which almost nothing is known except their location and orientation (northwest-southeast), do not appear on either group's plans. It is possible that they correspond to the MNAE sets of human remains labeled "Tomb 26" and "Tomb 28."

In the Southwest Cemetery (Complex D), on the other hand, the reverse pattern appears: all but four of the 21 identified tombs are oriented northwest-southeast, following the slope of the land or the nearest building wall. There is no apparent patterned difference between these six northwest-southeast oriented tombs and the other 19 from this cemetery with regard to tomb form (Table 2.5): three of the six are constructed with stone kerbs (the most common tomb type in this cemetery). Nor does this subset of tombs differ by number of occupants: two had no bones, two have a single occupant, and the other two have two occupants each (an adult female and an adolescent, and an adult male and a juvenile). Three of the four yielded no associated artifacts. One sherd was recovered from the fourth tomb.

Location	Tomb Types							
	I	II	III	IV	V	VI	VII	VIII
Northwest cemetery	NW 1a	NW 2	NW 12	NW 3	NW 7	NW 1e		NW 1b,c, d
	NW 6	NW 5	NW 18	NW 4	NW 9	NW 27		NW 20
	NW 8	NW 10	NW 11	NW 15	NW 19			NW 22
	NW 21	NW 13		NW 18				NW 24
	NW 14							NW 25
	NW 16							NW 28
	NW 17							NW 30
	NW 23							NW 31
	NW 26							NW 32
	NW 29							NW 33
	NW 34							NW 36
	NW 35							
The church	Tomb AA	Tomb D	Tomb N-1	Tomb A	Tomb I	Tomb U	Tomb FF	
	Tomb BB	Tomb E		Tomb B	Tomb J (east)		Tomb GG	
	Tomb DD	Tomb 8		Tomb N	Tomb J (west)		Tomb M	
	Tomb EE	Tomb R		Tomb O	Tomb K		Tomb 11	
	Tomb W	Tomb V		Tomb P	Tomb T		Tomb C	
		Tomb CC		Tomb S	Tomb Z		Tomb G	
		Tomb Q		Tomb L	Tomb Y			
				Tomb X				
Southwest cemetery		SW15		SW 10	SW 2		SW 4	
				SW 16	SW 7		SW 5	
				SW 17	SW 8		SW 13	
				SW 19	SW 11			
				SW 6	SW 12			
					SW 14			
					SW 18			
					SW 20			
					SW 1			

Table 2.5 — Hale Tomb Types, by Location.

Muslim burials have been identified within in the early Christian basilica at Mértola, with the bodies placed in a flexed position on their left sides facing eastwards towards Mecca (Torres and Santiago, 1993). However, no evidence exists of any actual Muslim occupation at Palma, so it seems unlikely that any of the tombs represent Islamic interments during the 8th-12th centuries. We have not attempted a detailed analysis of burial orientation, because mapping procedures are not well-documented for the early excavations.

Associated Artifacts

In keeping with Christian burial practice, almost all the artifacts recovered from the early Christian burials (except for ceramic sherds) were items of personal adornment (Table 2.6). Bronze earrings, bronze and iron belt buckles, and pins, all designated as "Visigothic" in style, were recovered from four tombs. Because all the tombs contained multiple individuals, it is not possible to say with certainty which individuals had originally been interred with these ornaments. Seven skeletal individuals show green stains

UL Tomb/MNA *Sepultura* #	MNA #	N inds	Associated Artifacts
Iron age tombs			
none	2000.405.7	c	cremation urn 5152
Pagan roman tombs			
none	none	i	cremation urn TP.66.95
Northwest cemetery			
NW 2/*Sepultura* 9	2005,215	2F, M, i	1.TP.85, iron belt buckle; TP.40.85, 4 sherds
NW 9/*Sepultura* 2	2005,208	2F, M	[green stain on adult proximal carpal phalanx]
NW 10/*Sepultura* 4	2005,21	F?, M	2.TP.85, Bronze belt buckle; TP.5.85, 1 sherd
NW 11/*Sepultura* 7	2005,213	F, 2M	TP.06.85, 11 ceramic sherds
NW 12/*Sepultura* 8	2005,214	F, M, a, 2j, c	TP.41.85, 7 sherds
NW 13	2005,241	F, M, c	TP.07.85, 6 sherds
NW 15	none	A	TP.8.85, 1 sherd
NW 16	none	M, A, i	TP.42.85, 1 sherd
NW 17	none	M	TP.9.85, 10 sherds, brick fragment
NW 18/*Sepultura* 11	2005,217	M, j	3.TP.85, a pair of bronze earrings; TP.10.85, 3 sherds, [green stain on R. mastoid]
NW 19/*Sepultura* 27	none	M	4.TP.85, 5 iron nails; 7 or 8 vessels
NW 21	none	M	5.TP.85, iron nail; TP.13.85, 1 sherd
NW 23	none	no bones	TP.14.85, 17 sherds [parts of 1 amphora]
NW 29	none	no bones	TP.16.85, 5 sherds
NW 33	none	no bones	TP.17.85, 23 pottery fragments
NW 34	none	2F, 2M, c, j	6.TP.85, bronze earring near skull 5, [green stain on fibula shaft]
NW 36	none	F, M, a	7.TP.85, iron nail
None/*Sepultura 26*	2005,244	M	[green stain on humerus], vessel at right hip?
The church & baptistry			
X/Sepultura 1A		F, 2M, adol.	ceramic pitcher with handle
11	none	M	iron lock mechanism 55.TP.84
Southwest cemetery			
SW 2	none		[green stain on right mandible of adult]
SW 4/*Sepultura* 7	2005,24	M, j	1 ceramic sherd, TP.25.85
SW 5	none	A	1 ceramic sherd, TP.26.85
SW 8	none	F, M, a	5 ceramic sherds, TP.29.85
SW 10		M, a	5 ceramic sherds, TP.30.85
SW 11		M	2 ceramic sherds, TP.31.85
SW 12/*Sepultura* 3	2005,239	F?, M	8.TP.85, one iron nail
SW 13/*Sepultura* 2	2005,238	F, M, a	9.TP.85, 1 iron nail; 1 ceramic sherd, TP.24.85
SW 15	none	M	3 ceramic sherds, TP.35.85
SW 16	none	no bones	1 ceramic sherd, TP.35.85
SW 18	none	A	1 ceramic sherd, TP.37.85
SW 21	none	no bones	1 complete bowl, TP.39.85; 2 ceramic sherds; 3 tile fragments
none/*Sepultura* B	none	F,c	1 coarse-temper thick-walled sherd
none/*Sepultura* F	none	M?	2 sherds, coarse paste
none/*Sepultura* M	none	F, M, c	[green stain on adult left radius]
The medieval chapel			
9	none	i, i	1 medieval coin (ceitis) dated 1438–1557
10	none	c	1 medieval coin (ceitis) dated 1438–1557
TP.82.84, TP.123.84	none	several i	5 Medieval coins dated 1222–1481 in grave fill
TP 113.84, TP.13.98	none	3A, 2i, c, adol	[green stains on adult frontal, 2 carpal phalanges]
Pombal cemetery			
none/Tomb 1	none	F, M	Visigothic ceramic vessel

Table 2.6 — Tombs with Associated Artifacts.

on cranial, arm, or hand bones, indicating *in situ* contact with copper or bronze objects, probably ornaments or coins. In six of the seven cases, no metal objects were cataloged at MNA in association with the burials, so the items may have been looted in antiquity.

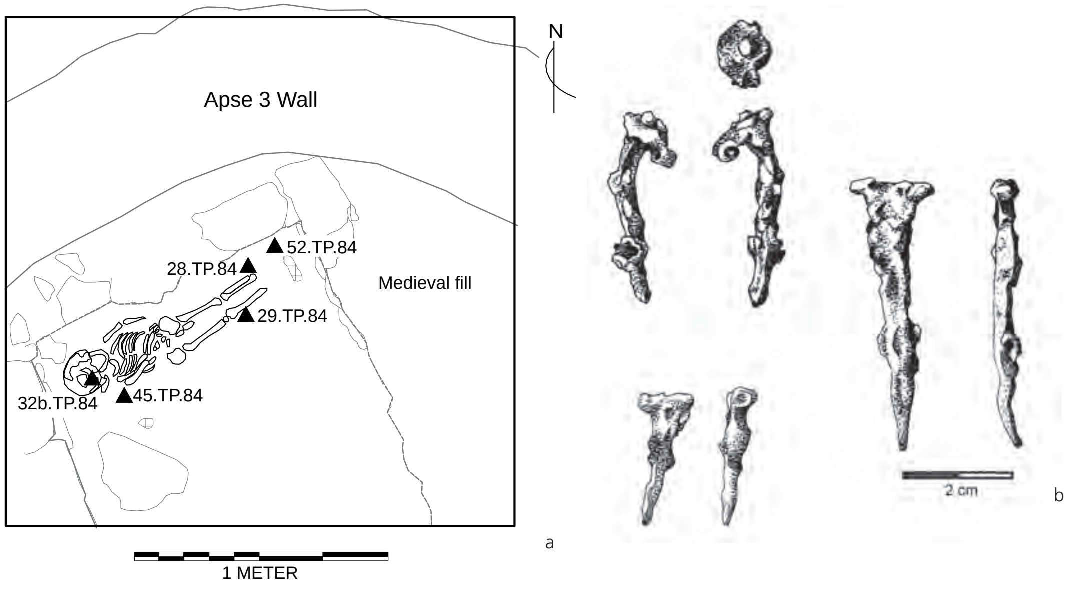


Fig. 2.13 — Tomb 9: a) plan of the nails in proximity to the tomb (Field drawing by Victoria Robinette; digitized by S. McNabb); b) Iron nails drawings (29.TP.84; 28.TP.84; 32.TP.84) (Mary T. Walters).

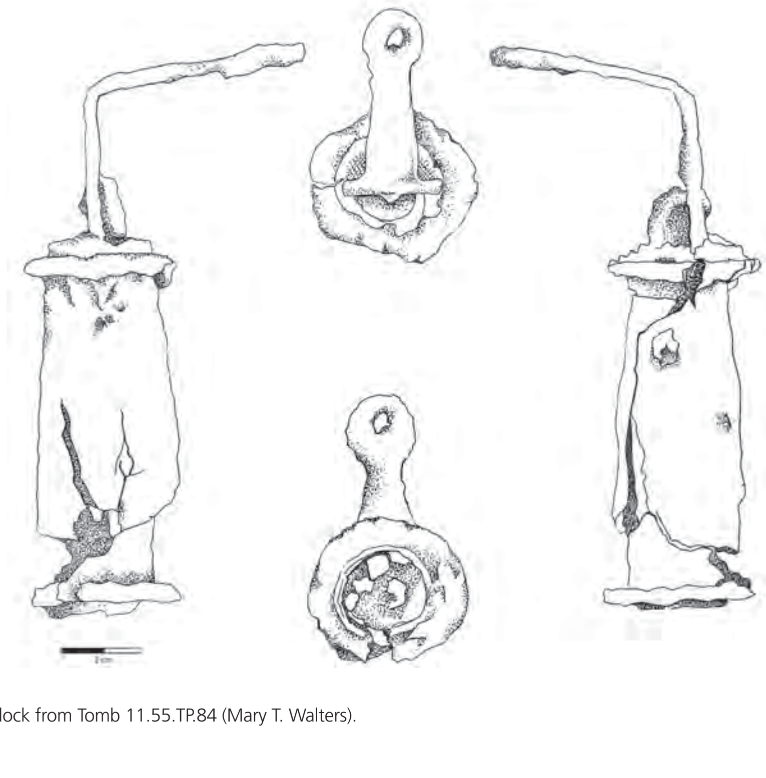


Fig. 2.14 — Iron lock from Tomb 11.55.TP.84 (Mary T. Walters).

The presence of iron nails in six of the tombs, three of them with multiple occupants, suggest that in each of the six, at least one of the bodies had been inhumed in a wooden coffin (cf. Toynbee, 1971, p. 102). This is clearest in Tomb 9 in the Medieval Chapel which contained five nails (fig. 2.13, a.b.c) distributed around the skeleton in a pattern, suggesting that the child's body may have been enclosed in a wooden coffin.

Regarding the iron lock found in Tomb 11 (fig. 2.14), it is unclear why such an item (stylistically dated to the 1st-2nd century AD) should have been included in the tomb. It seems too large to have belonged to a wooden container of the right size to contain the small deposit of hand and foot bones recovered from the tomb.

Complete ceramic vessels were recovered by MNAE archaeologists from at least two tombs: *Sepultura* 1-A (LC 74) just south of the south wall of the Western Basilica yielded a fine jug with a curved handle (MNA photo 41) (Appendix I, Section 4.3) and Tomb 27 in the Northwest Cemetery contained 7 or 8 vessels (2005.424). Both of these tombs are substantial with kerbs constructed of large, squared stone blocks. The presence of finely powdered ceramic dust in the exposed trabecular of the proximal right femur of the adult male in Tomb 26 in that same Cemetery suggests that this individual had been buried with a ceramic vessel pressed against his right hip; there is also a green stain at midshaft on his right humerus, suggesting the presence of a copper or bronze armlet.

The sherds recovered from numerous tombs in the Northwest and Southwest Cemeteries represent a wide range of ceramic pastes and vessel types. It seems likely that any whole vessels placed in these tombs would have been removed either in antiquity by grave robbers or in the mid-20th century by MNAE archaeologists, so some of these sherds may represent either the remains of large vessels that marked simple tombs (e.g., multiple fragments of an amphora, including the base, found in Tomb NW 23, a Type II brick box tomb; Table 2.2) or of vessels used in ritual meals honoring the memory of the dead. They are not exclusive to one sex or the other, nor to any particular age group or tomb type; however, they are absent from tombs within or around the Church.

Age and Sex Profile of the Burial Sample, by Location

There is no evidence of segregation of adult burials by sex in any of the three early Christian Church, Northwest and Southwest Cemeteries and Visigothic (the *Pombal* Cemetery) mortuary areas. Subadults are also buried throughout all three areas (Tables 2.2, 2.3, 2.4, and 2.7). This relatively heterogenous pattern contrasts markedly with the unique location of the very youngest members of the population in the preceding pagan Roman era, buried beneath the floors of domestic rooms in the villa (Table 2.1). An even sharper contrast is the high proportion of very young subadults buried within the spatially restricted area beneath the raised floor of the medieval *Capela de São Domingos* (Table 2.8). Within this small area excavated by the UL archaeologists within Apse 3 and the adjacent portion of Room XII in the Western Basilica were discovered a dense concentration of the remains of infants and very young children (neonates–2 years), comprising more than half (18/30, 60.0%) of the total number in this age category at Torre de Palma. Most of these remains were fragmentary, incomplete, and commingled, apparently placed directly in the ground with no traces of constructed tombs.

Sepultura	N Inds*	MNA catalog #	Artifacts
1	F, M	none	Visigothic ceramic jug
2	F, M, A, A, A, j	none	
3	M	2007.66, 2007.67	
4	A, adolescent	2007.67	
5		none	
6			
7	adolescent	2007.68	
8		none	
9		none	
10		none	
11		none	
12		none	
13		none	
14		none	
15		none	
16		none	

*Based on the skeletal inventory of human remains labeled for these numbered *sepulturas*.

Table 2.7 — *Cemitério do Pombal*.

UL Tomb #	LC #	N inds	Associated Artifacts
2	110	M	none
4	115a	i	none
5	115b	i	none
6	115c	i	none
7	115d	i	none
9	114	i	coin (ceitis)
10	113	c	coin (ceitis)
Human remains whose original tomb association is uncertain			
TP.6.83	122	A	none
TP.9.83	123	A, i, c	none
TP.113.84, TP.13.98	none	F, M, A, 3i, c, a	none
TP.74.84	none	2i, c, a	none
TP.82.84	none	i	none
TP.116.84	none	i	none
TP.123.84	none	3i, A	none
Sq. N023E024, Sec. B	none	A, c	none
Sq. N023E024, Sec. A	none	i, c	none
Contentor 4767, v.2	none	j	none
Contentor 4769, v.2	none	F	none

Table 2.8 — The Medieval Tombs in the *Ermida de São Domingos* (Complex B).

Ossuaries at Palma: Ancient or Modern?

The tradition of gathering bones from individual tombs for collective curation in a consecrated religious location was widespread in Portugal (as elsewhere in Europe) during the early Christian and Medieval eras. Four elaborately decorated bone chapels exist today near Torre de Palma. The *Capela dos Ossos* in the church of São Francisco at Évora displays the remains of some 5,000 Franciscan monks; several hundred crania, femora, and other bones are arranged in marvelous decorative patterns

(Quigley, 2001, p. 171-172; Louro, 1992). The *Capela* covers an area 21 m², with an altar at the south end. Inscribed on the wall above the altar are these words (formed by carefully arranged bones):

"Nós ossos que aqui es-
tamos pelos vossos esperamos"
(We bones who are here
await the arrival of yours)

Fig. 2.15 — The bone chapel at Santa Maria da Graça, Monforte. (Photo by Della Collins Cook)

This inscription also appears on the wall of the smaller bone chapel at Elvas, attached to the Igreja de Nossa Senhora-das Dolores. It was built in 1770, and the skulls were removed to an unknown location in 1883 (Quigley, 2001). A similar bone chapel is found at Campo Maior. The smallest of the four is the tiny one attached to the front of the parish church of Santa Maria da Graça in Monforte (fig. 2.15), some 5km from Torre de Palma. Measuring only 2.25m long, 1.9m wide, and 3m deep, with a masonry altar on the rear wall, it is probably contemporaneous with the bone chapel at Elvas and may have been built when the Monforte church's chancel vaulting was replaced.

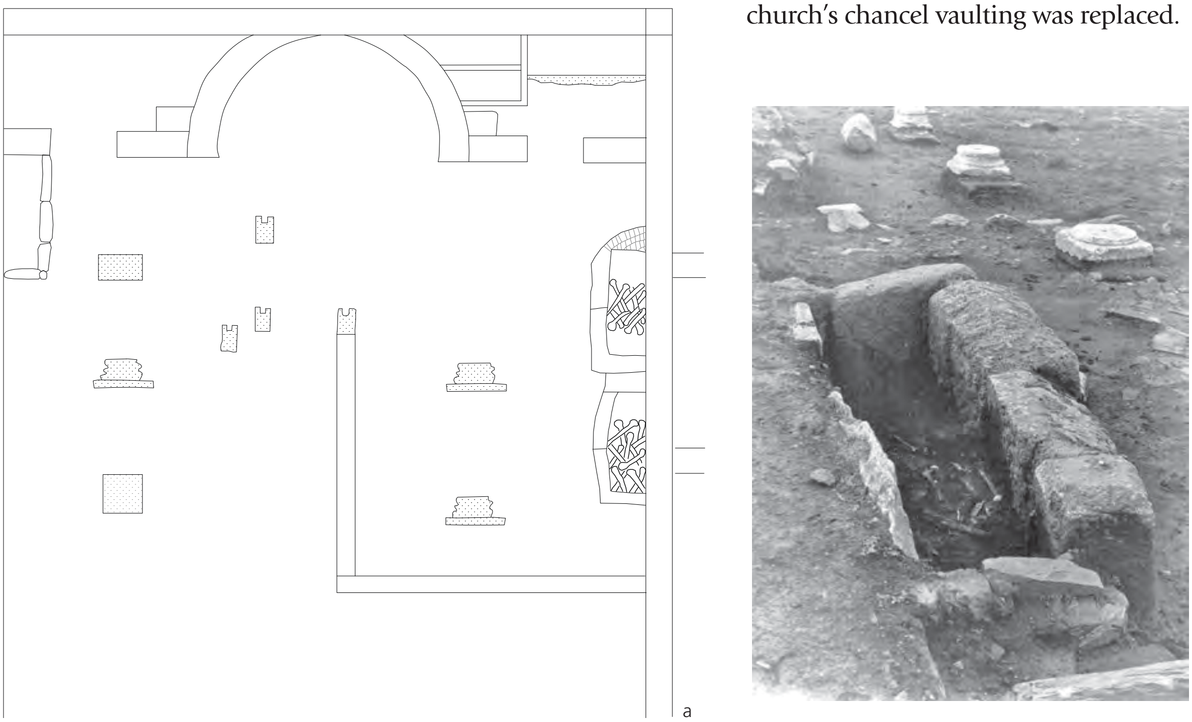


Fig. 2.16 — a) ossuary tombs in the *Capela* (original plan by João Lino da Silva, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S. McNabb); b) western tomb of this pair, showing disarticulated bones on the floor. (MNA photo 203)

At Palma, some of the large stone-block tombs built against the inner side of one wall of the Church contained no articulated skeletons but only the commingled remains of numerous individuals. Two adjacent large granite slab tombs (UL Tombs A and B) constructed against the south wall of the Eastern Basilica were depicted on MNA plan 9 as filled with disarticulated bones (fig. 2.16a). A photograph taken during the excavation of these two tombs clearly shows these commingled remains on the bottom of the westernmost of the tombs (fig. 2.16b). Another smaller tomb, Tomb U constructed near the south wall of the Western Basilica, was drawn on MNAE plan 7 as containing commingled remains.

The Large Reburial (TP.119.84)

In 1984, a test pit dug by the American archaeologists (Sq. N020E027) around a pier base on the south side of the Church between Apse 2 and Apse 3 revealed a large mass of commingled human remains (LC 53) deposited in a pit with no evidence of a constructed tomb. Hale had obtained a great deal of useful information about the field methods and extent of excavations made by the MNA archaeologists through interviews with a member of Heleno's original excavation crew, Antonio Peixe. Hale asked Peixe if he recalled anything that might explain this unusual burial. Peixe replied that "these were human bones that Heleno did not take back to the museum in Lisbon. But they were the bones of Christians, and so we buried them again in holy ground just outside the wall of the *Capela*."

Powell's examination of these remains indicated that none of the crania were intact, unlike most adult crania curated in the MNA "*Capela*" series. Given the high value placed upon complete skulls by archaeologists and physical anthropologists of the mid-20th century for purposes of racial/ethnic group identification, Powell and Hale hypothesized that these particular individuals were not deemed to have sufficient scientific worth to merit transportation to MNA.

The remains represented 19 incomplete individuals of both sexes and all ages. But where were their original burial locations? In the list of tombs identified in the Northwest Cemetery by the MNAE excavators, there is an unexplained gap: numbers 11 through 24 and number 26 are missing from the sequence. It seems possible that at least some of these 19 individuals may have been originally buried in these missing tombs. Another possibility is that some of the bones came from the two large ossuary tombs in the Eastern Basilica of the Church, described above.

The Small Reburial (TP.21.85)

During the following field season, the American excavators discovered another mass of commingled and fragmentary human bones in a pit undistinguished by any signs of a formal tomb near the southeastern corner of the Mausoleum in the Northwest Cemetery (Complex A). These bones represented the incomplete remains of at least 9 individuals, 7 adults and 2 subadults. Sr. Peixe could not contribute any information about the possible origin of these remains, but in the absence of any associated recognizable mortuary structure, it seems likely that this deposit also represents human remains left at the site at the order of Heleno and subsequently reburied by his workmen. There are 15 tomb numbers missing from the MNAE sequence of tombs identified in the *Cemitério ao pé das Ermidas* (Complex A): Tombs 1-11 and 25, 26, and 28 are represented by human skeletal remains but numbers 12-24 and 27 are missing. It seems possible that the commingled remains in this feature may have come from these "missing" tombs.

Summary

In some respects, the early Christian and medieval mortuary programs at Torre de Palma are remarkably egalitarian: individuals of all ages and both sexes are buried seemingly at random in all three Complexes. However, the tombs located inside the Church/Baptistry precinct (Complex B) almost without exception show more elaborate construction methods and materials (notably, worked stones such as lintels taken from the nearby abandoned villa) than do the majority of tombs from the two cemeteries, not surprising considering that burial inside the Church was probably accorded to individuals holding the highest social status in this community. In the Northwest Cemetery, the simplest tomb types (I, brick walls, and II, brick boxes) predominate and these, in turn, differ significantly from the more substantial tombs in the Southwest Cemetery, many of which include granite slabs (Type IV) or at least rough stone kerbs (Type V). In the Northwest Cemetery, the associated ceramic sherds suggest a 5th century AD date, while in the Southwest Cemetery ceramic evidence argues for a somewhat later period of peak construction, during the following century. At least some of the large above-ground tombs in the Church (Complex B) probably date from this period. It is unfortunate (though not unexpected) that so many of the tombs were robbed in antiquity of both construction elements (e.g., stone slab lids, and possibly sarcophagi) and ornaments deposited with the dead. However, the materials that have survived the centuries show us that Torre de Palma was well connected with the larger world of the Western Roman Empire and its medieval successors, in both the spiritual and the secular realms.

2.4. The *Cemitério do Pombal*

The earliest published reference to the Pombal site appeared in the *Memórias Paroquiais* (Soares et al., 1758), the nation-wide survey conducted after the disastrous earthquake in Lisbon in 1755. It mentioned tombs covered with large stones ("*tombs, cobertas com pedras grandes …*") containing human bones and "brass" artifacts. Almost two centuries later, Leite de Vasconcelos (1927–1929, p. 200) noted the presence of "*… otras tombas, com garrafinhas de vinho (isto é, ungentários, como parece)*" near the *Herdade de Torre de Palma*. Excavations at the Monte de Pombal site were carried out between 1952 and 1954 at the orders of Heleno, under the direction of J. Lino da Silva (Silva, 1953; Boaventura, 2001). In mid-October of 1953 J. Lino da Silva and his men were concurrently excavating in three spatially distinct areas: Southwest Cemetery (Complex D, the *Cemitério da Villa Lusitano-Romano*) and the Garden Quarter (Complex F) at Torre de Palma, the site of Cabeço de Vaiamonte, and the *Cemitério do Pombal* (Pombal 1). The Pombal cemetery is located some 500m from the

Church and 600m from the Roman-era villa (Boaventura and Banha, 2006). It was dug in one season and all the recovered bones and artifacts were shipped to the MNAE in Lisbon. Heleno considered it to be a "*Visigótico*" cemetery constructed on top of a much earlier Chalcolithic site, based on his interpretation of the ceramic and metal artifacts in the graves and the numerous stone tools that he characterized as "*Eneoliticos.*"

The excavation of multiple areas in these three nearby areas at the same time led to mislabeling of some human remains and, perhaps, artifacts from the *Cemitério do Pombal* upon their arrival at the MNAE when each of the containers from the field was catalogued and stored away. Five containers (*contentores*) numbered 4769–4773, were specifically labeled as containing materials excavated from numbered tombs at the *Cemitério do Pombal*. Several more containers were listed from specific graves excavated by J. Lino da Silva's team during this field season, but there was no indication of which cemetery was represented. Still others were listed as "s/ind." or "*sem indicio,*" i.e., of unknown provenience.

In 2006, a plan drawn by J. Lino da Silva during the 1953 field season at Pombal was discovered at the MNA (fig. 2.17), along with the notes and letters written by J. Lino da Silva to M. Heleno during the years 1951–1954. This plan is double-sided with the site plan of the *Cemitério do Pombal* drawn on one side and that of Cabeço de Vaiamonte on the other. There was no indication if the two plans were drawn at the same time. The notes describe in detail where and when excavations in and around the Torre de Palma site took place, as well as what was found in each of the excavated areas. Before the discovery of these documents, only one Roman artifact (Boaventura and Banha, 2006) and a few Chalcolithic stone artifacts (Boaventura, 2001) had been labeled as coming from Pombal. J. Lino da Silva did not describe any tomb architecture in his notes, but he drew the tombs

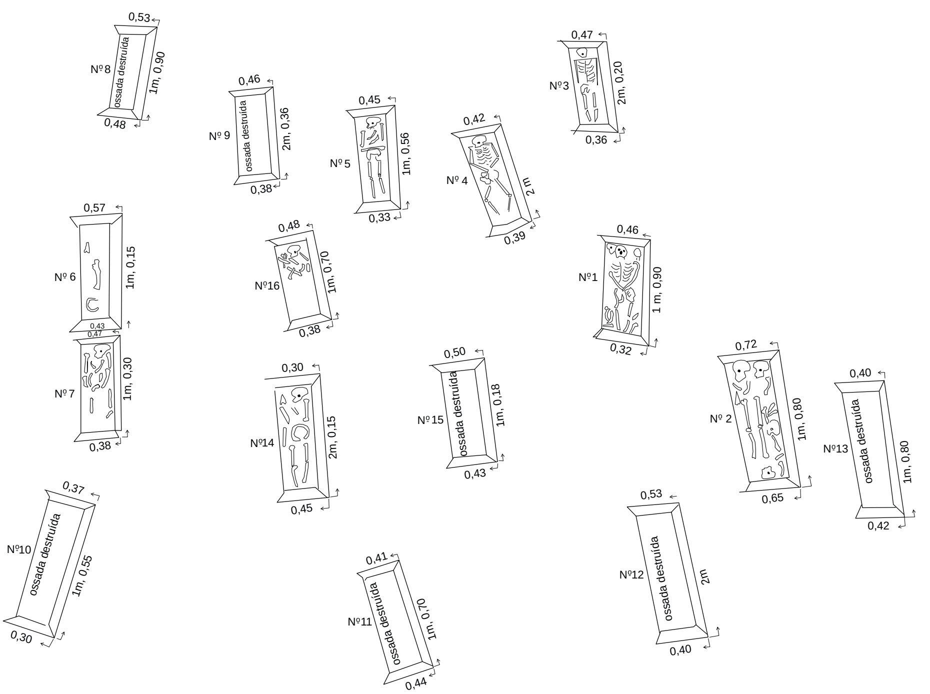


Fig. 2.17 — Plan of the *Cemitério do Pombal.* (Original plan by João Lino da Silva, Arquivo Manuel Heleno, Biblioteca, Museu Nacional de Arqueologia; digitized by S.J. Maloney)

as rectangles, similar to those that he drew on the plan showing tombs in the *Capela*. A recent study of the pre-Roman artifacts from the site turned up several fragments of Roman construction material, and these may indicate that some tomb structures had, in fact, existed (Fabião et al., 2008); taken with the reference to tombs covered with stones in the 1758 report and with the observations of Leite de Vasconcelos, it seems reasonable to assume that the Pombal tombs, even those without bones, were identifiable by their regular construction.

In J. Lino da Silva's notes, each of the Pombal graves is labeled with an identifying number and dimensions. However, the grave numbers on the map do not correspond readily to the order of graves as described by J. Lino da Silva or to the numbers given to the graves when they reached the museum in 1953. Bones and artifacts were sketched in as they appeared *in situ* in the graves; while there is no reason to doubt that the number and placement of bones are representative of the number and orientation of the individuals in each grave, there are many more artifacts described in J. Lino da Silva's notes than are indicated on his plan.

According to J. Lino da Silva's plan, there were 12 individuals represented by skeletal remains in eight of the 16 graves excavated under his direction at the *Cemitério do Pombal*. Two of the graves clearly contained more than one individual: Tomb 1 contained one complete articulated individual with a second cranium lying at the west end of the grave, and Tomb 2 contained 4 crania and a number of disarticulated long bones. Six additional graves (3, 4, 5, 7, 14, and 16) each were depicted as containing the bones of one individual, and the remaining eight graves are labeled on the map "*ossada destruida*" (bones destroyed). Other Visigothic cemeteries have yielded similar mortuary patterns, including a mixture of single- and multiple-occupant tombs, some with no bones present (e.g., the Visigothic necropolis at Poço do Mouros (Silves) (Gomes, 2001) and Padrão (Raposeira, Vila do Bispo) (Gomes and Paulo, 2011).

In 2007, Abby Crawford and Karimah Richardson, two students in Langley's summer Bioarchaeological Laboratory Course at MNA, examined and accessioned the bones in the five containers labeled as coming from graves in the *Cemitério do Pombal*; their work contributed substantially to the following description of this mortuary assemblage. Table 2.7 compares the number of individuals in each grave as drawn on J. Lino da Silva's map and the number of individuals represented by remains. There was apparently some mixing of remains, as described above, and several of the crania (e.g., the two drawn in Tomb 1) are missing. Of the 12 individuals represented by human skeletal remains from the Pombal Cemetery, four are subadults (one juvenile 9-10 years, and three adolescents: one 12-16 years and two 15-16 years) and eight are adults (2 females, one 30-40 years and one 40-50 years; 4 males; and 3 adults of unknown sex). This figure matches J. Lino da Silva's representation of skeletal remains in some of the tombs in the *Cemitério do Pombal*.

2.5. The *Capela de São Domingos* (the Medieval Mortuary Chapel/Complex B)

The most recent group of burials, clustered near the eastern apse of the Western Basilica (Apse 3) is readily distinguishable from the earlier early Christian interments by these criteria:

a. all the burials are located along the central axis of the Western Basilica;

b. none were buried in constructed above-ground stone or tile tombs, but instead in graves dug beneath the raised floor of the medieval chapel; and

c. two of the children buried here had in their hands medieval Portuguese coins dated to the 15^{th}-16^{th} centuries. Several other coins of the same era were recovered from the same sub-floor fill.

The first radiocarbon date obtained from human bone from Torre de Palma provided further evidence of post-Reconquista mortuary activities within the sacred precinct. The date was obtained from a tooth taken from an adult female cranium (MNA 4769 v.2) recovered from an unrecorded burial location in the basilica, probably excavated under the direction of F. de Almeida in 1971 at the very end of the MNAE excavations (Powell et al., 2008). The 2-sigma range for the date is AD 1469-1648 (Beta Analytic Radiocarbon Dating Laboratory).

Underneath the brick floor of the medieval chapel (*Ermida do São Domingos*) in Apse 3 (Rooms IX and XII; sqs N020E020, N020E022, N022E022, and N023E024) in the Western Basilica, the American excavators discovered the remains of numerous infants and small children, some represented by discrete burials and others by scattered clusters of bones, mostly fragmented and disarticulated, at the same subfloor level (Appendix I.6). The extreme degree of disturbance reflects very intensive re-use of this restricted space for the burial of very young subadults: at least 9 infants younger than 2 years of age were buried in the same strata within sqs. N022E022 and N023E024. The number of young subadults recovered from the eastern half of the Western Basilica exceeds the representation of this age category (roughly, birth to 7 years) in any other area, or indeed, within the total skeletal sample from the site (Table 2.8).

As Maloney (2002, p. 44-45) notes, "Apse 3 (Room IX) was modified in the period after the reconquest and used as a small chapel." The floor of the Medieval chapel was much higher than that of the early Christian building. None of these burials exhibited any evidence of identifiable tomb structures or coffins. Numismatic evidence from these levels indicate the chapel was built in the second half of the 13^{th} century and remained in use at least into the 16^{th}." John S. Huffstot (1999-2000, p. 127-128) described these finds in his analysis of coins recovered from Torre de Palma: "... two of these coins – both [of them] *ceitis* – were recovered from tombs located in the center of the *ermida*. The other 5 were recovered from the earthen fill which raised the floor level of the chapel. We cannot exclude the hypothesis that some or all these pieces also came from mortuary contexts, displaced by the continual re-use of this spacespace." (Translated from Portuguese.)

One additional burial (Tomb 2) (Appendix I, Section 4.6) was discovered by the American excavators in the extreme western portion of the Western Basilica. The grave broke through the retaining wall on the east side of Apse 4; this location indicates that the tomb post-dates the early Christian tombs in this area (e.g., Tomb P, MNAE Tomb F, immediately to the southwest). It contained the upper half of the articulated skeleton of an adult male, whose head lay in the eastern part of the square between two portions of the wall. The remainder of the skeleton had apparently been destroyed during cleaning of the basilica floor.

2.6. The South Field (Complex R)

The very fragmentary remains of a late adolescent or very young adult female were discovered in this area (Appendix I.8). They were encountered in sqs. S262E115, S262E117, and S264E116 on the last day of the 1999 field season and were excavated at the beginning of the field season in 2000.

There was no discernible tomb structure, but fragments of clay roof tiles were recovered above and beneath the bones. This tomb is the only known burial located south of the natural drainage channel that divides the Church zone from that of the villa, other than the two infant graves in the villa.

The South Field was never explored by the Portuguese campaigns. Two strong ranges of wall lines and well-defined rooms show that it served as an industrial quarter. The structures formed a courtyard that was an appendix to the main *pars rustica*. Since this area was virgin soil and the wall lines and spaces are very well defined and recorded, the American excavations in the South Field (Complexes R and S) served as a test area for certain approaches taken and may offer better insight into the expected percentages of ceramic and other materials consumption at this site.

2.7. Dimensions of Death in Ancient Portugal: Torre de Palma in Context

2.7.1. Iron Age Necropoli in Portugal and Spain

Portugal is rich in reminders of its pre-Roman heritage. At Palma, successive excavations uncovered evidence of a small Iron Age settlement: several complete and many incomplete ceramic vessels and metal artifacts that date stylistically from the end of the 7th century BC to the beginning of the 5th century BC (Langley et al., 2007). All these items are described in detail and well illustrated in Langley's report. The ceramics are similar in form and construction to vessels from Early Iron Age sites in the estuary of the Tejo River (Lisbon, Almaraz, and Santarém), the Alentejo site of Alcácer do Sal, and numerous sites in Spain and the southern Iberian Peninsula (Medellín, Las Cumbres, Setefilla, Alcores de Calmona, and Talavera la Vieja). In particular, the ceramic assemblage associated with Palma's *Sepultura* XXX is quite similar to the assemblage from Tomb 88 at Alcácer do Sal.

The collection of metal artifacts consists mainly of personal adornments: items of jewelry, belt buckles, bracelets, and pins (fibulas). These items resemble those found throughout southern Iberia, particularly at Medellín. They are fairly rare at most Portuguese Iron Age sites but relatively abundant at Palma, and only the Iron Age necropolis at Alcácer do Sal has yielded a larger assemblage. Langley and colleagues see the abundance of metal artifacts at Palma, as at Alcácer do Sal, Talavera, Medellín, and Aljucén, as indicating the presence of an elite segment of the society that controlled the redistribution of "prestige" artifacts; the identification of a fibula of the "Acebuchal" type at Palma reinforces the link between Torre de Palma and the distribution networks of the Atlantic coast.

No Iron Age mortuary structures were identified by Heleno at Palma, although mortuary mounds have been reported at Iron Age sites in Spain (at Medellín and El Jardal, for example), and in the Baixo Alentejo. However, the presence of cremated human bones in two of the large urns leaves no doubt that they marked mortuary features, most likely buried in mounds. In the words of Langley and her colleagues, the primary importance of these pre-Roman remains at Palma is "a profound alteration of the current view of the territory of the Alto Alentejo at this moment [in history], which is usually presented as a vast empty space" (Langley et al., 2007, p. 264), prompting a reappraisal of the extent and nature of the presence of Iron Age peoples in the Alto Alentejo in the first millennium BC.

2.7.2. Pagan Roman Mortuary Complexes in Portugal

José Carlos Caetano (2002) compiled an exhaustive catalog of Roman mortuary sites throughout the province of Lusitania. The district of Portalegre in the Alto Alentejo contains at least 18 villa sites with evidence of associated necropoli. In the *concelho* of Monforte where Palma is located, Langley and her colleagues (Boaventura and Langley, 2006, Langley, 2006) have documented nine additional Roman necropoli associated with villas, situating Palma within an extensive network of similar sites and dispelling earlier interpretations of the Palma villa as a largely isolated, somewhat anomalous site.

So, what was Palma's Roman mortuary complex like? It is difficult to be certain as its sparse mortuary features give only a faint glimpse of the range of pagan Roman burial practices reflecting the relationship between "*os vivos e os mortos*" in late antique Portugal. An examination of other sites provides some insight into what may have originally been the situation at Palma.

In 2008, the MNA mounted an impressive exhibit, *"Sit Tibi Terra Levis, Rituais Funerários Romanos e Paleocristãos em Portugal"* (Fabião et al., 2008), which focused on two archaeological sites containing Roman necropoli dated to the 1st-5th centuries AD. The first of these, Fraga, lies beyond the Douro River in the locality of Feira Nova (*Freguesia de* Alpendurada, *Concelho de* Marco de Canaveses). Excavated in 1902-1903 by the pioneering Portuguese archaeologist José Leite de Vasconcellos, this site contained some 30 or so cremation deposits, each one enclosed within a stone box walled by four slabs and covered by a fifth slab, clustered within a 300m^2 area. None of these tombs showed evidence of re-use (i.e., the later placement of additional remains), nor did any of them contain more than one cremated individual. The cremations had been performed at a different location, and the fragmentary bones and ashes then transported carefully for interment within ceramic urns in this necropolis. Ceramic vessels of several different types, some of which probably contained offerings of food and drink, were also placed in the stone containers. Some of these vessels bore alphabetic inscriptions, possibly the names of their owners; these are indicative of at least some degree of literacy even in this rural setting. The location of the necropolis near the conjunction of two rivers, the Douro and the Tâmega, and several established roads suggests that it served the surrounding scattered population and was apparently not associated with only one villa.

The other site featured in the MNA exhibit, Silveirona, lies in the *concelho* of Estremoz in the Alto Alentejo, not far to the south of Palma (Cunha, 2007; Fabião et al., 2008).

In 1934, excavations were undertaken at the villa of Coelha, personally directed by Heleno, Vasconcellos' successor as Director of the museum in Lisbon. Like Palma, this villa lay in a very fertile part of the province and served as the heart of a large Roman agricultural estate, today known as the Herdade de Coelha. Its proximity to marble quarries may account in part for the abundance of finely worked architectural features at the villa. Some 400m to the west of the *Monte* (farmhouse) at the modern Herdade de Coelha, a Roman-era necropolis was discovered, dating to the 2nd-5th centuries AD and containing 80 tombs. Inhumation burials predominated, with a few cremations also present. For each tomb, Heleno noted the orientation of the grave, its form and method of construction, and its contents, but unfortunately, few photographs were taken. Rectangular in form, most graves were oriented WNW-ESE with the heads to the east. Most of them had been dug directly into the subsurface rock without reinforced sides. Some were covered with slabs of stone, others with clay tiles or smaller stones. The presence of iron nails in some of the graves suggested the use of wooden coffins.

The acidity of the soil had mostly destroyed the human remains, but numerous artifacts, mostly ceramic vessels, were recovered in good condition. A few iron spear points and fragments of metal sandal trappings were identified, as well as two fragile glass vessels. These grave goods were typically deposited near the head, the waist, or the feet. In contrast to the grave vessels at Fraga, some of the Silveirona vessels were cracked or broken, perhaps having been deliberately fractured to prevent reuse for non-funerary purposes. Alternately, the pressure of the overlying earth or perturbations resulting from modern agricultural activities may be responsible for the damage. Occasionally vessel fragments were deposited directly atop the stone slabs covering the graves or, in one case, just beneath the slab, suggested that they were deposited following a funerary or memorial feast honoring the dead. A few of the graves contained pieces of fine *terra sigillata hispanica* or *sigillata clara* (of North African origin), along with a few local copies of this refined ware. Some of the vessels bear what may be identifying marks of a particular center of pottery manufacture. The few alphabetic inscriptions may be names of the vessels' owners or, alternatively, salutations to the dead. Rarely, a Roman coin was found in a grave. Several graves contained a finely carved marble grave plaque, bearing the votive formula, *D(is) M(anibus) S(acrum)*, "Sacred to the gods of the underworld," and a heartfelt wish for the departed, *Sit Tibi Terra Levis*, "May the earth rest lightly upon you,"along with the name and the age at death of the deceased and, sometimes, the name(s) of their family members who erected the plaque.

At Palma, the similarities to the Roman necropolis at Fraga include one cremation urn containing the burned remains of a child (TP.66.95) in the Northwest Cemetery and a number of fragmentary ceramic vessel sherds in both cemeteries near the Church; the latter may represent offerings buried with the dead or the remains of funerary meals. Like Palma, Silveirona contained both pre-Christian and Paleo-Christian burials; the latter resemble the early Christian interments at Palma, i.e., rectangular pits dug into the bedrock with covers of stone slabs or clay tiles, containing single or multiple individuals. Unlike Palma, Silveirona yielded no definite evidence of an early Christian edifice, although the presence of two large sarcophagi, various carved stone architectonic elements, and inscribed funerary plaques suggests that the later cemetery was associated with such a structure. The Palma Church encloses several monumental tomb structures, though, sadly, no inscriptions, funerary or otherwise.

Suggrundaria at Palma – Normal Mortuary Custom or Evidence of Infanticide?

Since the 19th century, controversy has swirled around the interpretation of the burials of neonates or very young infants who are discovered outside of 'typical' mortuary areas: do these represent normal burials for this age category, or are they evidence of clandestine interments of unwanted infants? At Palma, does the archaeological context of the two infant burials within the villa follow normal 1st-century pagan Roman burial practice for individuals of this very young age, or does it suggest a more sinister interpretation?

In 1892, the influential British archaeologist Augustus Henry Lane-Fox Pitt-Rivers suggested that infanticide might have been responsible for the numerous infant graves at the Romano-British settlement at Rotherly (Pitt-Rivers, 1892). In 1921, Alfred Heneage Cocks proposed that the simple form and unmarked locations of the numerous burials of very young infants at the Romano-British villa at Hambleden in Buckinghamshire "apparently showed that these interments took place secretly after dark" (Heneage Cocks, 1921, p. 150, in Eleanor Scott 1999, p. 110), invoking "a scenario of secretive behavior involving young women, illegitimacy, shame and infanticide" (Scott, 1999, p. 110); in similar vein, Johnson (1983) interpreted the Hambleden infant burials as "surreptitious evidence of unofficial births on the villa." Scott (1999) argues that these interpretations are colored by what she calls "the Romano-Victorian" view of issues of illegitimacy, shaped by "particular social, economic [and] cultural forces of post-Medieval England and colonial America, such as constructions of Christianity and femininity. These exact same forces are so unlikely to have existed in Roman Britain that we must seek an alternative explanation for the evidence." (Scott, 1999, p. 110).

Material for Scott's "alternative explanation" may be found in a passage from the treatise *Exposito Sermonum Antiquorum* (a Description of Ancient [i.e. obscure] Words) by Fabius Planciades Fulgentius, a North African who lived in the late 5th-early 6th centuries AD. Fulgentius wrote extensively on the history of ancient Roman customs and beliefs and he described a particular mode of burial called *suggrundaria*, which was reserved for infants who died within 40 days of their birth. In his words, "*Priori tempore suggrundaria antiqui dicebant sepulchra infantium qui necdum quadraginta dies implessent, quia nec busta dici poterant, quia ossa quae conburerentur non erant, nec tanta inmanitas cadaueris quae locum tumisceret*". In former times, the ancients called *suggrundaria* the places of burial of infants who had not yet reached 40 days, because they could not be called graves as there were no bones to be cremated nor was there a big enough corpse for a cenotaph to be raised (Withbread, 1971, p. 163). The term *suggrundaria* is derived from the Latin noun *suggrunda*, which means literally "the eaves of a house", and it implies that such burials were typically placed beneath or adjacent to the walls of domestic structures.

Two 1st-century AD authors allude to the ban on cremation of very young infants, and therefore offer some support for Fulgentius' statement. The Roman satirist Decimus Junius Juvenalis (Juvenal) commented in his Sixteenth Satire, "*... uel terra clauditur infans et minor igne rogi* (... when earth closes over a baby too young for the funeral pyre)" (Humphries, 1958, p. 180). And Pliny the Elder wrote "*hominem priusquam genito dente cremari mos gentium non est*" ("It is not the custom in any country to cremate the dead body of any infant before his teeth come out") in Book VII of his *Naturalis Historia*. Dorothy Watts (1989) discusses infant burials in *suggrundaria* in Roman Britain Christian contexts, suggesting that

Fulgentiuis was describing a mortuary tradition that continued in use close to his own era, not merely an "antique" custom.

None of these authors associates the infants buried in this particular fashion with the practice of infanticide; indeed, they all clearly state that the infant's age at death (from whatever cause) was the significant factor that decreed cremation or inhumation. Therefore, the unusual location of the two Palma neonates, buried beneath the floor in different rooms at the villa, cannot be taken as evidence of infanticide. Simon Mays (1993) has suggested that "poverty and illegitimacy" may have been a frequent motive for Romano-British infanticides, but the abundant evidence of wealth (e.g., the elaborate mosaic floors, the fine ceramic wares, etc.) certainly does not suggest an impoverished domestic context. We cannot know, of course, whether the two infants were illegitimate in the modern sense of the term, and we have no real idea whether that determination carried the same stigma in the 1st century AD as it did in what Scott called "the 'Romano-Victorian' view of issues of illegitimacy" (Scott, 1999, p. 110).

No adult female burials at Palma were excavated with a fetal skeleton *in situ*. While the long bone shaft lengths for the young infant numbered TP.109.92 are consistent with a late fetal developmental age (Acsàdi and Nemeskeri, 1970), the location of both infants separate from the graves of women suggests these infants were stillborn or prematurely born, and that they were treated in death like other neonates and infants. No attempt was made to assess survival intervals of these infants after birth.

Infant burials in cemeteries and in *suggrundaria* alike were often (but not always) encased in roof tile coffins or large ceramic pots or amphoras both in Rome and at the eastern and western edges of the Empire (Morris, 1992). In contrast, the two neonates in the villa burials at Palma were interred directly in the ground, with no associated artifacts or evidence of any enclosing vessel or structure, but the absence of grave goods or containers for the bodies does not, in itself, bespeak neglect or clandestine burial. Dedet and colleagues (1991) describe numerous burials of neonates and very young infants within domestic structures at Gailan and other Iron Age sites (c. 6th-5th centuries BC) in southern France which lack associated artifacts and enclosing containers, documenting the protohistoric existence of this mode of burial in southern Europe. They argue strongly against interpreting such burials as evidence of infanticide or sacrifices made for religious reasons. In sum, the most reasonable interpretation of these two burials at Palma is that they represent normal mortuary practice for neonates in a 1st-2nd-century AD pagan Roman household.

2.7.3. The Early Christian Presence in Lusitania

The Early Christian cemetery at Silveirona, Alto Alentejo

Heleno's excavations at Silveirona also uncovered an early Christian cemetery, located some 300m away from the earlier Roman necropolis (Fabião et al, 2008, p. 42-43; Cunha, 2007). This later necropolis covered an oval area 30m by 33m with the long axis oriented NW/SE. Of the 80 inhumation graves discovered, 35 were mapped and excavated. Almost all of them were oriented parallel to the long axis of the cemetery area, with the heads of the graves to the Northwest. Some graves contained only a single individual, while others included multiple, apparently successive interments (e.g., Tomb XXI, contained one extended supine skeleton with the skull of another adult lying to the left of its lower legs) (Fabião et al., 2008, p. 41). The outline of the graves was trapezoidal, and most of them were constructed with *tegulae* or stone slabs forming the walls and covers. Two cremation burials were also discovered, as well as two monolithic sarcophagi. The similarities to the early Christian tombs at Palma are striking, to say the least.

Sadly lacking at Palma, however, are inscriptions that identify the occupants of the early Christian tombs. At Silveirona, Christian epitaphs accompanied a few of the graves, crudely incised on the marble slabs covering the graves. Many of these slabs were apparently robbed from the earlier cemetery and structures. Some epitaphs have a cross before the person's name. The inscriptions differ in form and in content from the carefully carved funerary inscriptions found at the pre-Christian Roman necropolis at this site. A typical inscription (Fabião et al., 2008, p. 44) reads:

SABINUS V(I)R H(ONESTU)S,	Sabinus, an honest man,
VIXIT ANNOS	lived for 75 years
LXXV REQ(UIE)VIT IN	He rested in
PACE D(IE) III IDVS	peace, the third day of the Ides
MARTIAS	of March (March 13)
ERA DLV	in the year 555

As at Palma, the associated artifacts were almost all personal objects such as metal rings, pins, and earrings. A clay lamp of North African origin and several Roman Imperial coins illustrate cultural continuities with the pre-Christian community at this site.

Early Christian Basilicas in Portugal and Spain

The double-apsed early Christian Church at Torre de Palma is an example of a distinctive ecclesiastical architectural style that had its origin in the earliest Christianized Late Roman cities in North African (Torres and Santiago, 1993; Maloney, 1995). Other double-apsed basilicas and their associated mortuary areas excavated in the Iberian Peninsula include Mértola (Baixo Alentejo) in southern Portugal, and Casa Herrera (Mérida, Badajoz), El Germo (Córdova), and Vega del Mar (Málaga) in Spain. Santiago Macias (1993, p. 47-48) lists four features common to these Iberian double-apsed early Christian basilicas:

(1) the eastern apse contains no burials, as it was reserved for the principal altar;
(2) the western apse rarely contains any burials; none were found at Mértola, El Germo, or Vega del Mar, but 7 infant burials were discovered at Casa de Herrera;
(3) many tombs were placed within the walls of the basilica: 35 at Mértola, 65 at Casa Herrera, 30 at El Germo, and 38 at Vega del Mar; and
(4) burials of very young children were often concentrated in certain zones: e.g., at El Germo they were situated near the exterior walls of the main apse.

The Portuguese city of Mértola (the ancient Roman city of Myrtilis) in the Baixo Alentejo (within the ancient Roman province of Baetica) is located on a peninsula between two rivers, the Guardiana and the Oeiras. Excavations over the past 150 years at the site of Rossio do Carmo at Mértola uncovered the remains of an early Christian basilica with numerous tombs inside and clustered along the south side of the Church. A pagan Roman cremation cemetery had occupied the site in earlier times, with inhumation graves appearing in the 1st century AD. The broad central nave of the basilica was separated from the narrower north and south naves by rows of columns, dividing the space into seven bays (*tramas*). East and west ends were capped by matching rounded apses ("*duas ábsides afrontadas*", Macias, 1993, p. 34), while the narrower north and south naves ended in squared walls.

At Mértola, 20 early Christian tombs were discovered in the south nave, 15 in the central nave, and 31 outside the south wall of the basilica. There were no cases where one grave cut into an original grave, so they all must have been marked in some manner. Many of the graves retained their engraved tombstones, and the presence of North African names in several of the epitaphs reinforces the architectural connection to that region. The graves were dug directly through the floor into the bedrock and covered with slabs of stone (typically schist) after placement of the body. Some, but not all, of the graves had inner walls lined with stones. Several graves have walls plastered with a layer of *opus*; these typically were covered with marble slabs. In some cases, the mortar that covered the tombs was decorated with tessellated mosaics, a funerary custom seen in North African churches. Almost all the Early Christian graves were oriented east-west (matching the orientation of the basilica's naves). The deceased were laid out on their backs, arms extended at their sides and their heads towards the west so that they could rise to face the east on the Day of the Last Judgment. A very few of the graves were oriented north-south, in order to fit them into available space within the holy ground.

The majority of the early Christian burials inside the Basilica cluster in the first half of the 6th century AD. Burial within the walls of a church was expressly forbidden by Canon XVIII of the Council of Braga (the seat of a powerful archbishop) in 561 AD (Macias, 1993, p. 50); however, the tomb of a priest named Possidonius was discovered in the central nave at Mértola, and seven more tombs of church functionaries are clearly dated after that edict. Many tombs inside the basilica lack specific dates. The custom of placing tombs beneath the floor of the basilica continued well into the early 8th century AD. The 7th-century cleric Julian of Toledo wrote of the strong desire of the faithful to be buried "*apud memorias martyum*" (amidst the martyrs' memories). The celebration of the Mass for the Dead was permitted only within a basilica, near the reliquaries of these holy figures (Canon LXVIII, Council of Braga, 572 AD) (Macias, 1993, p. 50). Christian burials continued to be placed in the basilica well into the Middle Ages, and as available space for new burials became increasingly limited, earlier graves were opened so that the newly dead (probably family members) could be added.

The basilica at Mértola was abandoned sometime during the 8th century. After the destruction of the basilica (evidenced by masses of shattered roof tiles and building debris covering the floors and bases of the walls) during the succeeding Islamic period, numerous Islamic burials (signaled by their north-south orientation, with the descedent's face turned east towards Mecca) were dug through the rubble of the ruined church – testimony to the continued aura of sacred space and also to cultural links between the Christian and Islamic civilizations in Iberia.

Near Mérida, in the modern Spanish province of Badajoz, the double-apsed basilica of Casa Herrera was constructed sometime in the 6th century AD with three naves separated by rows of columns, oriented east-west. Some 65 early Christian graves were discovered during archaeological excavations, all of them dug into the bedrock beneath the floor of the naves. The graves followed the orientation of the naves, with the heads of the deceased resting on stone or brick pillows in the western end of the grave; none of the graves cut into earlier graves or the outer walls of the basilica. Only three graves were oriented north-south, apparently to make use of limited subfloor space. Multiple inhumations within the same grave were common, with the bones of earlier occupants carefully laid to one side or placed on top of the grave's stone lid after placement of the most recent body. Within the central nave, graves fill up almost all the available subfloor space, even within enclosed areas. No graves were placed within the eastern apse, and only the graves of young children were discovered in the western apse.

The majority of graves were simple rectangular pits cut into the bedrock, without interior constructions; these were more common in the outer portions of the naves and belong to the latest phase of mortuary use. Stone box graves (the walls lined with stone, marble, or masonry slabs) were abundant. Only three of the 65 graves documented archaeologically contained whole or fragmentary marble sarcophagi; these lay in the lateral naves. Despite the ban on offerings of food or drink placed in graves or sacrifices to the dead by the Council of Braga (Canon LXXIX, 572 AD), almost all of graves in the basilica at Casa Herrera contained whole or fragmented ceramic vessels: jars, *ollas*, or bottles. Items of personal adornment were also occasionally found, such as iron or bronze rings.

The early Christian complex at Vega del Mar, near Marbella, Málaga, on the southern coast of Spain, included a double-apsed basilica and surrounding buildings. It has been identified with the ancient Roman center called Cilniana, described in the Antonine Itinerary as one of the stations located between *Malaca* and *Gades* (Posac Mon and Puertas Trias, 1989). Archaeological excavations in the 1930s revealed 148 tombs located within and around the walls of the basilica, and recent excavations in 1979–1981 uncovered 32 more graves, as well as seven that had been disturbed by clandestine excavations. Six types of tombs were present:

(1) a simple pit dug directly into the bedrock beneath the floor, with no stone cover evident;
(2) a brick-lined pit covered by a stone slab or (more rarely) a rounded cover of *opus signinum*;
(3) a pit lined with marble slabs;
(4) a pit lined with clay tiles (*tegulae*), sometimes covered with stone slabs or tiles;
(5) a pit covered by a sloping roof of tiles;
(6) a mounded tomb (*túmulo*) originally covered by a wooden cover, represented now only by metal fastenings.

Only one example each of types three and five were recorded, while types two and six were the most common. The walls of the graves were sometimes stabilized with stone slabs, and in a few cases the floor had been lined with stones or bricks. The graves followed the east-west orientation of the basilica's naves, with the heads of the deceased placed to the west. Multiple, presumably successive, interments were common within single graves. No graves were discovered within either of the two rounded apses. Many of the graves had been disturbed before excavation, but some still contained whole or fragmentary ceramic vessels and, occasionally, items of personal adornment.

The early Christian Church at Palma is considerably larger than the basilicas at Mértola, Casa Herrera, and Vega del Mar (Chapter I, fig. 1.8) and all the tomb types identified at Palma are also present at those basilicas. However, the interior of the naves at Palma are relatively freer of tombs than are the naves of the other basilicas; this pattern possibly reflects a lower population density at Palma. A comparison of tomb locations within the basilicas at Palma with Macias' list of features common to his double-apsed Iberian basilicas shows some similarities but also several significant differences:

(1) no tombs were discovered within the eastern apse (Apse 1) of the larger basilica at Palma, just as was the case at other basilicas;
(2) no above-ground tombs are located within the western apse (Apse 2) of the eastern Palma basilica, although one subfloor tomb (Tomb 11) lies immediately to the east of the wall that originally demarcated the apse from the adjoining nave. One subfloor tomb (Tomb 1) located within this apse may belong to the post-Reconquest period of the Church's history;
(3) at least 20 above-ground tombs were located within the walls of the Palma basilicas, a pattern similar to Macias' other basilicas;
(4) a large number of sub-adult burials, most of them infants or very young children, were recovered from one particular area: the sub-floor area immediately to the west of the eastern apse of the smaller, later basilica (Apse 3); one burial of a child lay under the floor within Apse 3 itself. However, unlike at the early Christian basilicas described by Macias, all these burials at Palma date to the post-Reconquest medieval era of the Church's history, verified by radiocarbon dates from mortar samples in this vicinity and by coins from the 13th–16th centuries, two of them recovered from the graves of children (Tombs 9 and 10) and others recovered within the general subfloor fill amidst the bones of disturbed infant burials.

All five of these Portuguese and Spanish sites contain both single-occupant and multiple-occupant tombs; the latter appear to represent successive interments (probably of family members) rather than multiple simultaneous interments characteristic of mass mortality events such as plagues or warfare. At all the sites, tomb orientation is almost invariably east-west, with the head of the deceased person lying at the western end of the grave. In the Southwest Cemetery (Complex D) at Palma, the reverse pattern appears: all but 4 of the 27 tombs are oriented north-south, but this pattern was probably determined by the need to follow the slope of the land or the nearest building wall and these tombs do not differ with respect to construction, number, demography of occupants, or associated artifacts from the east-west oriented tombs in the same complex. The variety of associated artifacts recovered from tombs at Palma mirror those interred with the early Christian dead at the other four sites, being primarily of two types: personal adornments (rings, earrings, bracelets, and pins) or ceramic vessels that presumably contained offerings of food and drink.

2.7.4. Medieval Mortuary Complexes in Portugal

The Reconquest of Portugal

In 711 AD, Muslim armies from North Africa entered the Iberian Peninsula, and over the following three centuries they extended their conquests northward and eastward to the

Pyrenees. During this occupation, Christians were subject to taxation and political restrictions but were generally tolerated throughout Iberia so long as they pledged nominal fealty and paid a tax to the Caliph in Andalusia and to their local Muslim rulers. Christians and Muslims lived side by side peacefully, for the most part, and sometimes even buried their dead in adjoining cemeteries, as at Mértola in southern Portugal (Macias, 1993). However, a combination of religious and patriotic fervor among European Christians eventually led to a series of military campaigns aimed at driving the Moors back across the Strait of Gibraltar. By the mid-12th century, the Portuguese nobleman Afonso Henriques had led his Christian armies in a series of victories over the Moors, and in 1139 his troops proclaimed him Dom Afonso I, the first King of Portugal (Kaplan 1991, p. 53-54). With the so-called Reconquest of Portugal by Christian forces came the rebuilding of abandoned or damaged churches, chapels, and *ermidas* (hermitages), as Christianity was re-established as the dominant religion throughout southwestern Europe. Numerous post-Reconquest churches and cemeteries have been excavated and reported throughout Portugal, so we have a clear picture of medieval Portuguese mortuary customs in a wide variety of contexts. With the exception of grand tombs constructed of carved marble, reserved for the highest echelon of society and placed prominently above the floor of the side aisles and naves of the large basilicas, medieval inhumation graves typically followed the early Christian pattern of rectangular pits cut into bedrock or dug into subsoil and topped with slabs of schist or granite. Graves might be placed beneath the paved floor of a basilica or chapel, or outside but close by the structure's walls. They were oriented with the heads of the deceased to the west, in accordance with long-established Christian custom. During the Middle Ages (12th-14th centuries) most inhumations were laid directly in the grave, the body perhaps wrapped in a shroud (indicated archaeologically by metal pins), while interment in wooden coffins became more common during the later Middle Ages (post-14th century). Because consecrated ground for burials was necessarily restricted, re-use of graves was quite common. As successive interments displaced earlier occupants, the latter's bones were respectfully stacked near the head and feet of the newcomer or laid carefully on top of the stone slab cover.

The *Capela de São Domingo*s at Palma

After Palma was apparently largely abandoned sometime in the 8th century and its buildings (including the Church) fell into disrepair, a portion of the curved stone wall of Apse 3 remained standing 2m above ground, a very visible marker of the sacred precinct (fig. 2.4). As part of the medieval chapel, this area continued to receive burials intermittently into the early 17th century: two of the children (Tombs 9 and 10) in the eastern end of the Western Basilica were buried with medieval Portuguese coins dated 1438–1557 AD, and five more coins dating from 1222 to 1481 AD were recovered from the grave fill in the area around these burials (Huffstot 1999-2000, p. 127-128). In addition, the skull of an adult woman (Cont. 4769, v.2) buried there yielded a radiocarbon date of AD 1469–1648 (2-Sigma range, calibrated for eastern Portugal; Powell et al., 2012).

According to Maloney (2002, p. 44-45) exploration of the medieval level (sqs. N022E022, and N023E024) "revealed numerous burials of infants and children, none of which included an identifiable tomb structure or coffin." The remains of at least 17 individuals in these age groups (Table 2.8) were recovered within an area covering roughly 12m^2 in the northeastern quadrant of the Western Basilica (Rooms IX [Apse 3] and XII [nave]/ sqs. N020E020, N020E022, N022E022, and N023E024 [Appendix I.6]). The extreme degree of disturbance reflects very intensive re-use of this restricted space over several centuries, a pattern seen in many Portuguese medieval mortuary areas within churches (Cunha, 1997). Some of the burials had been only slightly disturbed (Tomb 10, Tomb 9, and Tomb 7), while others were represented only by clusters of disarticulated bones (e.g., Tombs 4, 5, and 6). The demographic bias is impressive. Subadults (younger than 20 years at death) account for 36.1% (90/249) of the total demographic sample at Palma; of these, infants (0-2 years) and young children (2-6 years) comprise more than half (51/90). The infants in the Apse 3 space comprise more than half (18/30, 60.0%) of all the infants recovered from Palma, and the young children in this small area account for almost one third (6/21, 28.6%) of all individuals in that age category.

Other Medieval Christian Necropoli in Portugal

Eugénia Cunha and her colleagues in the *Departamento de Antropologia* (today, the *Centro de Investigação em Antropologia e Saúde* in the *Departamento de Ciências da Vida*) at the *Universidade de Coimbra* have excavated numerous Portuguese medieval cemetery sites over the past two decades and published extensively on their archaeological and paleobiological analyses. Two such sites in the province of Entre-Douro-e-Minho in northern Portugal, Barreiras de Fão in the Município de Esposende, and a smaller cemetery associated with the medieval church of S. João de Ester at Chafé, provide much information on medieval mortuary traditions in this region of Iberia (Cunha and Matos, 1999; Cunha, 1997). Barreiras de Fão was a maritime village located at the mouth of the Rio Cávado where it enters the Atlantic Ocean, and relied upon fishing, agriculture, and the production of salt for its livelihood, according to historic tax records, *as Inquirições* of 1258. It is likely that the cemetery was associated with a church, but no remains of an ecclesiastical structure have yet been identified at the site. A large portion of the cemetery was excavated, and 77 graves yielded remains representing 120 individuals of all ages and both sexes, dating to the 12th-14th centuries AD. The graves were rectangular pits dug down into the bedrock, covered by slabs of stone, oriented east-west with the skulls lying to the west, facing the sky supported on little pillows of stone. The graves varied in size from 2m to less than 1m in length, and 30% of the graves were so small as to suggest that they were made for infants or small children. The bodies were placed directly in the graves, probably enclosed in linen shrouds. Successive reuse of graves was common: only 29% of the graves included remains of only one occupant. Unfortunately, the acidity of the soil precluded good bone preservation.

Twenty kilometers inland from Fão, excavations in the small cemetery associated with the medieval church of S. João de Ester yielded six burials, two of which were almost completely destroyed. The six contained the bones of eleven individuals dating from 13th-16th centuries, all well preserved. Two of the graves showed no signs of wooden coffins, but the other two yielded bits of metal, probably fastenings or nails. These six graves undoubtedly represent only a small portion of the original cemetery area.

A third medieval cemetery, associated with the church of S. João de Almedina at Coimbra, contained the remains of 115 individuals, inhabitants of this large urban community during the 12th-15th centuries (Cunha, 1997). Of these, 14 were subadults (12% of the total), one of them an infant. The excavation took place in the 1950s, and it is unclear whether infants were not systematically recognized or recovered, or if they were largely excluded from burial within this particular precinct. The graves exhibited the same formal features of those at Fão and S. João de Ester, with abundant evidence of the reuse of graves.

A fourth site, the early medieval *Ermida de São Saturnino* was a small sanctuary located in the Serra de Sintra, south of Lisbon (Cunha, 1997, Teté Garcia, 1997). Established in 1192 AD, it yielded three distinct groups of graves. Beneath the oldest part of the *ermida*, five rock-cut graves (*Quadro* 2) contained individuals who had been placed in the graves enveloped in shrouds, except for one adult male cleric who had been buried wearing a cassock, indicated by buttons, metal clasps, and fragments of cloth. *Quadro* 1 included 16 rock-cut graves that contained the skeletons of both adults and children laid out in rectangular pits, as well as two ossuary deposits of disarticulated bones placed in natural cavities in the adjacent rocky outcrop. Cristina Teté Garcia (1996, p. 95-96) described a unique subset of the burials in *Quadro* 1: "The final use of this necropolis (at its extreme western edge) took place in the 15th century, [consisting of] infant burials in rectangular or oval pits defined by granite blocks outlining the graves. All these sepultures contained subadults, two of which were accompanied by coins dating to the reign of Dom João I [1385–1433 AD]." One young child (Tomb 15) in this group was holding one of the coins (a *real*) in one hand. The original *ermida* fell into disuse for at the end of the 15th century and in the second half of the 16th century, a new *ermida* was constructed just to the north of the original structure. The latest group of burials, *Quadro* 3, was dated to the 18th century: five ossuary deposits containing multiple individuals (some partly articulated, some represented only by jumbled bones) laid in pits dug underneath the narthex of the *ermida*. There was no evidence of shrouds or clothing with these skeletal remains.

What Accounts for these Unusual Concentrations of Infants and Young Children at Palma?

There were two major saints named Dominic revered in Spain during the medieval period. No written evidence has been discovered so far makes clear to which of these saints the chapel is dedicated. A pendant found in the Western Basilica depicts a Saint Dominic, but which one is represented is unclear. One was Dominic de Guzmán (1170–1221), founder of the Dominican order, and the other was Dominic of Silos (c. 1000–1073). Both were born in Spain.

Dominic de Guzmán spent most of his adult life outside the Iberian Peninsula. He was not canonized until 1234, close to the time the medieval chapel at Palma was constructed. He is the patron saint of astronomers.

It is far more likely that the chapel at Palma was dedicated to Dominic of Silos. He is a thoroughly Spanish saint who spent his whole life living and working in Spain and would have been well-known by the 13th century. He is the patron saint of pregnant women and anxious mothers (Lappin, 2002). Infants and young children may have been buried in the Ermida to secure for them St. Dominic's particular spiritual protection.

3. Summary

No comprehensive study of the human remains was undertaken until 1996, when Powell joined the American crew. Through painstaking consultation of the plans and original field photographs (after their recovery by the MNA), most of the human remains from the tombs have now been linked to their appropriate proveniences. In some cases, bone fragments recovered by MNAE archaeologists from a particular tomb could be matched to fragments recovered years later from the same area by the American archaeologists. In all, 140 tombs have been discovered during more than five decades of excavations at this site. Not all the tombs yielded human remains at the time they were discovered, due to the vicissitudes of taphonomy and/or subsequent human interference, and some sets of human remains were recovered outside of any recognizable tomb structures, probably representing redeposited bones from disturbed burials.

The numerous mortuary features at Palma provide a wealth of information about the development of the site over some 2,000 years, from a small Iron Age village to a prosperous Medieval agricultural estate. The changing modes of burial testify to the shift away from pagan beliefs by the villa's inhabitants that led to the construction of one of the earliest know early Christian churches in Iberia. Even during the Islamic era (c. 8^{th}-12^{th} centuries AD) when the region was virtually abandoned and the Church itself fell into disrepair, the memory of this sacred space remained alive in the sparsely populated countryside. After the Reconquest, a royal grant of the Palma lands to a family ennobled for their military service to the King built a new chapel on the site of the old church, ushering in a new pattern of burials within its precinct.

III. The People Who Built Torre de Palma: the Bio-archaeology of an Early Christian Community

MARY LUCAS POWELL, DELLA COLLINS COOK, MARK R. SCHURR, JOHN R. HALE,
MAIA M. LANGLEY AND SARAH B. HOLT

1. Introduction

Chapter II presented a summary of the mortuary features at Torre de Palma. Detailed descriptions of the individual tombs are contained in Appendix I, the Mortuary Database, ordered chronologically from the earliest (the Iron Age village) to the most recent (the Medieval *Capela de São Domingos*). This chapter examines the skeletal remains of the inhabitants themselves in order to characterize their physical characteristics, diet, illnesses and traumatic injuries, and skeletal evidence of routine activities such as horseback riding. The chapter concludes with a brief "osteobiography" of an unusual individual, whose presence was unexpected but not incongruous, given Portugal's long relationship with lands that lay far to the south.

2. The Skeletal Sample

2.1. The Inventories of the Human Skeletal Remains

Bioarchaeologist Mary Lucas Powell spent several weeks during the University of Louisville Archaeological Project field seasons in 1996 and 1997 making a detailed inventory of the human remains and collecting data on the skeletal representation, age, and sex of each identifiable individual, skeletal metrics and morphology, paleopathology, and markers of daily activity. All the skeletal material recovered by the Louisville excavations had already been carefully washed with tap water and labeled with catalog numbers by the time she began her examination. In the case of commingled remains, the inventory entries for bones belonging to "adults" or "subadults" were color-coded on Powell's skeletal inventory forms to facilitate identification and analysis. The human bone preservation at Palma was generally very good, even for the delicate bones of young children and infants. This condition is due primarily to the alkaline quality of the soil, due to erosion from two large limestone hills located just above and east-northeast of the site (Clarke, 1992; Langley, 2006).

In 1999 and again in 2000, Powell spent four weeks examining the human remains from Palma recovered between 1947 and 1971 by archaeological excavations from the MNAE (now the MNA) in Lisbon. She was assisted by Nathalie Antunes-Ferreira, a recent graduate of the bioarchaeology program in the Department of Anthropology at the *Universidade de Coimbra*. These remains had not been cleaned prior to curation, and Antunes-Ferreira carefully washed each set of remains, using tap water and a very soft brush or cotton swabs. The bones were exposed to as little water as possible for cleaning, and a 50% alcohol/water solution was employed to clean the teeth, to reduce absorption of water that might cause cracking of the tooth crowns. The remains were air-dried overnight on one of the long tables in the osteology laboratory. The bones were then laid out in anatomical order for inventory.

During their first week of work, Powell and Antunes-Ferreira realized that, in many cases, the human remains from a single *sepultura* were curated in multiple containers with non-contiguous numbers. Many of the *sepulturas* had contained the partial remains of multiple interments, and it soon became obvious that each one of the small boxes (*volumes*) within each larger container (*contentor*) might contain commingled bones from several different individuals. In the small boxes, the remains were typically grouped by bone type, e.g., many vertebrae in one small box, long bones in a longer box, and a complete cranium in a third box. For each *sepultura*, Powell and Antunes-Ferreira filled out one or more skeletal inventory forms (depending on the number of individuals represented, with the individual *contentor* and *volume* numbers keyed to each category of remains. In the case of commingled remains, the inventory entries for bones belonging to adults or subadults, and when possible, for separate individuals, were color-coded on the skeletal inventory forms to facilitate identification and analysis.

Powell was aided in her analysis by a preliminary survey of the human remains made by John R. Hale, who spent several weeks in 1983 compiling a list of all materials from the MNAE excavations at Torre de Palma curated at the MNA and making photocopies of all the catalog cards for these materials. He also photographed and made notes on all the complete human crania from the site, which were at that time on display in a large glass-fronted cabinet. Hale's set of Summary Sheets listed the *contentor* and *volume* numbers for each *sepultura* along with his own estimation of sex and age of each skeletal individuals represented. These documents proved invaluable to Powell and Antunes-Ferreira.

Appendix II, the Skeletal Representation Database, contains data about the skeletal representation of each identified individual in the Palma sample, organized in six chronologically-ordered Tables (II.1 through II.6). The skeletal data are presented schematically by anatomical location and based on Powell's and Antunes-Ferreira's inventories. In these tables, left and right sides are counted separately (e.g., the left arm and the right arm, both more than 25% complete, would be scored as "PP") for skeletal elements or regions (e.g., the hand and foot) that are bilaterally paired. All the parts of the skull are counted together in one category.

In 2002, all the archaeological collections from Torre de Palma recovered by the American excavators were moved from the *Museu Municipal* in Monforte to the MNA where the other materials from Palma were curated as part of MNA Accession 243. From 2005 through 2009, Maia M. Langley taught a series of eight-week-long summer Bioanthropology Laboratory Workshops at the MNA devoted to teaching students methods of archaeological research using curated museum collections. Cristina Pombal, a recent graduate of the bioarchaeology program in the Department of Anthropology at the *Universidade de Coimbra*, supervised the re-inventory of the human skeletal remains during the 2005 Workshop, and Cristina Cruz (also a graduate of *Universidade de Coimbra*) filled this position in the later Workshops.

As part of each Workshop, the students cataloged the human remains from Torre de Palma, according to MNA protocols. Every feature that yielded human remains from the site was assigned a unique catalog number, and every piece of human bone or tooth from that provenience was assigned a three-part catalog number that encoded (1) the year of cataloging, (2) the *sepultura*/feature number, and (3) the sequential number for that specific item. For example, the first piece of cranial bone catalogued in 2005 from *Sepultura* 3-A from the Church's baptistry bears the MNA catalog designation "2005.226.1". After the bone inventory was completed, Pombal and the students drew up a paleobiological summary for each set of human remains which indicated the number of individuals identified by age and sex and contained a broad range of metric and morphological data collected from the individual skeletal elements. The raw data from these inventories were entered into a series of Excel files for the MNA archives.

3. Age and Sex Structure of the Palma Population Sample

3.1. Taphonomic Factors Affecting Skeletal Representation

The total skeletal sample from Torre de Palma, recovered from 139 mortuary features, represents a minimum of 249 individuals: 90 subadults (infants, children, juveniles, and adolescents) and 159 adults (54 females, 69 males, and 36 adults of undetermined sex).

It is the largest human sample recovered so far from a villa in Portugal. Unfortunately, not all of these individuals are equally well represented by skeletal remains, and a quick glance at Tables II-1 through II-6 in Appendix II shows that a large proportion of these individuals are present only in fragments. A variety of taphonomic factors is responsible for this heterogenous pattern, beginning with natural forces that hastened the decay of the bones in the ground through the acidity of the soil, the invasion by plant roots, and the destructive mechanical action of repeated wetting and drying out of the soil around the bones. Some bones were destroyed by small burrowing animals, identifiable by the distinctive marks of their gnawing. The most destruction was wrought by human actions – first, the tomb robbers who roughly rummaged about in the graves searching for valuable ornaments or other items, and later, the archaeologists who despite their careful excavation techniques unavoidably damaged the most fragile bones in the very process of recovery.

3.2. Methodology

Powell's estimates of age for each identified individual were based on standard osteological criteria outlined in Acsádi and Nemeskeri (1970), Bass (1987), and Buikstra and Ubelaker (1994). For subadults, development and eruption of the primary and secondary dentitions provided the most accurate age estimates; however, many of the subadults lacked dental material and their age estimates were based on the degree of skeletal development (e.g., fusion of the vertebral arch to the centrum, or length of long bone shafts). Individuals whose skeletal development (complete eruption of the permanent dentition except for the third molars, and fusion of the major post-cranial epiphyses) indicated a minimum age of 20 years were classified as adults. When possible, adult individuals were placed into decade-specific age-at-death categories: 20-30, 30-40, 40-50, 50-60, and 60+ years. The most reliable criteria for this classification were specific features of morphology of the pubic symphysis and sacroiliac auricular surface. Many adults lacked these features, however, and their decade-specific age estimates were based, perforce, on evaluation of the degree of endocranial and ectocranial fusion of the major sutures of the cranial vault, and macroscopic wear on the occlusal surfaces of the teeth. Decade-specific age estimates were possible for fewer than half of the adults.

For assessment of biological sex, pelvic morphological features proved the most reliable: the breadth of the sciatic notch, the structure of the pubic symphysis and arch, and the size of the acetabulum relative to the overall size of the innominate. For estimation of sex in adults, Powell followed the method outlined by Acsádi and Nemeskeri, scoring each key cranial and pelvic feature on a sliding scale: -2, female; -1, probable female; 0 indeterminate; +1, probable male; +2, male. For each individual, the scores were totaled; a negative number indicated a female and a positive number indicated a male. Estimation of sex was not attempted for subadults except for late adolescents (aged 18-19 years), because of uncertainty about the applicability of published methods for younger subadults.

A small number of adults provided the full range of skeletal features useful for age and sex assessment: complete crania with partial or complete dentitions, key pelvic criteria, and long bone metric data. These adults provided a valuable core sample for the construction of population-specific standards of dental macrowear correlated with estimates of pelvic age, very useful for comparisons with adults represented by teeth but not by pelves or observable cranial sutures; their post-cranial metric data, graphed by sex, were invaluable in constructing sex estimates for adults who lacked crania and/or pelves.

The demographic information presented in this chapter and in the preceding one represents a synthesis of the individual age and sex estimates of Powell and Antunes-Ferreira and the demographic profiles constructed by Cruz and Pombal in the Bioanthropology Laboratory Workshops at the MNA, following protocols outlined in Ferembach et al. (1980), Massey (1989), and other standard bioanthropological references. Powell worked closely with Langley and Cruz in the 2007 and 2008 Workshops. The age and sex estimates for the human remains from the *Cemitério de Pombal* were derived collectively by Powell and two of the Workshop students, Abby Crawford and Karimah K. Richardson.

The few discrepancies between the earlier and later estimates were resolved by re-examination of both data sets.

3.3. Results

Of the 249 individuals in the total burial sample (Table 3.1), 90 (36%) died before the age of twenty years. Of this subadult segment (Table 3.2), 30 (33.3%) were neonates or infants younger than 2 years at death, 21 (23.3%) were children who died between the ages of 2 and 6, and 20 (22.2%) juveniles who died between ages 6 and 12 years. The remaining 19 (21.2%) died during adolescence (12-20 years).

Age (years)	Subadults					Adults						Totals
	Infant 0-2	Child 2-6	Juvenile 6-12	Adolescent 12-20	N	20-30	30-40	40-50	50+	?Adult	N	
Pre-Christian	3	1	0	0	4	0	0	0	0	1	1	**5**
NW Cem	3	5	4	3	15	5	9	14	7	20	55	**70**
Church	7	7	10	8	32	4	19	9	5	22	59	**91**
Medieval Chapel	17	6	0	2	25	0	3	0	0	6	9	**34**
SW Cem	0	2	5	3	10	3	8	2	1	13	27	**37**
Pombal	0	0	1	2	3	0	0	3	0	6	9	**12**
S Field West	0	0	0	1	1	0	0	0	0	0	0	**1**
TOTALS	**30**	**21**	**20**	**19**	**90**	**12**	**38**	**28**	**13**	**68**	**159**	**249**

Table 3.1 — Age Profiles of the Structure of the skeletal sample.

LC #	**Infants** 0-2 years	**Children** 2-6 years	**Juveniles** 6-12 years	**Adolescents** 12-19 years	**N sum**
	Pre-Christian Tombs				
	Urna 5152	TP.66.95			
	TP.109.92				
	TP.113.93				
	3	**1**	**0**	**0**	**4**
	NW Cem (Complex A)				
7	NW 2/*Sep* 9				
16	NW 5/*Sep* 3				
20		NW 7			
10		NW 12/*Sep* 8		NW 12/*Sep* 8	
10			NW 12/*Sep* 8		
8		NW 13	NW 12/*Sep* 8		
24	NW 16				
26			NW 18/*Sep* 11		
6		NW 34		TP.21.85	
9				NW 36	
none		TP.21.85			
	3	**5**	**4**	**3**	**15**
	Church (Complex B)				
43	Tomb N/*Sep* P				
44			Tomb M/*Sep* H	Tomb M/*Sep* H	
49		Tomb U/*Sep B*			
104	Tomb 8	Tomb 8			
62	Tomb E				
	Large Reburial				
53	TP.119.84	TP.119.84	TP.119.84	TP.119.84	
53		TP.119.84			
	Baptistry & Environs				
63	Tomb C/*Sep* 7-A			Tomb C/*Sep* 7-A	
65		Tomb Y/*Sep* 8-A			
67			Tomb AA/*Sep* 9-A		
69	Tomb CC/*Sep* 10-A	Tomb CC/*Sep* 10-A			
69		Tomb CC/*Sep* 10-A			
70			Tomb DD/*Sep* 6-A	Tomb DD/*Sep* 6-A	
71			Tomb EE/*Sep* 5-A		
72			Tomb V/*Sep* 3-A	Tomb V/*Sep* 3-A	
73			Tomb W/*Sep* 2-A		
74				Tomb X/*Sep* 1-A	
	Human Remains Not Associated With a Tomb				
none	TP.83.84	TP.83.84			
none		TP.83.84			
102				TP.1.86	
	7	**9**	**7**	**7**	**30**

Table 3.2 — Subadult age profile.

LC #	Infants 0-2 years	Children 2-6 years	Juveniles 6-12 years	Adolescents 12-19 years	N sum
	Medieval *Capela*				
113		Tomb 10			
114	Tomb 9				
114	Tomb 9				
115	Tomb 4				
115	Tomb 5				
115	Tomb 6				
115	Tomb 7				
	Human Remains Not Associated With a Tomb				
123	TP.9.83	TP.9.83			
none	TP.113.84 & TP.13.98	TP.113.84 & TP.13.98		TP.113.84 & TP.13.98	
none	TP.113.84 & TP.13.98				
none	TP.113.84 & TP.13.98				
none	TP.74.84	TP.74.84		TP.74.84	
none	TP.74.84				
none	TP.82.84				
none	TP.116.84				
none	TP.123.84				
none	TP.123.84				
none	TP.123.84				
	Sq N023E024,Sec A	Sq N023E024,Sec B			
none		Sq N023E024,Sec A			
			Contentor 4767, v.2		
	18	**6**	**1**	**2**	**27**
	SW Cem (Complex D)				
76				SW 2	
78			SW 4 TP/*Sep* 7		
82				SW 8	
83			SW 10		
87			SW 13/*Sep* 2		
88				SW 14/*Sep* 1	
116			*Sepultura* A		
117		*Sepultura* B			
120		*Sepultura* M			
120			*Sep*. imperc.		
	0	**2**	**5**	**3**	**10**
	Cemitério do Pombal				
			Pombal 2	MNA 4	
				MNA 7	
				's/ind.'	
	0	**0**	**1**	**3**	**4**
	South Field				
				TP.67.98, 6.99, 198.99	
	0	**0**	**0**	**1**	**1**
TOTAL N	**30**	**21**	**20**	**19**	**90**

* These two individuals were found in 2005 boxed with *Sepultura* 25, during the Human Osteology Workshop at the Museu; they had not been included in that *Sepultura* in 2000 when Powell examined the human remains from that feature and are not included in her original inventory. They have been included in the total MNI in this Table because they most likely belong to the Palma archaeological collections.

Table 3.2 (cont.) — Subadult age profile.

Of the 123 individuals whose remains yielded reliable estimates of adult age at death (Table 3.3), 38 (30.9%) could not be placed within any of the 10-year adult age categories because of taphonomic factors, poor preservation, or incomplete recovery. Of the remaining 91 adults, 12 (9.8%) died between the ages of 20 and 30, 38 (30.9%) died between the ages of 30 and 40, 22 (17.9%) died at ages 40 to 50, and at least 13 adults (10.6%) reached their sixth, seventh, or even eighth decade of life.

Mortuary Area	20-30 years	30-40 years	40-50 years	50-60 +	Adults ?	Totals
Females						
NW Cemetery	4	8	3	1	7	**23**
SW Cemetery	2	4	0	0	2	**8**
Church	3	10	1	2	3	**19**
Pombal	0	0	1	0	1	**2**
Medieval Chapel	0	2	0	0	0	**2**
Totals	**9**	**24**	**5**	**3**	**13**	**54**
Percentage	**16.7%**	**44.4%**	**9.2%**	**5.6%**	**24.0%**	**42.2%**
Males						
NW Cemetery	1	1	11	6	6	**25**
SW Cemetery	1	3	2	1	5	**12**
Church	1	10	7	3	10	**31**
Pombal	0	1	1	0	2	**4**
Medieval Chapel	0	1	0	0	1	**2**
Totals	**3**	**16**	**21**	**10**	**24**	**69**
Percentage	**4.3%**	**20.4%**	**24.6%**	**14.5%**	**36.2%**	**56.1%**
Combined Sex Totals	**12**	**38**	**22**	**13**	**38**	**123**
Percentage	**9,3%**	**31,2%**	**20,3%**	**10,1%**	**28,1%**	**100,0%**

Table 3.3 — Adult age profile, by sex.

Four-fifths of the adults in the series (54 female, 69 males, 123/159, 77.3%) were sufficiently well-preserved for accurate estimation of sex. Metric data of proven utility for sex estimations, such as maximum diameters of humerus and femur heads, were collected from this core group of adults and employed to estimate the sex of less complete adult remains. Some adults with reasonably complete crania and/or mandibles lacked suitable postcranial remains for sex estimation, so cranial sexing criteria were relied upon when appropriate.

3.4. Discussion

The Church and Baptistry yielded almost half of the early Christian tombs. Subadults were recovered from all the mortuary areas but they are not equitably distributed, as Table 3.2 shows. One specific area in the Church, the Medieval Chapel (*Capela de São Domingos*) in Apse 3 and the adjacent portion of Room XII in the Western Basilica, yielded a very dense concentration of infants (late fetus/neonate – 2 years), comprising almost two-thirds (18/30, 60.0%) of the total number in this age category at Torre de Palma, as well as several older children. There is no evidence of segregation of adult burials by sex in any of the four areas that contained the majority of the tombs (the Church, the Northwest and Southwest

Cemeteries, and the Pombal Cemetery). The age and sex data from the Torre de Palma skeletal sample are not adequate for advanced demographic analysis, e.g., for construction of life tables, because of the very incomplete representation of many of the individuals.

4. Intra-Site Chronology

4.1. Absolute Dating of Individual Burials: the Archaeological Evidence

The earliest periods are poorly represented by mortuary features, and the great majority of the human remains came from the early Christian tombs (c. 4^{th}-8^{th} centuries AD) in the Church (*the Capela*/Complex B), the Northwest Cemetery (*the Cemitério ao pé das Ermidas*/ Complex A), the Southwest Cemetery (*the Cemitério da Villa Lusitano-Romano*/Complex D), and the *Cemitério do Pombal*. Although samples of architectural mortar from specific sites within the Church have yielded numerous ^{14}C dates that chart the consecutive construction stages (Maloney and Ringbom, 2000, and see Chapter I), very little archaeological evidence is available to seriate the tombs. To date, radiocarbon dates have been obtained from samples taken from three individuals. An adult male identified in the Small Reburial (TP.21.85) in the Northwest Cemetery yielded a calibrated date of AD 385–535 (2-sigma range; intercept of radiocarbon age with calibration curve at AD 420). The adult male buried in Tomb 11 (Apse 2) in the Eastern Basilica of the Church yielded a calibrated date of AD 620–670 (2-*sigma* range; intercept of radiocarbon age with calibration curve at AD 655). An adult female (MNA 4769, v.2) recovered from an unidentified location within the Church has been dated by ^{14}C to the 15^{th}-17^{th} centuries (AD 1469–1648, 2-sigma range). Two young children, buried beneath the elevated floor of the *Capela de São Domingos* in the Western Basilica of the Church, provided archaeological evidence for absolute dates: they were interred each with a coin (a *ceitis*) dated 1438–1557. Additional coins of that era were found in the subfloor fill that contained the disarticulated remains of infants and children (Huffstot, 1999-2000).

4.2. Relative Dating through Analysis of Fluoride in Human Bone

Given the paucity of archaeological evidence for absolute dating of the human remains, another method was implemented: the analysis of fluoride in human bone, which provides a relative dating method useful for seriating samples in a site-specific temporal sequence (Schurr, 1989). This method is based on the principle that buried bones and teeth gradually absorb fluoride ions from their environment via contact with ground water. Therefore, in a specific archaeological context, the oldest bones would have higher fluoride levels than the youngest bones, assuming that they were all exposed to the same taphonomic conditions. When applied and interpreted correctly, "the method can be extremely useful in the development of intrasite chronologies and in assessing the degree of mixing within and between deposits in a site or component" (Schurr and Gregory, 2002, p. 282). It can be profitably combined with archaeological contextual data and absolute dating techniques for establishing valuable intra-site chronological profiles.

Most of the early Christian tombs at Palma were simple pits dug down into the limestone bedrock, which lies very near the surface of the ground. Their walls were typically lined with bricks or clay roof tiles and the surface margins of the graves were marked with bricks, blocks and slabs of marble, granite, and schist (including lintels and thresholds), and broken sections of concrete floors and gutters from the abandoned villa that lay a short distance to the south. The bones in the Large and Small Reburials were placed in pits dug directly into the bedrock near where their original tombs had been discovered.

4.2.1. Materials and Methods

In 1999, Powell submitted 73 samples of human bone from burials excavated by the University of Louisville Torre de Palma Archaeological Project to Mark R. Schurr, a pioneer in the development of the fluoride relative dating technique at the Department of Anthropology at the University of Notre Dame, Indiana. Different skeletal elements display differential bone density: for example, a sample of femur midshaft cortex is denser than a sample of comparable size from the shaft of a rib. Ideally, all the Palma samples would have been drawn from elements of equal density; however, because of the incomplete nature of many of the sets of skeletal remains, this practice would have significantly restricted the intra-site representation of the Palma series. The preferred bone type was fragments of long bone shaft, but when necessary, samples were taken from mandibles, ribs, and fragments of pelvis or cranial vault.

The preparation and analysis of the bone samples followed the methodology described previously by Schurr (1989; Schurr and Gregory, 2002). To prepare the bone samples for analysis, cancellous bone was removed when present and the bones were cleaned using a nylon brush under distilled water. The bone fragments were then placed in deionized water, sonicated in an ultrasound cleaner for 30 minutes, and dried for 24 hours at 70°C. The clean, dry bone fragments were then ground to a fine powder with an agate mortar and pestle. Small portions of the powder were weighed in plastic disposable cups using an analytical balance, and then dissolved in .5ml of .5M perchloric acid. This solution was diluted with 1ml of water followed by 1ml of TISAB II buffer solution; this buffer controls the pH of the sample and forms complexes with other ions that might interfere with the desired measurement.

The fluoride content of each bone sample was measured using a fluoride-selective electrode, calibrated before each sample measurement using standard fluoride solutions to ensure consistency. The electrode was placed in the prepared solution, a reading was taken after submersion for two minutes, and the fluoride content was calculated from the calibration curve and the weight of the sample. A standard bone-powder sample was included in each run to verify that there were no systematic errors in the measurement. Three replicate determinations were made for each sample, and the average of the three replicate measurements was used to calculate the fluoride content of the bone, expressed as percent fluoride.

4.2.2. Results

Table 3.4 lists the provenience, age, sex and fluoride value (% fluoride) for each human bone sample, grouped by intra-site location, and Table 3.5 shows the location of each sample's value within the entire range of values. Figure 3.1 charts the continuous distribution of fluoride values (N = 73; range 0.086% – 1.246%; mean value 0.4984%) for Palma bone samples. Figure 3.2 is a bar graph which presents visual comparisons of the relative ranges of fluoride values for the samples representing each intra-site location. The five individuals with absolute dates are indicated on the graph.

The lowest value (0.086) came from a sample of calcined human bone from Tomb 5 in the Northwest Cemetery; Schurr pronounced this sample "essentially a fossil," and eliminated it from further analysis. The highest value (1.246) represented an elderly male (60+ years at death) buried in NW 21, a well-constructed tomb with head, foot, and both walls built up of five courses of bricks laid flat and a floor of bedrock. This high value is consistent with the two relatively early radiocarbon dates obtained for this particular mortuary locale: a calibrated radiocarbon date of 410–610 AD from a sample of brownish-yellowish mortar (TP.036.2) with fine aggregate, taken in one piece from the interior joints between the two upper layers of the east wall of the Mausoleum in this cemetery (Äsa Ringbom, personal communication), and a calibrated date of AD 385–535 (2-sigma range; intercept of radiocarbon age with calibration curve at AD 420) from an adult male in the Small Reburial from this cemetery.

4.2.3. Statistical Analysis

The fluoride levels in the human bone samples from Torre de Palma were compared statistically by four variables: age group, sex, intra-site location, and bone type, using one-way analysis of variance (ANOVA). The sample series included 16 subadults, ranging in age from neonates to young adolescents (<15 years). Several of the very young children showed fluoride values that seemed markedly inconsistent with their burial contexts. For example, the neonate (TP.109.92) buried beneath a room floor in the 2nd-3rd-century AD villa, the earliest sample in the series based on archaeological context, showed a value of 0.149%, the second lowest value in the entire series. And the two young children (Tomb 9 and Tomb 10) who were buried with 15th-16th-century coins beneath the Western Basilica floor showed values of 0.431% and 0.460%, respectively; these values placed them squarely in the center of the range, although they were among the most recent burials in the series, according to archaeological context and associated artifacts. This pattern at Palma was the reverse of the differential pattern by age observed by Schurr and colleagues in human bone samples from the Neolithic site of Tell Halula in Syria (Guerrero et al., 2011), where subadults showed typically higher fluoride values than adults from the same specific contexts. Schurr and his colleagues decided to omit subadults younger than 15 years at death from further analysis for the final relative dating sequence at the Syrian site, and Schurr and Powell decided to follow this same plan for Palma series.

Table 3.4 — Fluoride values of Palma samples. ▶

Burial	TP#	Age	Sex	Bone Type	%F1	Absolute dates
The Church						
Large Reburial	TP.119.84, ind 2	Adult	?	ilium	0,387	
Large Reburial	TP.119.84, ind 6	Adult	?	maxilla	0,374	
Large Reburial	TP.119.84, ind 3	Adult	?	ilium	0,314	
Large Reburial	TP.119.84, ind 4	Adult	?	femur	0,304	
Large Reburial	TP.119.84, ind 7	Adult	?	mandible	0,251	
Large Reburial	TP.119.84, ind 1	Adult	?	ilium	0,179	
Large Reburial	TP.119.84, ind 5	Adult	?	femur	0,144	
B01	TP.28.83, 50.83	19-22	Female	tibia	0,145	
B02	TP.45.83	30-40	Male	rib	0,365	
B03	TP.59.83 A	35-45	Female	fibula	0,895	
B03	TP.59.83 C	30-40	Male	pubis	0,806	
B03	TP.59.83 B	35-45	Male	ulna	0,791	
B03	TP.59.83 D	25-30	Male	parietal	0,458	
B03	TP.59.83 E	35-45	Male	parietal	0,483	
B03	TP.59.83	juv 8-10	?	fibula	0,533	
B04	TP.124.84	neonate	?	long bone	0,668	
B05	TP.114.84	child 3-5	?	long bone	0,663	
B07	TP.115.84	infant	?	fibula	0,509	
B08	TP.117.84	30-40	Female	fibula	0,85	
B09	TP.116.84*	infant	?	fibula	0,431	* Coin, AD 1438-1557
B10	TP.118.84**	child 5-6	?	fibula	0,46	** Coin, AD 1438-1557
B11	TP.96.84 ***	adult	Male	carpal phalanx		*** AD 655 (C14 calibrated date intercept)
Apse 3	TP.6.83	Adult	?	metatarsal	0,632	
Apse 3	TP.6.83	child 2-3	?	long bone	0,483	
Apse 3	TP.9.83a	infant	?	long bone	0,493	
Apse 3	TP9.83b	child 2-3	?	rib	0,431	
Apse 3	TP.123.84	infant	?	clavicle	0,415	
Apse 3	TP.82.84a	infant	?	fibula	0,388	
Apse 3	TP.82.84b	infant	?	rib	0,199	
Southwest Cemetery						
SW01	TP.23.85	30-40	Female	fibula	0,657	
SW02	TP.24.85	Adult	Female	long bone shaft	0,621	
SW05	TP.26.85	Adult	Female	long bone shaft	0,652	
SW07	TP.28.85	20-30	Female	long bone shaft	0,495	
SW08	TP.29.85	30-40	Female	long bone shaft	0,22	
SW10	TP.30.85	20-30	Male	long bone shaft	0,515	
SW11	TP.31.85	30-40	Male	long bone shaft	0,277	
SW12	TP.32.85	30-50	Male	long bone shaft	0,379	
SW13	TP.33.85 A	30-40	Female	clavicle	0,154	
SW13	TP.33.85 B	35-45	Male	fibula	0,543	
SW14	TP.34.85	20-30	Female	long bone shaft	0,397	
SW15	TP.35.85	30-40	Male	fibula	0,369	
SW18	TP.37.85	30-40	?	long bone shaft	0,368	
SW22	LC 80	30-40	Female	long bone shaft	1,088	
Northwest Cemetery						
NW2	TP.40.85	30-50	Female	tibia	0,536	
NW5	TP.1.85	Adult	Male	long bone shaft	0,086	
NW6	TP.2.85	30-40	Female	rib	0,479	
NW10	TP.5.85	30-50	?	rib	0,702	
NW11	TP.6.85	30-50	Male	rib	0,658	
NW13	TP.7.85	40-60	Male	fibula	0,622	
NW15	TP.8.85	Adult	?	tibia	0,452	
NW17	TP.9.85	30-40	Male	rib	0,465	
NW18	TP.10.85	40-50	Male	rib	0,715	
NW19	TP.12.85	Adult	Male	tibia	0,738	
NW21	TP.13.85	50-60	Male	rib	1,246	
NW34	TP.18.85 (1)	Adult	Female	tibia	0,875	
NW34	TP.18.85 (2)	Adult	Male	femur	0,665	
NW34	TP.18.85 (3)	Adult	Female	cranial vault	0,294	
NW34	TP.18.85 (4)	Adult	Male	cranial vault	0,426	
Small Reburial	TP.21.85 A	Adult	?	temporal	0,433	
Small Reburial	TP.21.85 B	Adult	?	temporal	0,789	
Small Reburial	TP.21.85 C	Adult	?	temporal	0,297	
Small Reburial	TP.21.85 D	Adult	?	temporal	0,478	
Small Reburial	TP.21.85 E ****	Adult	Male	long bone	0,4	**** AD 420 (C14 calibrated date intercept)
Small Reburial	TP21/85 F	Adolescent	?	long bone	0,288	
Other Locations						
South Field	TP.98.99, 98.00	17-19	Female	humerus	0,182	
Roman villa	TP.109.92	neonate	–	long bone	0,149	

% Fluoride Scale	NW Cemetery/Small Reburial	SW Cemetery
0.000 – 0.099		
0.100 – 0.149		
0.150 – 0.199		0.154/SW13
0.200 – 0.249		0.220/SW8a
0.250 – 0.299	0.288/SRB 7 0.294/NW 34.3	0.253/SW8b 0.277/SW11
	0.297/SRB C	
0.300 – 0.349		
0.350 – 0.399	0.400/SRB E**	0.368/SW18 0.369/SW15
		0.379/SW12 0.397/SW14
0.400 – 0.449	0.426/NW34.4 0.452/NW 15	
	0.423/SRB 6 0.433/SRB A	
0.450 – 0.499	0.465/NW17 0.479/NW6 0.478/SRB D	0.495/SW7
0.500 – 0.549	0.533/NW34.5 0.536/NW2	0.515/SW10 0.543/SW13
0.550 – 0.599		
0.600 – 0.649	0.622/NW13	0.621/SW2
0.650 – 0.699	0.658/NW11 0.665/NW34.2	0.652/SW5 0.657/SW1
0.700 – 0.749	0.702/NW10 0.715/NW18	
	0.738/NW19 0.739/NW34	
0.750 – 0.799	0.789/SRB B	
0.800 – 0.849		
0.850 – 0.899	0.875/NW34.1	
0.900 – 0.949		
0.950 – 0.999		
> 1.000	1.246/NW21	1.088/SW22
Total = 73	**N =23**	**N = 15**

* buried with a coin (*ceitis*), dated 1438c1557

** radiocarbon dated AD 385–434

Table 3.5 — Fluoride Values, by intra-site location.

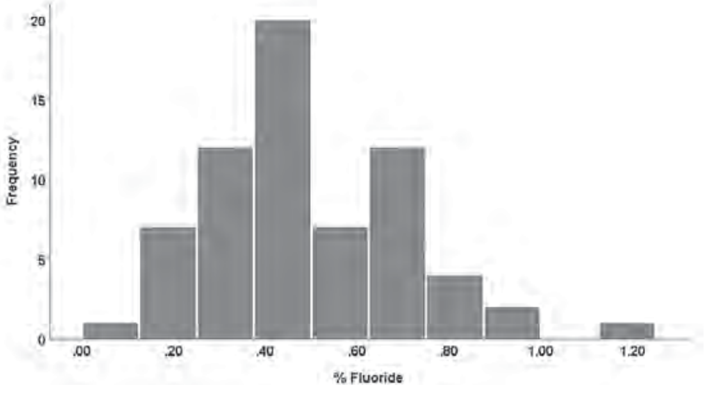


Fig. 3.1 — Distribution of fluoride values in Palma sample. (Mark R. Schurr)

Large Reburial	The Medieval Chapel	The Church	Other Site Areas
0.144/LRB 5		B1/0.145	0.149/Villa
0.179/LRB 1	0.199/TP.82.84		0.182/South Field
0.196/LRB A			
0.251/LRB 7			
0.282/LRB B			
0.304/LRB 4 0.344/LRB D			
0.314/LRB 3			
0.374/LRB 6 0.358/LRB C	0.388/TP.82.84a 0.365/B2		
0.387/LRB 2			
	0.415/TP.123.84 0.431/B9*		
	0.431/TP.9.83b		
	0.460/B10*	B3d/0.458 B3e/0.483	
	0.483/TP.6.83 0.493/TP.9.83		
	0.509/B7		
	0.632/TP.6.83		
	0.663/B5 0.668/ B4	B3j/0.652	
		B3b/0.791	
		B3c/0.806 B8/0.850	
		B3a/0.895	
		1.134/TP.1.86	
N = 11	**N = 13**	**N = 9**	**N = 2**

* buried with a coin (*ceitis*), dated 1438–1557

** radiocarbon dated d. C. 385–434

Table 3.5 (cont.) — Fluoride Values, by intra-site location.

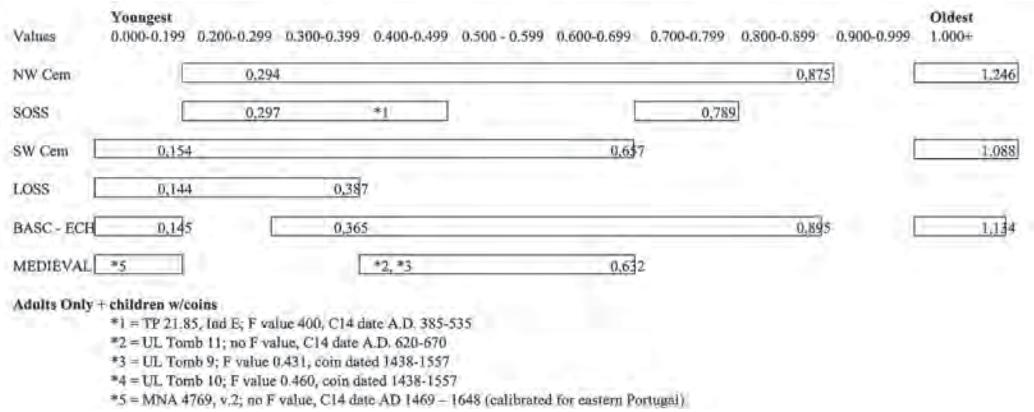


Fig. 3.2 — Bar graph of Palma fluoride values. (Mark R. Schurr)

A second ANOVA analysis by age which omitted Palma subadults <15 years old at death indicated no statistically significant difference ($p < .05$) among adults by age. Analysis of adults by sex also showed no significant difference ($p > .05$). A third analysis by bone type showed that bones with thicker cortex (e.g., mandibles) showed generally lower values than samples from ribs and long bones with relatively thin cortex (ulna, fibula, and tibia) regardless of burial context; however, this pattern was not judged as statistically significant ($p > .05$).

The ANOVA analysis by intra-site area indicated that the Northwest Cemetery (range of values: 0.294%–1. 246%) contained the oldest burials, followed respectively by the Basilica precinct (0.145%–0.895%), the Small Reburial (0.288%–0.789%), and the Southwest Cemetery (0.154%–0.657%). The SOSS (Small Reburial) values fall within the range of the Northwest Cemetery, as they should considering the archaeological context; it seems certain that the SOSS bones came from individual graves in the Northwest Cemetery. The range of values from the Large Reburial (0.144%–0.374%) fits neatly within the upper range of values from the Basilica; this probably reflects the inclusion of bones from post-Reconquest Medieval-era burials (12^{th}-16^{th} centuries) in the western portion of the Basilica, commingled with bones from the earlier Christian burials (4^{th}-8^{h} centuries) in that Complex. The only statistically significant difference revealed by ANOVA was the comparison between the Northwest Cemetery and the Large Reburial subsamples, a reasonable distinction consistent with their respective archaeological contexts.

5. Cranial and Mandibular Metrics and Morphology

5.1. Cranial Metrics & Morphology

Only a few of the adult Palma skeletons included cranial elements sufficiently intact for measurement. Table 3.6 lists the measurements taken on crania and mandibles; the definitions of the variables follow Martin (1928), Giles and Elliott (1962), Bass (1987), and Steele and Bramblett (1988). Tables 3.7 and 3.8 present descriptive statistics (mean values, SD, and minimum and maximum values) for females and males, respectively. The very small sample sizes preclude meaningful intra-site or inter-site statistical analysis, and the data are presented here for descriptive purposes. The mean cranial index calculated for the Torre de Palma females is 76.98 (N = 10, with a range of 73.22–80.23) which puts them well within in the "mesocranic" category (75.00–79.99, "average or medium"; Bass, 1987, p. 69). For the males, the average is 74.47 (N = 10, with a range of 72.00–77.23), classifying them as slightly more dolichocranic (X – 74.99, "narrow or long headed"; Bass, 1987, p. 69) than the females.

One adult female from Palma (ind. 4769, v.2) is not included in this because her distinctive cranial morphology set her apart from the other Palma females, suggesting that she represented a different genetic pool, most likely sub-Saharan Africa. She displays a longer and lower cranial vault than do the other adults in this typically mesocranic population sample: her cranial index of 70.40 (maximum cranial breadth

Cranium	
	Maximum Cranial Length (glabella–opisthocranion)
	Maximum Cranial Breadth (euryon–euryon)
	Maximum Cranial Height (basion–bregma)
	Basion-Prosthion Length
	Basion-Nasion Length
	Mastoid Length
	Prosthion–Nasion Height
	Minimum Frontal Breadth (frontotemporale–frontotemporale)
	Upper Facial Height (nasion–alveolare)
	Total Facial Height (nasion–gnathion)
	Bizygomatic Breadth (zygion–zygion)
	Nasal Height (nasion–nasiospinale)
	Nasal Breadth (alare–alare)
	Orbital Height (maximum height upper-lower orbital border)
	Orbital Breadth (maxillofrontale–ectoconchion)
	Maxilloalveolar Length (prosthion–alveolon)
	Maxilloalveolar Breadth (ectomolare–ectomolare)
	Palate Length (orale–staphylion)
	Palate Breadth (endomolare–endomolare)

Mandible	
	Bicondylar Breadth (condylion–condylion, lateral width)
	Bigonial Breadth (gonion–gonion)
	Ascending Ramus Height (gonion–uppermost surface of condylar head)
	Ascending Ramus Maximum Breadth (maximum distance between anterior and posterior borders)
	Ascending Ramus Minimum Breadth (minimum distance between anterior and posterior borders)
	Symphyseal angle (angle at gonion between inferior body border and posterior ramus border)
	Mandibular Body Length (gnathion–gonion)
	Mandibular Body Height at M1/M2 (maximum distance between inferior and superior body borders)
	Mandibular Body Thickness at M2 (maximum distance between lateral and medial points on the mandibular body at midline of M2)

Table 3.6 — Cranial and Mandibular Measurements.

	N	Mean (mm)	ST DEV	Min Value	Max Value
Cranium					
Maximum Cranial Length	10	178,85	6,44	167,00	187,00
Maximum Cranial Breadth	10	137,55	6,94	125,00	146,00
Maximum Cranial Height	7	131,43	4,07	125,00	136,50
Basion-Prosthion Length	5	86,88	4,77	81,00	92,50
Basion-Nasion Length	7	98,57	2,95	96,00	104,50
Mastoid Length	3	26,30	6,13	19,50	31,40
Prosthion-Nasion Height	5	62,32	2,77	59,20	66,70
Minimum Frontal Breadth	9	94,78	3,07	89,00	99,00
Upper Facial Height	8	66,38	3,44	60,05	70,60
Total Facial Height	2	111,85	3,75	109,20	114,50
Bizygomatic Breadth	5	126,70	2,99	125,00	132,00
Nasal Height	8	49,15	3,51	44,00	54,00
Nasal Breadth	7	23,31	1,45	21,70	25,30
Orbital Height	8	33,48	1,73	30,80	35,10
Orbital Breadth	8	37,47	1,64	34,90	40,00
Maxilloalveolar Length	5	52,58	2,84	48,10	55,40
Maxilloalveolar Breadth	5	59,70	4,08	55,40	64,50
Palate Length	5	42,28	2,34	38,60	44,00
Palate Breadth	5	35,26	3,12	32,00	40,30
Mandible					
Bicondylar Breadth	5	120,70	3,90	117	126
Bigonial Breadth	5	94,00	5,79	85	100
Ascending Ramus Height	6	56,05	7,05	44	65
Ascending Ramus Minimum Breadth	6	31,40	1,09	30	33
Symphyseal Height	6	28,35	2,07	25	31,3
Mandibular Body Length	5	71,65	3,77	66,25	76,5
Mandibular Body Height at M1/M2	6	25,95	1,66	23,5	28
Mandibular Body Thickness at M2	6	16,53	1,38	14,5	18,5

Table 3.7 — Cranial Descriptive Metrics – Females.

	N	Mean (mm)	ST DEV	Min Value	Max Value
Cranium					
Maximum Cranial Length	11	191,68	5,45	184,50	201,50
Maximum Cranial Breadth	11	142,68	2,50	139,50	147,00
Maximum Cranial Height	8	135,50	5,47	126,00	140,50
Basion-Prosthion Length	2	91,80	3,82	89,10	94,50
Basion-Nasion Length	0	0,00	0,00	0,00	0,00
Mastoid Length	2	25,25	5,44	21,40	29,10
Prosthion-Nasion Height	1	66,00	0,00	66,00	66,00
Minimum Frontal Breadth	11	97,51	6,35	90,00	109,00
Upper Facial Height	1	115,80	0,00	115,80	115,80
Total Facial Height	4	70,39	3,43	68,20	75,50
Bizygomatic Breadth	2	135,75	4,60	132,50	139,00
Nasal Height	8	52,64	3,04	47,50	57,20
Nasal Breadth	7	23,55	1,69	20,50	26,20
Orbital Height	8	33,86	1,85	31,20	35,60
Orbital Breadth	8	37,73	3,53	34,70	43,50
Maxilloalveolar Length	2	52,50	2,12	51,00	54,00
Maxilloalveolar Breadth	0	0	0	0	0
Palate Length	2	45,25	3,18	43,00	47,50
Palate Breadth	1	36,80	0,00	36,80	36,80
Mandible					
Bicondylar Breadth	1	131,00	0,00	131,00	131,00
Bigonial Breadth	2	106,00	1,41	105,00	107,00
Ascending Ramus Height	2	61,50	4,24	61,5	64,50
Ascending Ramus Minimum Breadth	1	34,50	0,00	34,50	34,50
Symphyseal Height	2	33,08	2,72	31,15	35,00
Mandibular Body Length	2	31,10	1,27	30,20	32,00
Mandibular Body Height at M1/M2	2	74,30	5,23	70,60	78,00
Mandibular Body Thickness at M2	2	16,05	2,76	14,10	18,00

Table 3.8 — Cranial Descriptive Metrics – Males.

(euryon–euryon) = 132mm x 100/maximum length (glabella–opistocranion) = 187.5mm) places her squarely in the dolichocranic category (X– 74.99, "narrow or long headed"; Bass, 1987, p. 69), more so than any of the males in the Palma sample. She is the subject of a detailed "osteobiography" in Section 10 of this chapter.

5.2 Cranial Non-Metric Traits

Non-metric traits of the skeletal system, also known as epigenetic traits or discrete traits, are often used to compare different population samples with respect to their occurrence. Unlike metric variables, nonmetric traits can be scored in fragmentary elements, a distinct advantage in poorly preserved skeletal series. Table 3.9 lists 25 commonly reported cranial non-metric traits observed in the Torre de Palma skeletal sample. Twenty-one of the traits listed here are defined and illustrated in Buikstra and Ubelaker's Standards for data collection from human skeletal remains (1994); the remaining four traits (Nos. 15, 18, 21, and 22) are taken from Hauser and DeStefano's (1989) definitive reference work on cranial nonmetric traits. These traits typically take one of four forms:

(a) Ossicles (small bones that form within cranial sutures),
(b) Variations in foramen number and location,
(c) Proliferative ossifications such as bony spurs, bridges, or tori, which represent abnormal bone formation; and
(d) Failures of ossification, resulting in open defects in normally patent bony surfaces.

Table 3.10 presents the frequencies of each trait by sex. For each trait, the number of possible observations was recorded, followed by the number of positive and of negative occurrences. For bilateral traits, left and right sides have been combined in the total counts of possible observations; for unilateral traits, the number of individuals of each sex observed is equal to the number of observations. All traits were scored dichotomously (i.e., as present or absent), except for the supraorbital foramen/supraorbital notch: the two different forms were scored separately. Atypical variants were noted on the original data forms, as, for example, the unusual internal divisions of the mental foramen observed in several individuals in a single large tomb, *Sepultura* 3-A located near the Baptistry.

Because of the wide variation in skeletal preservation and representation in the Palma human remains, some traits could be observed on many individuals (e.g., ossicles in the sutures of the cranial vault, maxillary and mandibular tori, and the facial foramina), while others could be scored on very few (e.g., traits located on the basicranium). The highest frequency for any trait was for the zygomatico-facial foramen, scored as "present" in 69.2% (9/13) of observable females and 52.0% (13/25) of observable males. Parietal foramina were common in both sexes: 58.3% (14/24) of females and 51.6% (16/31) of males. Neither ossicles at bregma nor parietal notch bones were observed in either sex, and several traits were present at high levels in one sex but not the other.

Because the cranial traits listed above have demonstrated familial inheritance in numerous studies of human populations, they have been frequently employed by bio-

Ossicles	
	1. Apical bone
	2. Bregmatic bone
	3. Asterionic bone
	4. Parietal notch bone
	5. Epipteric bone
	6. Lambdoid ossicle
	7. Sagittal ossicle
	8. Coronal ossicle
Proliferative ossifications	
	17. Maxillary torus (H&DeS)
	18. Palatine torus (H&DeS)
	19. Mandibular torus
	20. Auditory exostoses
	21. Divided hypoglossal canal
	22. Mylohyoid canal bridge

Foramina	
	9. Parietal (obelionic) foramen
	10. Supraorbital foramen present
	11. Mastoid foramen
	12. Zygomatico-facial foramen
	13. Accessory infra-orbital foramen
	14. Accessory palatine foramen (H&DeS)
	15. Accessory mental foramen
	16. Condylar canal foramen
Failures of normal ossification	
	23. Foramen spinosum incomplete
	24. Metopic suture present
	25. Divided occipital condylar facet (H&DeS)

Table 3.9 — List of Non-Metric Cranial Traits.

	Females, totals (NW cem., Church)			males, totals (All 4 areas)		
Non-Metric Trait	**N obs**	**N pres**	**% pres**	**N obs**	**N pres**	**% pres**
1. Ossicle at lambda	11	1	9,1	16	3	18,8
2. Ossicle at bregma	11	0	0	11	0	0
3. Ossicle at asterion	13	2	15,4	23	0	0
4. Parietal notch bone	21	0	0	28	0	0
5. Epipteric bone	18	1	5,6	22	0	0
6. Lambdoid suture ossicles	17	4	23,5	21	4	19
7. Sagittal suture ossicles	9	1	11,1	9	1	11,1
8. Coronal suture ossicles	17	1	5,9	15	0	0
9. Parietal foramen present	24	14	58,3	31	16	51,6
10. Supraorbital foramen present	27	11	40,7	26	6	23,1
10a. Supraorbital notch	27	20	74,1	26	6	23,1
11. Mastoid foramen	20	16	80	2	1	50
12. Zygomatico-facial foramen present	13	9	69,2	25	13	52
13. Accessory infra-orbital foramen	15	0	0	15	4	26,7
14. Accessory palatine foramen	10	6	60	17	0	0
15. Condylar canal foramen	9	5	55,6	20	2	10
16. Accessory Mental Foramen	21	3	14,3	38	2	5,3
17. Maxillary torus	22	3	13,6	17	0	0
18. Palatine torus	9	1	11,1	18	0	0
19. Mandibular Torus	20	6	30	33	10	30,3
20. Auditory Extoses	23	0	0	17	1	5,9
21. Hypoglossal canal divided	21	11	52,4	17	6	35,4
22. Mylohyoid Groove Bridge	19	4	21,1	30	4	13,3
23. Foramen spinosum open	4	2	50	26	6	23,1
24. Metopic suture present	16	2	12,5	8	2	25
25. Condylar facet divided	16	1	6,25	33	0	0

*Small and Large Reburials not included in this table

Table 3.10 — Non-metric cranial trait frequencies, by sex.

anthropologists seeking to identify family groupings in mortuary contexts (see Hauser and De Stefano, 1989; Buikstra, Frankenberg and Konigsberg, 1990a, 1990b) for extensive discussions of this topic). The French biological anthropologists Éric Crubézy and Pascal Sellier (1990a, 1990b) cite numerous European studies of this nature, emphasizing the importance of hypothesis construction and testing by statistical analysis to confirm genuine associations between archaeological and biological data pertinent to this goal.

An example is the statistical analysis of the occurrences of 71 osteological and dental traits in thirteen individuals recovered from a Late-Roman villa (3rd century AD) near Regensberg-Hartig in Bavaria, Germany (Alt, Pichler and Vach, 1995). The analysis supported the archaeologically-derived hypothesis that these individuals represented a portion of a multi-generational family who were killed when local Germanic tribesmen attacked the villa. The presence of two distinctive discrete traits (metopism and aplasia of M3) in five of the thirteen, as well as the presence of amelogenesis imperfecta in four of the five, far exceeded the expected frequency (compared with European reference populations) of these three traits if these individuals were unrelated biologically.

In Chapter II it was noted that many of the tombs (particularly those in and around the early Christian Church) contained multiple individuals in varying stages of skeletal completeness; the wide range of variation in this regard suggested the re-use of individual tombs over time rather than simultaneous interment of several individuals. This pattern was interpreted by the Portuguese and American archaeologists alike as evidence of re-use of "family tombs," a custom still observed in many parts of Europe today: the bones of the less-recent dead are rearranged to make room for the bodies of the newly dead, thus maintaining a family connection in a specific mortuary location. The appearance of several atypical forms of one particular discrete cranial trait, accessory mental foramina, in 4 of the 6 observable mandibles in one of the large tombs, *Sepultura* 3-A in the Baptistry, located just to the south of the southern nave wall of the Western Basilica offers biological evidence suggestive of a family affiliation among these 6 individuals, i.e., a "family tomb." The variants in *Sepultura* 3-A are of several different forms (fig. 3.3):

<u>Juvenile, 7-9 years</u>: The anterior portion of the left mandible (the right side is missing) presents one large mental foramen divided internally by a thin bony bridge.

<u>Adolescent, 12-14 years</u>: On the left side, a large oval foramen of normal size and appearance is flanked by a smaller foramen posterior to it; the two are connected by a narrow channel (confirmed by inserting the tip of a metal probe into the larger foramen, which was then visible in the smaller foramen). On the right side, the normal foramen is flanked by a small accessory foramen just anterior-superior to it.

<u>Adult #1</u>: The left mental foramen is large, with a broad groove curving parallel to its superior border. The right foramen is smaller, with a very small accessory foramen just anterior to it.

<u>Adults #2</u> (right side only) and <u>#3</u> (left side only) have normal foramina.

<u>Adult #4</u>: The right mental foramen is very large (6.7×5mm) with a broad bony internal bridge dividing it internally. Two visible bony channels, one heading anteriorly, the other heading posteriorly, flank this bridge. The left side is missing.

This trait has a low frequency of 14.8% in the total Palma sample (12 occurrences in 81 observations). It appears in only 9 individuals from 5 mortuary features: the 2 subadults and 4 adults from *Sepultura* 3-A (noted above), a young adult male (TP.1.86) in the northern end of the Church, and 1 adult in the Large Reburial (TP.119.84), all in the Church precinct, and an adult female in *Sepultura* 7 in the Northwest Cemetery. All the occurrences except those in *Sepultura* 3-A are solo appearances, manifesting as simple accessory foramina in addition to one foramen of normal size and appearance.

Fig. 3.3 — Mandibles from *Sepultura* 3-A showing variants of mental foramina. (Photo by David Brangers)

Hauser and De Stefano (1989, p. 230-232) define the mental foramen as the external opening of the mandibular canal which contains the inferior alveolar nerve and blood vessels. Interior to the opening of the foramen, each of these soft tissue structures bifurcates: one branch continues within the mandible to the canine and incisor teeth, while the other branch exits the mandible body towards the adjacent superficial structures. They note that "[this] foramen may vary with respect to its position, its shape and size [and] it may be double or multiple with varying distances between the apertures ... in most cases of multiple foramina these are not of equal size, they may be situated vertically one above the other, horizontally side by side or diagonally to each other ... If the second orifice is positioned either anterior to and a little below, or behind and below, the main mental foramen, it corresponds to a persistent external orifice of a canal de Serres ... and does not represent a second orifice of the mandibular canal." Internal divisions of the foramen may occur, either partial or complete, and no consistent differences in occurrence by sex or by side have been reported are noted, though some studies show a preponderance of one sex or one side or the other.

6. Post-cranial Metrics & Morphology

A total of 21 measurements for the humerus, femur, tibia, talus, and calcaneus of adults in the Palma skeletal sample are listed in Table 3.11. It is immediately evident from Table 3.12 (females) and Table 3.13 (males) that only a small subset of the adults provided metric data, but this small subsample does prove useful for analysis of adult post-cranial sexual dimorphism, intra-site variations, and inter-site comparisons. Five indices of skeletal morphology were calculated from these data. The humerus robusticity index and femur robusticity index both express the relative size of the long bone shafts. The femur pilasteric index reflects relative medio-lateral flattening of the shaft; this index complements the platymeric index, which quantifies the degree of anterior-posterior shaft flattening. In similar fashion, the platycnemic index expresses the relative medio-lateral flattening of the shaft of that bone.

Table 3.14 compares Palma male and female mean values of key metric variables of the humerus, femur, tibia, talus, and calcaneus for evaluation of sexual dimorphism. Two-tail t-tests were employed, assuming heteroscedastic variance in the male and female samples. For the index of sexual dimorphism, the male mean was expressed as a percentage of the female mean (male mean/female mean) for each measurement and morphological index, following Pomeroy and Zakrzewski, 2009.

Humerus	
	1. Vertical diameter of head
	2. Maximum length
	3. Maximum diameter at midshaft
	4. Minimum diameter at midshaft
	5. Least Circumference of the shaft (Bass 1995)
	6. Robusticity Index (Bass 1995)
Femur	
	7. Maximum length
	8. Bicondylar length
	9. Maximum head diameter
	10. Anterior-posterior subtrochanteric diameter
	11. Medial-lateral subtrochanteric diameter
	12. Anterior-posterior midshaft diameter
	13. Medial-lateral midshaft diameter
	14.Midshaft circumference
	15. Midshaft Robusticity Index (Bass 1995)
	16. Pilasteric Index (Ruff 1987)
	17. Platymeric Index (Bass 1995)
Tibia	
	18. Maximum length
	19. Anterior-posterior diameter at the nutrient foramen (Bass 1995)
	20. Medial-lateral diameter at the nutrient foramen (Bass 1995)
	21. Platycnemic Index (Bass 1995)
Talus (Silva 1995)	
	22. Maximum body length
	23. Maximum body width
	24. Midbody height
Calcaneus (Silva 1995)	
	25. Maximum body length
	26. Maximum body height

Table 3.11 — List of postcranial measurements.

Variable	N	Mean	SD	Min	Max
Humerus					
Head Vert Diameter	24	40,58	2,067	36,70	44,50
Max Length	18	292,94	17,433	272,00	340,00
Midshaft Max Diameter	23	19,83	1,567	17,80	22,80
Midshaft Min Diameter	23	15,73	1,141	14,10	19,00
Least Circumference	23	54,82	3,501	51,00	62,50
Robusticity Index	**17**	**18,64**	**1,62**	**16,18**	**21,40**
Femur					
Maximum Length	23	421,72	19,003	388,00	459,00
Bicondylar Length	19	396,43	20,147	381,00	457,00
Max Head Diameter	31	41,22	1,795	38,00	44,50
Subtroc AP Diameter	28	24,54	2,369	20,60	29,50
Subtroc ML Diameter	29	30,48	2,514	24,20	35,80
Midshaft AP Diameter	34	27,25	1,949	24,50	32,60
Midshaft ML Diameter	34	26,17	2,100	23,00	32,00
Midshaft Circumference	32	81,98	3,893	32,00	92,00
Midshaft Robusticity Index	**20**	**12,81**	**0,38**	**11,93**	**13,43**
Pilasteric Index	**34**	**104,13**	**10,89**	**78,53**	**124,49**
Playmeric Index	**27**	**81,22**	**11,53**	**62,61**	**119,42**
Tibia					
Max Length	16	333,00	17,340	311,00	376,00
Nut Foramen ML Diameter	16	30,55	2,175	27,40	34,70
Nut Foramen AP Diameter	16	21,53	2,285	18,05	25,40
Platycnemic Index	**12**	**70,35**	**7,132**	**61,50**	**85,50**
Talus					
Max Body Length	14	52,25	2,00	48,50	56,00
Max Body Width	15	40,10	2,35	37,00	45,00
Midbody Height	15	29,53	1,27	27,00	31,50
Calcaneus					
Max Body Length	20	74,87	2,59	71,00	80,50
Max Body Height	20	42,80	3,06	38,00	50,00

Table 3.12 — Palma females: Postcranial descriptive skeletal metrics.

Variable	N	Mean	SD	Min	Max
Humerus					
Head Vert Diameter	31	46,63	2,5186	42,00	52,00
Max Length	23	318,93	10,8526	303,00	338,00
Midshaft Max Diameter	26	23,05	2,8287	19,35	32,90
Midshaft Min Diameter	26	18,81	1,5724	15,40	21,40
Least Circumference	26	65,21	5,2862	52,00	52,0
Robusticity Index	**21**	**20,94**	**1,08**	**19,28**	**23,3**
Femur					
Maximum Length	24	453,35	21,4286	412,00	499,00
Bicondylar Length	21	451,69	22,4513	411,00	412,00
Max Head Diameter	37	48,45	2,9973	42,20	52,00
Subtroc AP Diameter	30	27,57	2,6801	22,60	37,00
Subtroc ML Diameter	29	33,71	3,3917	24,20	40,40
Midshaft AP Diameter	36	31,23	2,5370	24,40	35,00
Midshaft ML Diameter	36	27,77	2,1860	24,80	34,50
Midshaft Circumference	33	90,61	6,5464	78,00	103,00
Midshaft Robusticity Index	**18**	**13,08**	**0,4900**	**12,12**	**14,14**
Pilasteric Index	**36**	**112,99**	**11,3720**	**80,29**	**134,62**
Playmeric Index	**24**	**81,55**	**7,8600**	**66,09**	**98,38**
Tibia					
Max Length	20	366,18	20,46	326,00	407,00
Nut Foramen ML Diameter	20	35,6	2,56	31,00	40,20
Nut Foramen AP Diameter	19	24,59	2,52	20,60	30,00
Platycnemic Index	**17**	**69,347**	**6,37**	**58,50**	**80,00**
Talus					
Max Body Length	22	58,25	2,67	54,00	64,50
Max Body Width	21	44,14	2,75	39,00	49,00
Midbody Height	22	32,41	1,90	29,00	36,50
Calcaneus					
Max Body Length	21	83,31	4,56	73,00	91,00
Max Body Height	20	45,97	4,21	37,00	55,00

Table 3.13 — Palma males: Postcranial descriptive skeletal metrics.

Variable	Male N	Male Mean	Male SD	P	t value	d.f.	SD Index*	Female N	Female Mean	Female SD
Humerus										
Head Vert Diameter	31	46,63	2,519	* 0.0001	9,537	53	1,149	24	40,58	2,067
Max Length	23	318,93	10,853	* 0.0001	5,856	39	1,089	18	292,94	17,433
Midshaft Max Diameter	26	23,05	2,829	* 0.0001	4,838	47	1,162	23	19,83	1,567
Midshaft Min Diameter	26	18,81	1,572	* 0.0001	7,755	47	1,196	23	15,73	1,141
Least Circumference	26	65,21	5,286	* 0.0001	7,997	47	1,190	23	54,82	3,501
Robusticity Index	21	20,94	1,08				1,123	17	18,64	1,62
Femur										
Maximum Length	24	453,35	21,429	* 0.0001	5,345	45	1,075	23	421,72	19,003
Bicondylar Length	21	451,69	22,451	* 0.0001	8,159	38	1,139	19	396,43	20,147
Max Head Diameter	37	48,45	2,997	* 0.0001	11,769	66	1,175	31	41,22	1,795
Subtroc AP Diameter	30	27,57	2,680	0,584	0,551	62	1,012	34	27,25	1,949
Subtroc ML Diameter	29	33,71	3,392	* 0.0001	10,774	61	1,288	34	26,17	2,100
Midshaft AP Diameter	34	31,01	2,894	0,445	0,769	61	1,017	29	30,48	2,514
Midshaft ML Diameter	34	27,53	2,103	* 0.0001	5,262	60	1,122	28	24,54	2,369
Midshaft Circumference	33	90,61	6,546	0,592	0,538	63	1,105	32	81,98	3,893
Midshaft Robusticity Index	18	13,08	0,490				1,021	20	12,81	0,38
Pilasteric Index	36	112,99	11,372				1,086	34	104,13	10,89
Playmeric Index	24	81,55	7,860				1,004	27	81,22	11,53
Tibia										
Max Length	20	366,18	20,456	* 0.0001	5,167	34	1,100	16	333,00	17,340
Nut Foramen ML Diameter	20	35,60	2,558	* 0.0001	6,283	34	1,165	16	30,55	2,175
Nut Foramen AP Diameter	19	24,59	2,516	0,001	3,736	33	1,142	16	21,53	2,285
Platycnemic Index	17	69,347	6,37				0,986	12	70,35	7,132
Talus										
Max Body Length	22	58,25	2,670	* 0.0001	7,205	34	1,115	14	52,25	2,000
Max Body Width	21	44,14	2,750	* 0.0001	4,609	34	1,101	15	40,10	2,350
Midbody Height	22	32,41	1,900	* 0.0001	5,130	35	1,098	15	29,53	1,270
Calcaneus										
Max Body Length	21	83,31	4,560	* 0.0001	7,237	39	1,113	20	74,87	2,590
Max Body Height	20	45,97	4,210	0,010	2,724	38	1,074	20	42,80	3,060

Table 3.14 — Postcranial sexual dimorphism, by skeletal metrics.

Table 3.15 compares subsamples of selected postcranial metric data from female and male adults in tombs within the Northwest Cemetery (Complex A) with adults buried within the Church precinct itself (Complex B). Following the common early Christian mortuary practice of preferred burial *ad sanctos* ("near the saints"), i.e., within the holiest parts of the church, burial within the church itself or within its precinct wall (Complex B) would no doubt have been considered preferable to burial in one of the associated extra-mural cemeteries (Complexes A and D). This location may have been reserved for individuals of higher social status, whose position ensured superior diets and health from childhood onward, resulting in larger body size relative to those individuals buried in locations of lesser prestige.

Table 3.16 presents comparative metric data from Palma adults with adults from several other Portuguese samples representing both archaeological populations (Troia) and modern Portuguese (the Coimbra Identified Skeletal Collection and the *Instituto de Medicina Legal* collection in Porto). Identification of metric data standards for sex estimation in human skeletal remains is most accurate when derived from known-sex population samples that are similar to the target study population. Sofia N. Wasterlain and Eugénia

	COMP A N	Means	SD	Min	Max	Core Sample Mean		COMP B N	Means	SD	Min	Max
Females												
Hum Max Length	6	286,67	15,651	272	310	N = 15	291.40	9	294,67	19,735	273	340
Hum Robust Ind	6	18,76	1,681	16,61	21,25	N = 15	18.96	9	19,098	1,97	16,18	21,25
Fem Max Length	6	413,333	20,086	395	437	N = 17	419.741	11	423,818	16,898	398	459
Fem Rob Index	8	12,91	0,283	12,35	13,13	N = 17	12.811	9	12,766	0,495	11,93	13,43
Fem: Pilasteric Index	6	107,344	6,869	97,701	115,094	N = 17	106.667	11	106,296	9,694	99,219	123,256
Fem: Platymeria	5	81,13	6,483	71,12	89,66	N = 16	81.130	11	81,13	14,266	64,23	119,42
Tibia Max Length	6	325,166	11,214	311	344	N = 14	333.000	8	342,375	18,205	315	376
Tibia: Platycnemia	5	67,14	8,857	61,5	72,7	N = 12	69.242	7	70,74	4,68	61,3	85,5
Males												
Hum Max Length	9	320,444	12,699	303	336	N = 18	320.471	9	320,5	11,906	308	340
Hum Robust Ind	9	20,997	1,357	18,4	23,29	N = 18		9	20,556	0,773	19,48	21,94
Fem Max Length	8	457,25	24,708	421	493	N = 14	451.730	6	447,917	13,61	435	473,5
Fem Rob Index	9	13,113	0,583	12,275	14,139	N = 18	13.080	9	13,046	0,463	12,118	13,441
Fem: Pilasteric Index	13	118,078	8,529	102,78	132,69	N = 20	118.365	7	120,864	11,495	102,71	143,62
Fem: Platymeria	13	84,31	8,206	66,089	98,387	N = 20	82.046	7	77,843	5,161	69,086	84,848
Tibia Max Length	12	362,042	22,884	326	395	N = 18	366.175	6	376,667	17,096	356	407
Tibia: Platycnemia	9	73,32	5,007	63,3	80	N = 16	69.206	7	64,2	4,494	58,5	71,4

Table 3.15 — Comparison of long bone metric means by Palma location and by sex.

Variable	N	Mean	SD		N	Mean	SD
	Females				**Males**		
Humerus							
Head Vert Diameter							
Palma	24	40,58	2,067		37	46,63	2,997
Coimbra ISC (W and C 2000)	100	39,70	2,06		100	45,02	2,33
Robusticity Index							
Palma	17	18,64	1,62		21	20,94	1,08
Troia (Gameiro 2003)	4	18,03	0,77		1	21,7	0
Femur							
Max Head Diameter							
Palma	31	41,22	1,795		37	48,45	2,997
Coimbra ISC (W & C 2000)	100	40,77	2,42		100	45,69	2,26
Platymeric Index							
Palma	27	81,22	11,53		24	81,55	7,860
Pompei (Capasso) in Lazer (2009)		84,2				85,1	
Herculaneum (Bisel) in Lazer (2009)		83,1				81,9	
Tibia							
Platycnemic Index							
Palma	12	70,35	7,132		17	69,347	6,37
Pompei (Capasso) in Lazer (2009)				70.3 comb, N=50 left			
Herculaneum (Bisel) in Lazer (2009)				(very similar to P)			

Table 3.16 — Palma vs. other samples: postcranial skeletal metrics and morphology.

Cunha (2000) analyzed the comparative value of humerus and femur epiphysis metric data for estimation of sex in adult skeletal remains, utilizing samples of 100 females and 100 males from the Coimbra Identified Skeletal Collection (CISC) curated at the *Museu de Antropologia, Universidade de Coimbra*. This Collection includes 505 individuals of known sex and age who lived and died during the late 19th and early 20th centuries in the region around Coimbra; the Collection is extraordinarily well-documented by hospital medical records and burial registers from the *Cemitério Municipal de Conchada* in that city. They had determined that the male-female midpoints (male Mean – female Mean/2) calculated for these variables from non-Portuguese population data, previously published by other researchers, failed to identify correctly an acceptable proportion of their CISC known-sex individuals, and their goal was to determine whether effective population-specific sectioning cut points between female and male mean values for five metric variables would yield more accurate data for studies of Portuguese populations.

6.1. Humerus

Sexual dimorphism: Comparison of Palma respective mean female and male values for vertical humerus head diameter by one-tailed t-test (Table 3.14) indicated a highly significant difference between them ($p < .0001$) at the .05 level. Palma females and males also differed significantly at this level for the other four humerus metric mean values presented in that table, and for mean humerus robusticity index values by sex: 18.64 for females vs. 20.94 for males.

Intra-site comparisons: Of the small sample available from female adults, those buried in the Church precinct, had longer, more robust humeri than did their counterparts buried in the Northwest Cemetery. Male humeri from the two locations showed almost exactly the same mean length, though those from the Northwest Cemetery were slightly more robust (Table 3.15).

Inter-population comparisons: The mean female and male values for vertical diameter of the humerus head (HVHD) in adults from Palma skeletal sample were somewhat larger than the equivalent values from CISC (Table 3.16): for females, 41.22mm vs. 39.70mm and for males, 48.45mm vs. 45.02mm. Therefore, the sectioning point for Palma adults for humerus head vertical diameter would be 43.60mm, not 42.36mm (the calculated sectioning point for the CISC sample).

6.2. Femur

Sexual dimorphism: Palma males and females were significantly dimorphic ($p < .0001$) for five of the seven femur metric variables analyzed (Table 3.14); only for subtrochanteric anterior-posterior diameter and midshaft maximum diameter were the differences in means not significant at the .05 level. Femur midshaft robusticity did not differ greatly between the sexes: the male mean for this index was 13.08, and the female mean was 12.81. The pilasteric index (which reflects relative medio-lateral flattening of the femur shaft) was considerably greater in Palma males (112.99) than in Palma females (104.13), although the complementary index (platymeric) which reflects relative anterior-posterior flattening of the shaft) showed almost identical means for both sexes: 81.55 for males vs. 81.22 for females, placing them at the upper end of the "broad or flat" category (range: X – 84.9) (Bass, 1995, p. 225).

Intra-site comparisons: Females buried in the Church precinct had longer but less robust femora than the females buried in the Northwest Cemetery (Table 3.15). In contrast, the males in the latter had longer but slightly less robust femora than those buried in the Church precinct.

Inter-population comparisons: Wasterlain and Cunha (2000) analyzed femur vertical head diameter data from 100 females and 100 males from the Coimbra Identified Skeletal Collection (CISC) for the purpose of establishing population-specific sectioning cut points between female and male mean values. In the Palma sample, male and female means were significantly dimorphic for this variable, and for both sexes the mean values exceeded those from the CISC sample (Table 3.16): for females 41.22mm vs. 40.77mm, and for males, 48.45mm vs. 45.69mm. The appropriate sectioning point for the Palma adult values would therefore be 44.83mm, not 43.23 (the CISC sectioning point).

6.3. Tibia

Sexual dimorphism: Palma males and females differed significantly (p < .0001) at the .05 level for two of the three tibia metric variables (Table 3.14). The mean values by sex for the anterior-posterior shaft diameter measured at the level of the nutrient foramen differed hardly at all (males = 24.59mm and females = 21.53), thus explaining the similarity of the male and female mean values for the platycnemic index (69.35 for males and 70.35 for females) which reflects the relative medio-lateral flattening of the upper tibia shaft. These values place the Palma female tibiae at the very upper end of the "mesocnemic" range (63.0–69.9), while the Palma male tibiae fall in the very lowest end of the "eurycnemic" range (70.0–X) (Bass, 1995, p. 245).

Intra-site comparisons: The mean for maximum tibia length from adult females buried in the Church precinct exceeded that from the Northwest Cemetery females (Table 3.15), matching the pattern seen for female mean maximum femur length in those two subsamples. These two higher values for the Church burials meant on the average they were taller than the females buried in the Northwest Cemetery.

Inter-population comparisons: Data for maximum tibia length was not available from other comparable Portuguese samples. Values for the platycnemic index for both Palma females and males was very similar to the values for the skeletal samples from 1st century AD Herculaneum reported by Luigi Capasso and by Sarah Bisel for the contemporaneous sample from Pompeii (Lazer, 2009) (Table 3.16).

6.4. Talus and Calcaneus

Sexual Dimorphism: Ana Maria Silva (1995) recorded metric data from the tali and calcanei of 80 males and 85 females of known sex from the Identified Skeletal Collection at the Museum of Anthropology, *Universidade de Coimbra*, Portugal, for the purpose of developing population-specific discriminant functions useful for determining sex based on these measurements. All the individuals in the Collection were European Portuguese who were born between 1826 and 1922 and died between 1910 and 1936. Table 3.17 compares selected metric talus and calcaneus data from females and males in the Palma skeletal series and CISC. The Palma females and males exceed the CISC individuals for all of these measurements. For example, the cut point between the Palma female and male means for

Variable	N	Mean	SD	Min	Max	N	Mean	SD
	Torre de Palma Females					CISC Females		
Talus								
Max Body Length (TM1)	14	52,25	2,00	48,50	56,00	85	48,12	2,33
Max Body Width (TM2)	15	40,10	2,35	37,00	45,00	85	37,31	2,21
Midbody Height (TM3)	15	29,53	1,27	27,00	31,50	85	27,68	1,55
Calcaneus								
Max Body Length (CM1)	20	74,87	2,59	71,00	80,50	85	72,10	3,95
Max Body Height (CM2)	20	42,80	3,06	38,00	50,00	85	44,01	2,46
	Torre de Palma Males					CISC Males		
Talus								
Max Body Length (TM1)	22	58,25	2,67	54,00	64,50	80	53,35	2,88
Max Body Width (TM2)	21	44,14	2,75	39,00	49,00	80	41,32	2,20
Midbody Height (TM3)	22	32,41	1,90	29,00	36,50	80	30,67	1,90
Calcaneus								
Max Body Length (CM1)	21	83,31	4,56	73,00	91,00	80	79,05	4,48
Max Body Height (CM2)	20	45,97	4,21	37,00	55,00	80	49,67	3,18

Table 3.17 — Talus and calcaneus metrics, Torre de Palma vs. CISC skeletal samples.

maximum length of the talus body is 55.25mm, while the CISC female-male cut point for this same variable is 50.74; similarly, the cut point between the Palma female and male means for maximum length of the calcaneus is 79.1mm, while the CISC female-male cut point for this same variable is 75.5mm.

A. M. Silva first applied her metric data to the set of discriminant functions developed by D. Gentry Steele (1976) for sex determination using talus and calcaneus metric data from the Terry Collection[1], a skeletonized 20th-century American White and Black cadaver collection from Washington University Medical School in St. Louis, Missouri. The mean values for the Terry Collection individuals generally exceeded those of her CISC sample, and so Steele's functions suffered a loss of classificatory power vis-à-vis the CISC data. A. M. Silva then developed a series of functions that demonstrated stronger classificatory power, and therefore are more appropriate for Portuguese (and other) population samples that match the Coimbra sample means.

As noted earlier in this discussion, this pattern of greater size for the Palma adults compared with the CISC adults is also evident in key measurements of the humerus (vertical head diameter) and femur (vertical head diameter and shaft length). As a result, A. M. Silva's discriminant functions, while highly accurate for sex determination in her sample, would tend to misclassify Palma females as males.

6.5. Estimations of Living Stature

Adult stature has been considered a valuable marker of general health and nutrition in population studies worldwide (summarized in Cardoso and Gomes, 2009). It is a particu-

[1] The Terry Collection was assembled (1910 – 1967) by Robert J. Terry, Professor in the Anatomy Department in the Washington University Medical School, St. Louis, Missouri, and by his successor Mildred Trotter. It represents European Americans and African Americans who died in the St. Louis area. This collection is now curated in the Department of Anthropology, National Museum of Natural History, Smithsonian Institution, in Washington, DC.

larly useful measure of health for ancient populations for whom few or no written records exist. The most reliable stature estimates for skeletal populations are those derived from living populations of similar biological and cultural attributes. Detailed studies of skeletonized cadaver collections have demonstrated that maximum length measurements of leg bones (the femur and tibia) yield more accurate estimates of living stature than do maximum length measurements of arm bones (the humerus, radius, and ulna) (Trotter, 1970).

Table 3.18 presents mean femur lengths for adult females and males from Palma and from seven other Portuguese population samples, ranging in time from Roman (2nd century BC-6th century AD) to the mid 20th century (Cardoso and Gomes, 2009), plus one Medieval sample from a Muslim cemetery in Écija, southwestern Spain (Pomeroy and Zakrzewski, 2009). The Palma sample means (420.75mm for females and 453.35mm for males) exceed those from the late 19th-early 20th -century cadaver samples from the Museu Bocage, Lisbon (Cardoso and Gomes, 2009) and those from Coimbra Identified Skeletal Collection at the Universidade de Coimbra (Correia, Balseiro and De Areia, 2005). They are most comparable to those from the Medieval (12th-16th centuries AD) sample from Leiria (424.20mm for females and 451.30mm for males, Garcia 2007) and those from the late 20th-century cadaver sample from the Instituto Medicina Legal in Porto (423.20mm for females and 455.40mm for males; Mendonça 2000).

Table 3.19 contains mean stature estimates for adult females and males from these eight population samples, calculated by the formula developed by Mendonça (2000). By comparison, the Torre de Palma males and females were, on the average, taller than a sample of late 19th-early 20th-century Portuguese from the northern districts of the country (Mendonça, 2000). In that sample of 100 males and 100 females from the *Instituto de Medicina Legal* in Porto, male stature ranged from 153-185cm, with a mean of 167.9cm, and female stature ranged from 145-175cm, with a mean of 157.7cm.

Cardoso and Gomez (2009), in their review of secular trends of stature in Portugal from the Mesolithic era (6th millenium BC) to the mid 20th century AD, track an overall increase in adult male and female height from prehistory to the Middle Ages. They posit several factors for the precipitous decrease in stature, however, from the 16th century through the late 19th century: the gradual economic decline of Portugal during those centuries, with increasing urbanization and slow adaptation to industrialization relative to northern European nations. The widescale movement of Portuguese (following the general trend in Europe) from rural to urban centers during the later portions of the "Early Modern Ages" (18th and 19th centuries) led to overcrowding, poor sanitation and medical care, rising levels of infectious disease, all these factors exacerbated by inadequate nutrition for all but the wealthy classes. When comparing general levels of health in Portugal health over the past five hundred years, they state, citing Magalhães' (1993) analysis of agricultural and pastoral practices in Portugal, that "poor nutrition during the Portuguese Early Modern Ages, compared with the Middle Ages, has been associated with deficient labor in cultivating the fields, competition from cheaper foreign products, diversion of resources for the Portuguese overseas expansion, and lack of investment in technology by the great landowners who still exploited peasant labor." They noted that Maat (2005), Steckel (2004), and others have documented a similar decline in health (evaluated by multiple measures) and adult stature in other parts of Europe during this time. All of these researchers document a sharp reversal of this downward trend beginning in the late 19th century, following significant advances in agricultural methods and food production, medical care, sanitation, and institutionalized

Time Period (Common Era)	Sample	N	Mean (mm)	SD	N	Mean (mm)	SD	Reference
		Females			Males			
Mesolithic (5210-4950 BCE)	Moita do Sebastião (Salvaterra dos Magos)	1	375		4	426,50	18,21	Cardoso and Gomes, 2009
Late Neolithic/Chalcolithic (3500-2100 BCE)	Poço Velho, Eira Pedrinha	17	386		4	408,40		Cardoso and Gomes, 2009
Roman (2nd C BCE-6th C)	Conímbriga (Coimbra)	3	397,90		6	446,40		Gameiro, 1998
Visigoth (6th C)	Silveirona (Estremoz)	7	411,00	9,24	17	448,50	25,64	Serra, 1952
Early Christian (4th-8th C)	**Torre de Palma (Monforte)**	**26**	**420,75**	**19,12**	**24**	**453,35**	**21,83**	**this study**
Medieval Muslim (8-11th C)	**Écija, Spain**	**32**	**409,83**		**40**	**450,79**		**Pomeroy and Zakrzewski, 2008**
Medieval (12th–16th C)	São Martinho (Leiria)	18	424,20	18,54	29	451,30	19,48	Garcia, 2007
Modern (Late 19th C)	Museu Bocage (Lisbon)	69	406,80	21,55	69	440,20	21,52	Cardoso and Gomes, 2009
Modern (Early 20th C)	Museu Bocage (Lisbon)	53	408,40	20,10	58	441,50	22,77	Cardoso and Gomes, 2009
Modern (19th-Early 20th C)	**Identified Skeletal Collection (Coimbra)**	**76**	**397,70**		**106**	**431,40**		**Correia, Balseiro and De Areia, 2005**
Modern (Late 20th C)	Instituto Medicina Legal (Porto)	100	423,20		100	455,40		Mendonça, 1995

Table 3.18 — Max. Femur Lengths: comparison of Portuguese samples.

Time Period (Common Era)	Sample	N	Mean (mm)	N	Mean (mm)	Reference
		Females		Males		
Mesolithic (5210-4950 BCE)	Moita do Sebastião (Salvaterra dos Magos)	3	148,00	10	153,20	Cardoso and Gomes, 2009
Late Neolithic/Chalcolithic (3500–2100 BCE)	Poço Velho, Eira Pedrinha, Quinta do Anjo	16	144,40	10	157,00	Cardoso and Gomes, 2009
Roman (2nd C BCE–6th C)	Conímbriga (Coimbra)	4	151,50	6	165,50	Gameiro, 1998
Visigoth (6th C)	Silveirona (Estremoz)	7	154,80	17	166,10	Serra, 1952
Early Christian (4th-8th C)	**Torre de Palma (Monforte)**	**26**	**160,09**	**24**	**170,82**	**this study**
Medieval Muslim (8-11th C)	**Ecija, Spain**	**32**	**154,54**	**40**	**166,66**	**Pomeroy and Zakrzewski, 2008**
Medieval (12th-16th C)	São Martinho (Leiria)	23	157,10	37	165,70	Garcia, 2007
Modern (Late 19th C)	Museu Bocage (Lisbon)	69	153,80	69	163,90	Cardoso and Gomes, 2009
Modern (Early 20th C)	Museu Bocage (Lisbon)	53	154,20	58	164,20	Cardoso and Gomes, 2009
Modern (19th-Early 20th C)	**Identified Skeletal Collection (Coimbra)**	**76**	**154,66**	**106**	**164,78**	**Correia, Balseiro and De Areia, 2005**
Modern (Late 20th C)	Instituto Medicina Legal (Porto)	100	157,70	100	167,90	Mendonça, 1995

Table 3.19 — Estimated Stature: comparison of Portuguese samples.

concern for the welfare of the poor, but these trends affected general levels of health and growth in southern Europe more slowly than in the northern regions. The comparison of adult stature (based on maximum femur length) in Table 3.19 of Portuguese population samples from the Middle Ages with those from the 19th and 20th centuries (e.g., the the Coimbra Identified Skeletal Collection data) fully illustrates this decline. Cardoso and Gomes (2009) attribute the subsequent reversal of this trend, beginning in the mid 20th century (Mendonça's sample from the Instituto Medicina Legal in Porto), to the rapid modernization of Portugal, which began in the 1960s and has progressed steadily since that time.

The skeletal sample from Palma represents the pre-Medieval period (c. 5th-8th centuries), yet the mean stature estimates for Palma females and males exceed those from medieval Leiria and Écija. What factors might account for this pattern? Palma was situated in a very fertile region of the Alto Alentejo, renowned since Roman times for its agricultural productivity and its abundant natural food resources (both plant and animal), an assessment supported by Mackinnon's study of the Palma faunal remains (Chapter IV) and the analysis of the Palma diet via carbon and nitrogen isotope assays in the following section of this chapter. Its location near a major well-known route leading from *Olisipo* (Lisbon) on the Atlantic Coast to *Augusta Emerita* (Mérida) in *Hispania* (fig. 1.1) assured its owners ready access to imported wares from various parts of the Roman Empire (as attested by the rich archaeological *spolia* at the site), but its inhabitants were spared the dangers of urban living: disease, poor nutrition and sanitation, and political disruptions.

Another factor that may have contributed to the relatively tall stature of the Palma inhabitants was the possible contribution of genetic material from tall northern European populations (e.g., Visigoths) who came to Iberia as mercenary allies of Rome to subdue the native Portuguese peoples in the last century BC. These peoples appreciated the natural richness of the Roman province of Lusitania, and many of them settled there permanently. Perhaps future aDNA analysis of Palma skeletons will shed light on this possible contribution.

7. Dietary Reconstruction

This analysis of the human diet at Palma combines information from three different sources: (1) analysis of stable carbon and nitrogen isotopes in human bone collagen by Mark Schurr; (2) faunal remains sampled from a 4th-5th century AD midden at Palma, described by zooarchaeologist Michael Mackinnon (1999-2000, 2000-2001, and Chapter IV in this publication); and (3) examination of the human skeletal remains from Palma for evidence of diet-related pathology, including dental caries, occlusal wear, and ante-mortem tooth loss.

7.1. Analysis of Stable Carbon and Nitrogen Isotopes

Stable isotope analysis of collagen from human bone allows for the reconstruction of individual diets from past populations (Katzenberg, 2008; Schoeninger, 2011) because, as the old saying goes, "You are what you eat." Bone collagen remodels very slowly, so the isotope values derived from bone samples cover roughly the last 10-30 years of the sampled individual's life and therefore provides a long-term view of diet. The two most frequently analyzed elements for dietary analysis are carbon and nitrogen. Like most elements, they both have several different isotopic forms that share the same number of protons and electrons but differ in their number of neutrons. The most famous carbon isotope in archaeological research is ^{14}C, an unstable radioactive isotope whose steady rate of decay over time makes it a very useful tool for the determination of the absolute age of organic materials. Stable (non-radioactive) isotope ratios of carbon (^{12}C/^{13}C, written as ð^{13}C) and nitrogen (^{14}N/^{15}N, written as ð^{14}N) occur in differing proportions in different plant and animal tissues, and are therefore widely used in the reconstruction of ancient diets.

Plants utilize contrasting photosynthetic pathways in metabolizing carbon dioxide: woody/leafy plants common to temperate climates, including most plants whose seeds, leaves, nuts, berries, or roots are used by humans for food, follow the C_3 (Calvin-Benson) pathway, while plants adapted to hot, dry climates, such as tropical grasses (including maize, amaranths, chenopods, and millet), follow the C_4 (Hatch-Slack) pathway (Schoeninger, 2011; Tieszen, 1991). The ratios of $^{12}C/^{13}C$ (written as ð^{13}C) are expressed as negative values in parts per thousand, or "per mil" relative to the international standard for carbon, Vienna PeeDee Belemnite Carbonate (VPDB), a marine carbonate (Katzenberg, 2008). These ratios differ markedly between the two plant categories.

The C_3 plants in the Palma diet would have included cereals such as wheat and barley (the major staples of the Mediterranean diet from ancient times up to the present day); olives and dry legumes (peas and beans) were also important, as attested by numerous Roman writers on agriculture and medicine (Garnsey, 1999; Flint-Hamilton, 1999). Two major C_4 plants prominent today in human diets, maize from the New World and sorghum in tropical Africa, had not yet been introduced into the Iberian Peninsula, but another C_4 plant, millet (*panicum miliaceum*, called "broomcorn millet"), was known in Greece and Italy from the 3rd millennium BC onwards. It was used mainly as fodder for cattle, although consumed by humans in times of scarcity. Italian millet (*setaria italia*) was also common in southern Europe (Brothwell and Brothwell, 1998, p. 99; Tafuri, Craig and Canci, 2009). Dalby (2003, p. 218) noted about millet in his encyclopedic study, *Food in the Ancient World from A to Z*, that "It must have been a convenient crop in certain special circumstances, since it will ripen in Mediterranean lands even if planted as late as the second half of June."

All nitrogen in a diet effectively comes from protein. Like carbon, the element nitrogen also has two stable isotopes, ^{14}N and ^{15}N, which occur in different proportions. Analysis of these isotopes is useful for investigating the importance of non-plant foods in archaeological diets, particularly dietary protein from animal products, e.g. meat or milk (Schoeninger, 2011). For nitrogen, the sample ratio (written as ð^{15}N) is compared relative to the international standard: AIR (ambient inhalable reserve) (Katzenberg, 2008; Schoeninger and Moore, 1992).

7.1.1. Materials and methods

Analysis of stable carbon and nitrogen isotope ratios in 65 human bone samples: 16 adult females, 20 adult males, and 16 adults of unknown sex, and 14 subadults excavated at Palma by the University of Louisville was conducted by Schurr. In keeping with the discovery by Katzenberg and Lovell (1999) that pathological segments of bone had higher levels of ð^{15}N (averaging 2%) than normal bone because the pathological bone contained collagen formed from the catabolism of existing proteins, bone samples were taken only from clearly non-pathological skeletal elements.

Upon arrival at Schurr's laboratory, the samples were processed according to standard laboratory protocols (described in Schurr and Powell, 2005). They were first cleaned in an ultrasonic cleaner and then protein was extracted from the cleaned samples by slow demineralization. All the bone samples from Palma met the established standards (Ambrose, 1990) for collagen preservation: %N > 5% and %C > 13%, atomic C: N ratios between 2.9 and 3.6 and percent, and collagen yields greater than 1%. The mean atomic C: N ratio was 3.45. The ratios of the extracted proteins, along with the percentages of carbon and nitrogen in the sample, were measured using a Finnegan Delta Plus mass spectrometer equipped with a Carlo-Erba elemental analyzer and a Conflo II interface. Carbon and nitrogen isotopes were measured simultaneously to collect data on the proportions of the two elements. The precision of the analysis, with results reported in the standard "delta" notation units of "per mil" (0/00), was +/- 0.1% for both elements, and the precision of the C/N ratio measurement was +/- 0.16.

Tomb Number	Schurr Lab #	Age	Sex	Bone	% Yield	ð 13 C	C/N	ð 15 N
Northwest Cemetery (Complex A)								
NW 34, ind 2	018/85-2	adult	F	femur	12,2	-19,4	3,45	12,9
NW 2/*Sep* 9C	040/85	30-40	F	tibia	9,5	-19,4	3,65	12,9
NW 13	31229	40-50	M	fibula	6,5	-19,6	3,28	11,9
NW 11	31199	40-50	M	fibula	6,4	-18,1	3,47	12,7
NW 6/*Sep* 1A	31079	30-40	F	rib	5,4	-19,8	3,37	11,7
NW 10	31168	40-50	M	rib	8,8	-18,4	3,29	11,4
NW 17	31291	30-40	M	rib	7,9	-19,8	3,58	11,7
NW 16	042/85	50-60	M	fibula	9,6	-18,5	3,28	12,0
NW 15	31260	adult	?	tibia	11,8	-18,7	3,52	10,6
NW 19/*Sep* 27	31382	40+	M	tibia	8,5	-19,6	3,45	12,5
TP.21.85A	021/85-A	adult	?	cranium	16,9	-18,7	3,27	11,3
TP.21.85B	021/85-B	adult	?	cranium	14,1	-18,7	4,83	16,1
TP.21.85C	021/85-C	adult	?	cranium	21,4	-14,3	3,33	11,6
TP.21.85D	021/85-D	adult	?	cranium	10,3	-18,9	3,29	12,1
TP.21.85	021/85-E*	40-50	M	femur	7,8	-19,4	3,50	13,3
Basilica & Baptistry (Complex B)								
TP.19.84-01	119/84-01	adult	?	ilium	10,8	-18,5	3,26	12,5
TP.19.84-02	119/84-02	adult	?	ilium	5,7	-11,3	3,26	14,0
TP.19.84-03	119/84-03	adult	?	ilium	9,6	-18,7	3,26	12,1
TP.19.84-04	119/84-04	adult	?	femur	7,2	-19,0	3,26	11,5
TP.19.84-05	119/84-05	adult	?	femur	7,3	-18,5	3,26	11,8
TP.19.84-07	119/84-07	adult	?	mandible	5,5	-19,1	3,26	11,8
TP.19.84-A	119/84-A	adult	M	ilium	7,6	-18,5	3,26	12,6
TP.19.84-B	119/84-B	adult	M	femur	10,3	-18,9	3,26	11,1
TP.19.84-C	119/84-C	adult	M	ilium	7,6	-18,4	3,26	11,6
TP.19.84-D	119/84-D	adult	F	femur	5,6	-16,9	3,26	11,9
Tomb 1	28/83;50/83	20-30	F	tibia	3,5	-20	3,28	9,1
Tomb 3A	059/83-A	30-40	F	fibula	5,3	-19,5	3,34	10,3
Tomb 3B	059/83-B	40-50	M	pubis	4,6	-19,3	3,28	10,8
Tomb 3C	059/83-C	45-60	M	ulna	7,8	-19,4	3,21	10,8
Tomb 3D	059/83-D	30-35	M	parietal	4,3	-19,2	3,24	11,2
Tomb 3E	059/83-E	40-50	M	parietal	6,5	-19,6	3,26	11,5
Tomb 11	096/84	40+	M	carpal ph	N/A	-18,8	3,31	14,0
MNA cont 4769, v.2	N/A	0-40	F	molar	N/A	-18,3	N/A	N/A
Southwest Cemetery (Complex D)								
SW 1	023/85	30-40	F	fibula	8,3	-18,9	3,38	11,3
SW 22	MNA 80	30-40	F	long bone		-17,2		10,2
SW 7	028/85	20-30	F	long bone	8,1	-18,9	3,35	11,5
SW 8A	029/85-A	30-40	F	long bone	4,5	-18,7	3,42	12,0
SW 8 B	029/85-B	16-18	?	long bone	5	-18,3	3,47	11,0
SW 10	030/85	adult	M	long bone	5,3	-19	3,79	12,6
SW 11	031/85	adult	M	long bone	10,3	-18,8	3,34	12,2
SW 13/*Sep* 2A	033/85-A	20-25	F	clavicle	10,2	-18,1	3,43	11,7
SW 13/*Sep* 2B	033/85-B	40-50	M	fibula	13,4	-18,7	3,3	12,2
SW 14	034/85	30-40	?	long bone	7,4	-19,1	3,34	12,7
SW 18	037/85	30-40	?	long bone	10,5	-19,2	3,52	11,8
SW 5	025/85	adult	?	long bone	6,9	-19,4	3,59	11,0
SW 15	035/85	30-40	M	fibula	11	-19	3,35	12,4

Table 3.20 — Stable Isotope Values for Palma Adults, by Sex and Location.

7.1.2. Results

The δ¹³C values for Palma adults ranged from -18.6‰ to –22.9‰, with an overall mean of -20.634 (SD 0.6989) (Table 3.20). This range suggests a diet oriented mainly to C_3 plants, with some inclusion of C_4 plants (probably millet, perhaps consumed indirectly via the meat of domesticated cattle). The overall mean female value for δ¹³C was -20.46 (SD 0.9387), with a range of -18.6 to -21.7. This mean is only a bit less negative than the overall mean male value of -20.832 (SD 0.6864), with a similar range: -19.8 to -22.9. Statistical comparisons by student's t-test of female and male mean values for δ¹³C within each of the three mortuary areas (the Church and its two cemeteries) indicated no differences by sex at the .05 level of significance (fig. 3.4).

At Palma, burial inside the Church precinct may have signaled a higher social status than burial in the two nearby cemeteries (Aries, 1982; Naji, 2005, and others). At Palma, for example, burial in proximity to the marble-lined tomb (UL Tomb 11) of the man buried in a prestigious location in the western apse of the larger basilica may have been a coveted reward. However, comparisons by t-tests of mean ð¹³C and mean values for males and female adults from the Church (Complex B) with age and sex-matched samples from the two small cemeteries indicated no significant differences ($p < .05$). In general, these patterns do not suggest different dietary patterns throughout life for the individuals buried inside or outside the Church precinct proper.

The Palma adult ð¹⁵N values range from 9.1‰ to 17.9‰, suggesting a diet rich in animal products. Statistical comparison of Palma male (mean = 12.3737) and female (mean = 11.3867) ð¹⁵N values showed a significant difference by sex ($P = 0.0435$), a quite different result from the comparison of ð¹³C mean values, suggesting that males consumed significantly more animal protein than did females. However, there were no statistically significant differences between the matched-sex samples from the two cemeteries or between

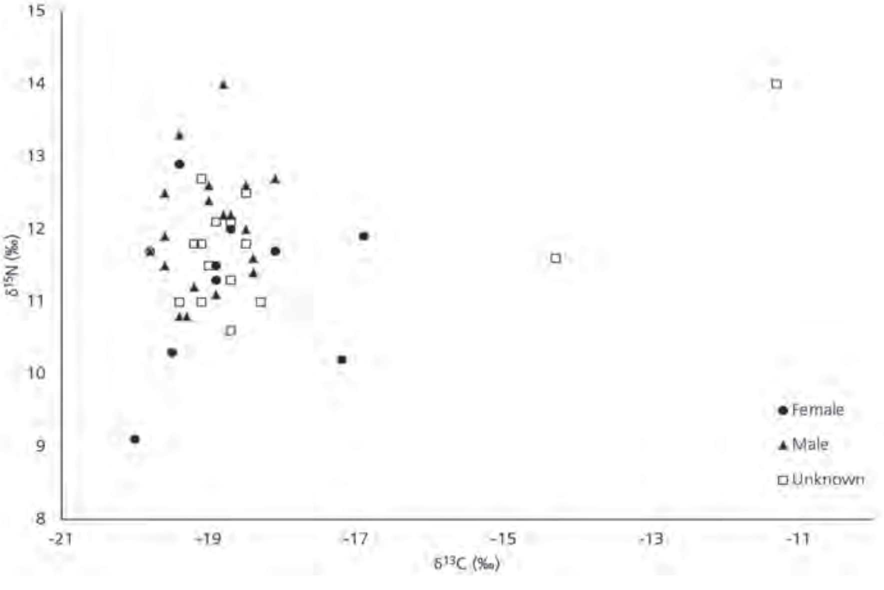


Fig. 3.4 — Carbon and Nitrogen Isotope Ratio Values at Torre de Palma. (Mark R. Schurr)

the combined-cemeteries sample and the sample from the Church precinct, suggesting that dietary differences with respect to protein were determined by sex, not by social status (fig. 3.4).

7.1.3. Inter-Site Comparisons

Figure 3.5 compares the carbon and nitrogen isotope signatures of the early Christian and Medieval inhabitants of Palma with the signatures of the other population samples described below. The Palma mean values for δ^{13}C fall well within the ranges reported for adults in western European populations during the Late Classical (Prowse et al., 2004; 2005; Lösch et al., 2014) and Medieval periods (Luxton, 2015), whose plant foods were almost entirely of the C_3 variety.

The relatively higher ð^{15}C values in the Palma bone samples indicate a diet with more abundant animal protein, a finding consistent with the zooarchaeological analysis summarized below and detailed in Chapter IV of this volume.

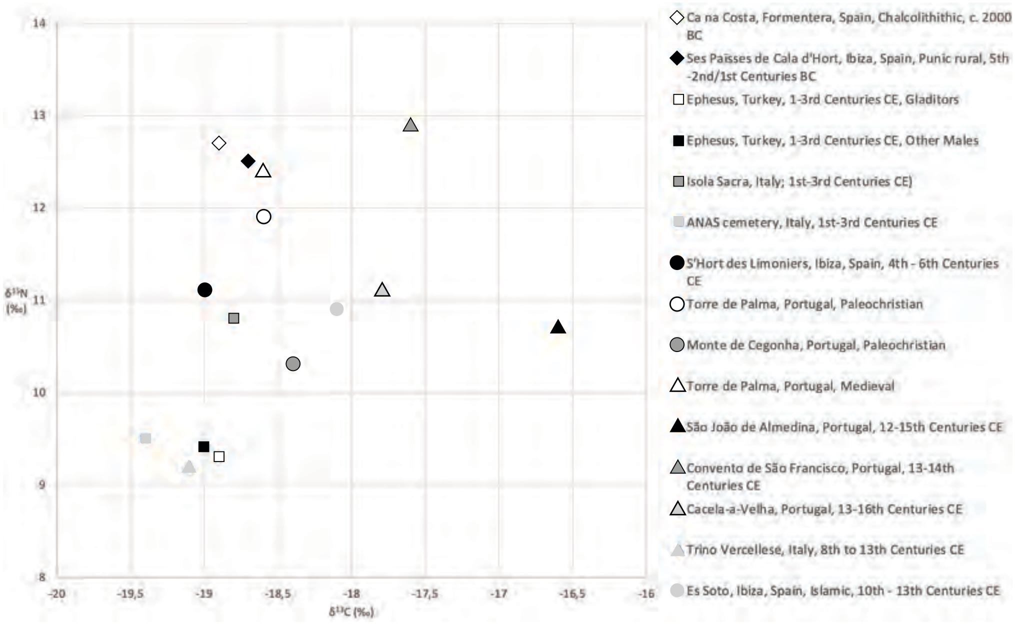


Fig. 3.5 — Dietary Isotope Ratios: Palma vs. other sites. (Mark R. Schurr)

7.1.3.1. Late Antiquity

Monte da Cegonha, Portugal. The Roman villa of Monte da Cegonha in southern Portugal (civitas of Pax Julia) is located approximately 100km south of Torre de Palma, 13.5km northeast of Beja in the Baxio Alentejo region of southern Portugal (Saragoça et al., 2016). The villa, built in the 1st century AD, was occupied with subsequent revisions until the 12th century. The restructuring of the villa in the 4th century incorporated a small early Christian basilica inside the villa, and interments there continued until the end of the 7th century. The 12 graves excavated in and around this church yielded the remains of 25 individuals: 5 complete skeletons (4 females and 1 male) and 20 ossuary burials (5 children younger than 5 years and 15 adults (1 female, 5 males, 2 probable males and 7 adults of indeterminate sex).

The human δ^{13}C isotopic collagen signatures ranged from -18.80 ‰ to -17.40 ‰. As at Palma, there were no significant dietary differences related to gender or to burial type (primary inhumations versus ossuary bones, sarcophagus versus other graves). At Palma, adult δ^{13}C bone collagen values bracketed the Monte da Cegonha values, ranging from -20.0 ‰ to -16.9 ‰. For Cegonha females, whether buried inside or outside the basilica, the mean value for δ^{13}C was -18.3‰, compared with the Palma overall mean female value for δ^{13}C of -18.8‰. The mean ð^{13}C value for Cegonha males differed slightly by burial location: -18.1‰ for those buried inside the basilica vs. -18.5 for those buried outside that location. By comparison, the overall male mean value for δ^{13}C at Palma was -19.0 ‰.

The human δ^{15}N isotopic collagen signatures at Monte da Cegonha ranged from 9.40 ‰ to 13.20 ‰. The comparable Palma δ^{15}N values are similar, ranging from 9.1 ‰ to 15.8 ‰. The mean value for females was 11.4 (N=11, SD=1.15, range 9.1 to 12.9), and for Palma males, 12.1 (N=20, SD=0.80, range 10.8 to 14.0). There were significant differences in δ^{15}N values (Mann-Whitney $p < 0.05$) between individuals buried inside and outside the basilica:

. Adults: Inside-basilica mean: 10.75; outside basilica mean: 9.98
. Subadults: Inside-basilica mean: 11.20; outside-basilica mean: 10.65

This pattern suggests dietary differences related to social stratification. The low nitrogen isotopic ratios suggest minimal freshwater fish intake, or perhaps low trophic level fish or fish sauce consumption, as reflected by the low δ^{13}Capa-col spacings reported.

Isola Sacra, Italy. Tracy Prowse and her co-authors (2004, 2005) sampled 105 skeletal individuals aged 5 - +45 years at death from the Imperial Roman-era coastal necropolis of Isola Sacra near Rome, Italy. For comparison, they also sampled 14 adult individuals from the ANAS Cemetery, a nearby inland site from the same time period. Table 3.21 compares mean carbon and nitrogen stable isotope values from these sites with data from Palma. The adults from Isola Sacra yielded relatively enriched ð^{13}C values (overall adult mean -18.8, with almost no difference at all between female and male means), interpreted as "indicat[ing] the consumption of a terrestrial diet combined with a significant contribution of one or more foods with high values of ð^{15}N." (Prowse et al., 2004, p. 263). Because Isola Sacra is located on the seacoast, it seems very likely that the diet included a high proportion of marine protein. The Palma ð^{13}C values (overall mean -20.634, SD 0.6989) are even more enriched, but given its inland location, consumption of millet seems a more likely explanation. The adults buried at the ANAS site, located inland from Isola Sacra, evidently consumed a more heavily terrestrial-protein diet perhaps supplemented with millet.

Prowse et al.'s sample (2004, 2005) included 14 subadults aged 5-15 years at death. The mean δ^{13}C value for these Isola Sacra subadults was -19.0 (N=14, SD=0.3), and the mean ð^{15}N value was 10.4 (N=13, SD=0.8). By comparison, the mean δ^{13}C value for the

Isola Sacra adults was -18.76 (N=91, mean SD=0.27) and the mean adult ð^{15}N value was 10.84 (N=91, mean SD=1.08). Prowse et al. noted, "Subadults (5-15 years) had lower ð^{15}N values than older adults, but their δ^{13}C values were generally higher than adult values ... it appears that they consumed a large herbivorous diet, which included less olive oil and wine than was typically found in adult diets." (Prowse et al., 2005, p. 10). Of course, archaeological mortality samples are, of necessity, composed of the "non-survivors" in each age category, and Prowse and her co-authors wisely note that "it may also be that these young 'non-survivors' were not eating an optimal diet… and this contributed to their early age-at-death." (Prowse et al., 2005, p. 10)

At Palma, bone samples were taken from 14 subadults ranging in age from newborn to adolescence for analysis of stable carbon and nitrogen isotopes (Table 3.21). The mean δ^{13}C value for the five Palma subadults aged 5-16 years was –21.02 (SD=0.3633), somewhat more negative than the mean δ^{13}C value for the Isola Sacra subadults of similar ages (-19.0). The mean ð^{15}N value for Palma older subadults was 11.44 (SD=1.3831), higher than the value for that age group at Isola Sacra (10.4).

UL Tomb	Schurr Lab #	Age	Bone	% Yield	ð^{15}N	C/N Ratio	ð^{13}C
Atrium Builder Villa, TP.109.92	109/92	Neonate	long bone	9,9	12,9	3,19	-18,2
Tomb 4	124/84	Neonate	long bone	11,6	12,9	3,26	-20,2
Tomb 7	115/84	Infant 1-1.5	fibula	10,1	14,2	3,26	-20,2
Medieval Chapel, TP.9.83a	009/83-1	Infant 1-2	long bone	8,2	13,7	3,23	-18,5
Medieval Chapel, TP.123.84	123/84	Infant	rib, clavicle	12,1	11,4	3,26	-18,6
Medieval Chapel, TP.82.84	082/84	Infant	fibula	8,6	11,9	3,31	-18,7
Medieval Chapel, TP.6.93	006/83-1	Child 2-3	long bone	9,9	10,7	3,26	-19,1
Medieval Chapel, TP.9.83b	009/83-2	Child 2-3	rib	15,2	15,8	3,36	-18,4
Tomb 5	114/85	Child 3-5	long bone	6,9	13,5	3,22	-20,2
Small Reburial, TP.21.85	021/85-6	Child 5-6	long bone	8,6	12,5	3,4	-18,8
Tomb 10	118/84	Child 5-6	fibula, rib	9,4	11	3,26	-21,2
Tomb NW 34, ind B	018/85	Child 7-8	cranial vault	11,2	13,1	3,51	-19,7
Tomb 3, ind F	059/83	Juvenile 8-10	fibula	6,1	9,6	3,33	-19,5
Small Reburial, TP.21.85	021/85-7	Adolescent 14-16	long bone	11,8	11	3,35	-19,1

Table 3.21 — Stable Isotope Values for Torre de Palma Subadults.

Ephesus, Turkey. Sandra Lösch et al. (2014) present data from stable carbon and nitrogen isotope analyses on 20 adult males excavated from a gladiator cemetery in Ephesus, Turkey, dated to the 2nd-3rd centuries AD, as well as from 13 non-gladiator males, 4 females, and 3 infants from other sites of the same era in that ancient city. Table 3.22 contains the mean values from these Ephesus samples, for comparison with Palma values. The mean ð^{13}C values for all adults (-18.9 for the gladiators, -19.0 for the non-gladiator males, and -18.9 for the females) show no statistically significant differences and are quite similar to those from the contemporaneous Isola Sacra and the ANAS samples from Italy. A few individuals show more positive ð^{13}C values, (e.g., -17.8), and the authors suggest that "the most probable cause for this is an increased consumption of C_4 plants such as millet" (Lösch et al., 2014, p. 9).

The ð^{15}N values are low relative to other contemporary Roman sites: the mean value for gladiators is 9.3%, the non-gladiator male mean is 9.4%, and the female mean is

Site Sample		N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
				ð^{13}C					ðN^{15}		
Torre de Palma	Females	15	-20,46	0,939	-18,60	-21,70	15	11,39	0,879	9,1	12,9
(Paleochristian, 5th–8th C)	Males	20	-20,83	0,686	-19,80	-22,90	20	12,37	1,558	10,8	17,9
	Sex Unknown	16	-20,56	0,320	-20,20	-21,40	16	12,30	1,352	10,6	16,1
	All Adults	51	-20,63	0,699	-18,60	-22,90	51	12,05	1,401	9,1	17,9
	Subadults (5-15)	5	-21,02	0,336	-20,50	-21,40	5	11,44	1,314	11	13,1
Three Medieval Portuguese Sites (Luxton 2015)											
São João de Almedina, Coimbra	Females	11	-16,58	1,18	-14,46	-18,83	11	10,98	0,63	10,33	12,12
	Males	13	-17,02	0,85	-15,35	-18,07	13	10,55	0,77	9,36	11,60
	All Adults	24	-16,82	1,01	-14,46	-18,83	24	10,75	0,73	9,36	12,12
Convento de São Francisco, Santarém	Females	17	-17,74	0,76	-15,73	-18,43	17	12,67	0,76	11,48	14,21
	Males	13	-17,70	0,51	-16,41	-18,08	13	13,19	0,77	11,98	14,45
	All Adults	30	-17,72	0,66	-15,73	-18,43	30	12,89	0,8	11,48	14,45
Cacela-a-Velha, Cacela	Females	9	-18,04	0,47	-17,43	-18,73	9	10,72	0,78	9,44	11,67
	Males	25	-17,66	0,76	-15,73	18,96	25	11,28	1	8,67	13,11
	All Adults	34	-17,76	0,71	-15,73	18,96	34	11,13	0,97	9,44	13,11
Isola Sacra, Italy (Prowse et al 2004, 2005)	ages 5- +45	105	-18,80	0,30	-17,80	-19,70	103	10,80	1,20	7,50	14,40
	Females	32	-18,87				32	10,67			
	Males	48	-18,70				48	10,97			
	Subadults 5-15	14	-19,00	0,30			14	10,40	0,80		
ANAS cemetery, Italy (Prowse et al 2004, 2005)	Adults	14	-19,41	0,37	-18,90	-20,00	14	9,50	1,79	6,90	11,30
Ephesus, Turkey (Losch et al 2014)	Gladiators	20	-18,90	0,40	-17,80	-19,40	20	9,30	0,80	7,60	11,20
	Other Males	13	-19,00	0,20	-18,70	-19,60	13	9,40	0,60	8,80	10,50
	Females	4	-18,90	0,50	-18,20	-19,40	4	8,90	1,10	7,40	9,80

Table 3.22 — Inter-site Comparisons of Stable Carbon and Nitrogen Isotope Values.

8.9%, possibly due to significant consumption of legumes and little animal protein. As Lösch et al. note, “Legumes generally have very low ^{15}N values due to their molecular nitrogen fixation by symbiotic bacteria, which in turn might be reflected in the consumer’s collagen.” (Lösch et al., 2014, p. 9)

7.1.3.2. The Medieval Era

Sharla Luxton (2015) analyzed stable carbon and nitrogen isotope levels in human bone from three Late Medieval sites in Portugal: São João de Almedina, in Coimbra, the Convent de São Francisco in Santarém, and Cacela-a-Velha, in the Algarve. Table 3.21. compares the mean isotope values in adult females and males at the three sites (Luxton, 2015, Tables 6, 7, and 8) with values from Palma adults. Although these three sites post-date the early Christian occupation at Palma, the basic diet there had probably changed little from the Classical Roman/Late Antiquity diet, nor was it very different from the typical medieval Iberian diet particularly for the inland sites located at Coimbra and Santarém (Alexander et al., 2015 and Luxton, 2015; both present detailed discussions of the medieval Iberian foodstuffs and dietary patterns).

At São João de Almedina, in Coimbra, (Luxton, 2015, Table 6), the mean δ^{13}C value equals-16.82‰ (SD 1.01), ranging from -18.83 to -14.46‰. The female mean is -16.58 (1.18), with a range of -17.54 to -14.46, and the male mean is -17.02 (SD 0.85), with a range of -18.07 to -15.35. At the Convent de São Francisco in Santarem, northeast of Lisbon, (Luxton, 2015, Table 7) the mean $\delta^{13}C$ value is -17.72‰ (SD 0.66) and range from -18.43 to -15.73‰. The female mean is -17.74 (SD 0.76), with a range of -18.43 to -15.73, and the male mean is -17.70 (SD 0.51), ranging from -18.08 to -15.73. At Cacela-a-Velha, in the south of Portugal (the Algarve) (Luxton, 2015, Table 8) the mean $\delta^{13}C$ value equals -17.76‰ (SD 0.71), with a range of -18.96 to -15.73‰. At each of the study sites, the female and male means do not differ significantly at the .05 level, evaluated by independent-sample t-tests.

For stable nitrogen, the mean $\delta^{15}N$ value at São João de Almedina is 10.75‰ (SD 0.73), with a range of 9.36‰ to 12.12‰. The female mean is 10.98 (SD 0.63), with a range of 10.33‰ to 12.12‰, and the male mean is 10.56 (SD 0.77), with a range of 9.36‰ to 11.60‰. At the Convent de São Francisco, the overall adult mean $\delta^{15}N$ value equals 12.89‰ (SD 0.80) with a range of 11.98 to 14.45‰. The female mean value is 12.67 (SD 0.76), with a range of 11.48 to 14.21, and the male mean is 13.19 (SD 0.77) with a range of 11.98 to 14.45. At Cacela-a-Velha, the adult mean value equals 11.13 (SD 0.97), with a range from 8.67 to 13.11‰. The female mean is 10.72 (SD 0.78), with a range of 9.44 to 11.67, and the male mean is 11.28 (SD 1.00), with a range of 867 to 13.11. The female and male means do not differ significantly (.05 level) at any of the three sites.

In interpreting these results of her dietary analysis, Luxton suggests that the lack of significant statistical correlation between ð13C and ð15N values at São João de Almedina indicate minimal input of marine protein, with some degree of reliance on non-animal protein from C_4 plant sources such as millet, "consumed either as a primary food source or secondarily by consuming the livestock that may have been foddered on" (Luxton, 2015, p. 72). In the sample from the Convento de São Francisco, by contrast, the ð15N mean values surpass those reported in human bone excavated from Mesolithic Portuguese coastal shell-mound sites (Lubell et al., 1994), where faunal analyses determined that the diet definitely contained large proportions of marine protein, in addition to a relatively high correlation between ð13C and ð15N values. This large component of non-terrestrial animal protein may also have elevated the ð13C values in the Convento mortuary sample. The statistical correlation between ð15N and ð13C values in the Cacela-a-Velha sample also suggests a high dietary proportion of marine protein, not surprising in a coastal population; the relatively enriched ð13C values also suggest some consumption of C_4 plants, most likely millet.

The Palma adult values for ð13C are even higher than those from these three medieval Portuguese sites, with an overall mean of -20.634 (SD 0.6989). The ð15N values at Palma are also high (overall mean 12.054, SD 1.4008), suggesting a diet rich in animal protein and possibly augmented by millet, either consumed directly as a cereal grain or indirectly (i.e., through its use as animal fodder). No analysis of correlation between carbon and nitrogen isotope values was conducted for the Palma sample, but Torre de Palma is an inland site, located very close to the border between Portugal and Spain, and its inhabitants probably consumed little marine protein, although dried fish and the popular fermented fish sauce called *garum* may have been imported from the coastal areas. The high nitrogen isotope levels at Palma suggest that the legumes that typically figured in the Classical Roman diet (chickpeas, lentils, broad beans) were not a significant part of the Palma diet, as their consumption tends to lower ð15N values in human bone (Schoeninger, 2011). Future archaeobotanical studies at Palma may shed light on this question.

7.1.4. Anthropogenic Factors: Manuring of Agricultural Fields

There are many confounding factors in the interpretation of stable carbon and nitrogen isotope values obtained from analyses of archaeological human bone samples. For example, various Roman writers on agriculture (Varro, Cicero, Columella, Pliny, etc.) all mention the long-established practice of using agricultural plant residue (chaff, etc.) and animal manure for enrichment of the soil (Foxhall, 1998). "Studies into manuring practices in the cultivation of cereals and grains suggest that the practice can result in increased ð^{15}N values in crops. This resulting enrichment of ð^{15}N in plants would yield values in consumers resembling either a mixed plant-and-animal-based diet or a largely animal-based diet" (Bogaard et al., 2007, p. 336). Gert J. Van Klinken et al. (2000, p. 49) also note importance of transferring nitrogen-rich animal dung to agricultural fields: "The 'manuring effect' will be transported up the food chain and influence ð^{15}N values in human consumers. It seems highly likely that when improved farming techniques increased the working of land, shifts in soil and plant ð^{15}N values resulted. Thus, there is a need to check for anthropogenic effects in the archaeological food chain, which can be done by measuring associated plant and animal remains." Given the large numbers of domesticated animals raised on the Palma agricultural estate (sheep, cattle, pigs, goats, horses, and mules), it would seem very likely that animal manure was employed as soil enrichment in the large fields of wheat, barley, and other grains as well as to nourish vines and olive trees.

Legumes: helpful and harmful

Kimberly B. Flint-Hamilton (1999, p. 373), writing on the antiquity of legumes (lentils, chickpeas, broad beans [*vinca faba*], and others) in the Greek and Roman diet, writes, "As early as the 4th century BC, Xenophon notes in his *Geoponica* that legume cultivation replenishes exhausted soils. Cato acknowledges that certain legumes act as fertilizer (*De Agri Cultura* 37) and Pliny (*Historia Naturalis* 18.134, 137) mentions that certain species of legume enrich the soil so that fertilizer is not necessary." However, Lösch et al. (2014, p. 9) suggested that the unexpectedly low stable nitrogen values in gladiators' bones at Ephesus may reflect the fact that "legumes in general have very low ð^{15}N values due to their molecular nitrogen fixation by symbiotic bacteria which in turn reflected in the consumer's collagen. Presumably the regular consumption of large amounts of pulses lowers ð^{15}N values considerably." Unfortunately, no archaeobotanical studies have been done to date at Palma, so we do not know if legumes played an important role in the typical diet of humans and animals.

Dietary variation

Not only do various foods contain varying proportions of essential and trace elements, but their consumption in various combinations can influence their nutritional contribution to human health. Van Klinken et al. (2000) point out that the addition of a relatively small amount of animal protein (high in nitrogen) to a mainly C_3-based plant diet (cereal grains, fruit, olives, leafy plants) has a disproportionate effect on raising ð^{15}N values. Several of the studies cited in this section included stable isotope analysis of associated faunal remains, both herbivores and carnivores, to obtain comparative data for the parallel human bone analyses. This step has not yet been taken for the faunal remains recovered from Palma (Mackinnon, 1999-2000, 2000-2001), so we do not know, for example, if ð^{13}C and ð^{15}N values of domesticated cattle and other species destined for the table were altered by the utilization of millet as fodder.

7.2. Zooarchaeological Analysis of Faunal Remains from Torre de Palma

Midden samples were recovered by University of Louisville archaeologists in 1983, 1984, and 2000 from an undisturbed domestic garbage dump in the South Field portion of the Palma site, south of the villa. This deposit was dated to the 4th-5th centuries AD by coins scattered within the midden. The samples contained some 4000 pieces of animal bone, which were analyzed by zooarchaeologist Michael Mackinnon (University of Winnipeg) (1999-2000, 2001-2002; Chapter IV of this volume). Among the 1,237 pieces that could be identified to element and species, domestic mammals comprised 68.4% of the sample, wild mammals registered 29.1%, bird bones accounted for 2.0%, and shells (primarily marine oysters) amounted to 0.6%. The finding that non-domesticated animal bone (deer, wild boar, hare, and rabbit) accounted for 30% of the total sample was quite a surprise: that is the largest frequency of wild fauna reported to date from any Roman site in the whole western Mediterranean.

Domesticated animals

The relative frequency of the principal domestic animals–cattle (465 pieces, 17.4%), caprines (sheep/goats, 1095 pieces, 41%), and pigs (437, 39.1%) in the total domestic animal sample (2671 bone pieces) (Table 4.2) provides information about the meat portion of the diet and indirect evidence for husbandry, fowling and agricultural pursuits. Domestic fowl evidently contributed little to the economy at Torre de Palma, although bird bones do not survive as well as those of mammals and they may be under-represented. The bones of sheep/goat and pig occur in fairly equal quantities, while cattle register about one-fourth of their number. This tri-fold distribution supports the hypothesis that the Torre de Palma occupants practiced a mixed farming and husbandry regime with no apparent specialty.

Sheep and goats

Based on the faunal analysis, sheep remains outnumber goats by a ratio of about 5 to 1 but the age and sex ratios are evenly balanced, so it would seem that production of wool took precedence over milk. Female goats produce more milk than ewes do, but sheep yield far superior wool. Some caprines were killed after achieving maximum weight between one and two years of age, and the others were allowed to reach at least 4-8 years to yield several coats of wool and serve as brood stock. Today, flocks of sheep are grazed amidst the olive groves on the Palma estate, and is seems likely that in Late Antiquity the Palma sheep and goats also never grazed very far from the villa, as there is no evidence of seasonal transhumant grazing operations. The anatomical distribution of the caprine bones in the midden sample suggests that the animals were killed and consumed at the site, with little import or export of meat cuts. The predominance of choice primary and secondary cuts, indicative of household-level cooking activities, suggests some measure of wealth in the household economy that produced these midden remains.

Pigs

Pork was the favorite meat enjoyed by Romans, and pig-farming was a profitable enterprise in areas where the costs of feeding were negligible. At Palma, pigs could forage easily in the surrounding oak forests, feeding off of acorns and other woodland materials, and so it was somewhat surprising that pigs accounted for only 37.1% of the domestic animal bone sample, as most contemporary rural Roman villa sites in Italy show 50.0% or higher. The absence of bones from suckling pigs (birth–6 months) at Palma was a surprise, since these immature animals provide a particularly succulent meat (still popular in Portugal today); although their bones are more fragile than those of mature pigs, given the uniformly high level of bone preservation, some immature bones had been expected to appear in the sample. The ratio of mature sows to boars (identified by their dimorphic canine teeth, or "tusks") is almost 50:50. The majority of pig bones are from lower limbs, suggesting that during butchering the choice cuts were removed "bone-in" and taken elsewhere, perhaps some of them cured as hams and exported.

Cattle

The cattle raised at Palma were typically employed primarily as draught animals, pulling ploughs or carts, during their lifetimes, as evidenced by their advanced ages (determined by examination of the teeth) and frequent bowing of their toe bones. Mackinnon notes that Martial and other Roman writers on agricultural practices mentioned that the fields in Iberia were "tilled by stout steers." Many of the bovine foot bones bear cutmarks indicative of hide removal; these bones were often left attached to the hide during processing to add weight for stretching the curing hides, and they also are a prime source of "neats-foot oil," ideal for treating leather.

Equids

Several different categories of archaeological evidence at Palma point to the importance of equine husbandry. First, an elaborate mosaic floor in a one of the large rooms in the Peristyle House where the villa's owner met clients and transacted business depicts five full-length portraits of horses crowned with palm fronds (the sign of victory in sporting events) and distinguished by plaques bearing their names. Was the villa a center for breeding and training of racehorses, and do their palm fronds indicate that they were champions? Or was this merely a scene chosen from one of the pattern-books offered by itinerant mosaic artists to wealthy patrons to flatter their dreams of glory?

Second, the architectural remains of another large structure, called the Portico Building, is consistent with modern stable design in terms of paving (a cobblestone floor which could be matted with straw) and the small dimensions (c. 3 × 3m.) of the numerous rooms (Mackinnon, 1999-2000, p. 134). Third, an ancient hippodrome was identified in aerial photographs in the field to the southeast beyond the villa, similar to the one discovered at the Roman town of Mirobriga, south of Lisbon. Fourth, a large number of metal objects, including whole and fragmentary bits, a strigil, and numerous bridle fittings are included in the spolia from the site, and fifth, although no complete horse burials were identified at Palma, horse teeth outnumber those of donkeys and mules in the small collection of isolated equid dentition recovered at the site (Mackinnon, 1999-2000, p. 134). Horses, like dogs, were not considered as food and therefore we would not expect their bones to be discarded in middens filled with the usual kitchen garbage. However, we should consider the possible use of horses in hunting wild game for sport and to obtain meat and hides for domestic consumption or commercial purposes. Perhaps the villa owners entertained their elite guests with hunting expeditions and gourmet feasts of venison, boar and hare, subsequently turning over excess pelts and hides for processing.

Wild animals

Wild animals are more prominent in the Iberian diet than in the Italian diet during Roman times. At Palma, the high proportion of wild game suggests that hunting was a favorite entertainment for the elite owners of the villa and their guests, who enjoyed dining on gourmet feasts of venison, boar, and hare. Dietary ostentation is further shown in the faunal remains in the form of imported oyster shells brought over 200km from the coast. Hunting was certainly not necessary for subsistence, as the large numbers of domestic animal bones testify to plentiful sources of farmed meat. Deer were evidently a favored prey for both meat and hides, and were probably hunted on horseback, as depicted in numerous mosaics and wall paintings at wealthy villas throughout the Roman Empire. The abundance of cutmarks on both deer and cattle foot bones supports the hypothesis that the processing of hides for leather was an important local industry. Although no tanning facilities have been identified as yet at Palma, other industrial activities such as smithing and smelting took place in the southern region of the site. Hide processing is a decidedly odoriferous enterprise because of the chemicals used, and this industry was most likely situated some distance away from and downwind of the residential sectors.

In summary, the abundance and variety of wild and domesticated faunal remains at Palma suggests that the typical diet was reasonably well provided with animal protein. The lack of statistically significant intra-site variation in values by social status (as marked by burial location outside the Basilica precinct as opposed to inside it) evidently did not carry the penalty of a protein-deficient diet; although males apparently consumed more animal protein than females did; the female ð^{15}N values are higher than those from three Medieval Portuguese sites (Luxton, 2015) as well as those from contemporaneous sites in Italy (Prowse et al., 2005) and Turkey (Lösch et al., 2014).

7.3. Dental Evidence of Diet

The Palma Dental Sample

Tables 3.23, 3.24, and 3.25 (see *infra*) display dental data for individuals with observable teeth from the Church and its two associated cemeteries. The total number of adult individuals from these three mortuary areas is 135, yielding a potential total number of teeth of 4,320 teeth. For the 49 subadults (aged 1-19 years at death) in this sample, the potential total would be smaller, c. 1,176 teeth (49 × 24). However, the actual numbers of individuals with teeth suitable for observation are much smaller: 61 adults with 727 teeth (17% of the potential number), and 18 subadults with 228 teeth (c. 13%). Furthermore, many of these individuals had only a few teeth present; only 41 of the 135 adults (30%) and 13 of the 49 subadults (26%) presented 8 or more teeth for observation. Therefore, this dental sample cannot be considered a good representation of the oral health of the Palma inhabitants. However, it can provide some limited information about basic aspects of dental pathology: the degree and rate of progression of molar occlusal wear, the proportion of teeth lost ante-mortem vs. post-mortem, and the patterning of carious lesions.

7.3.1. Dental Wear

Eugenia Scott's method (1979) for quantifying dental wear on the occlusal surfaces of the permanent molars was employed for the Palma dental sample (Table 3.26). This scoring system includes five early stages (0-4) of progressive erosion of cusp enamel without dentine exposure, five later stages (5-9) of progressive dentine exposure, and one final stage (10) in which no enamel is present. Each quadrant of the molar occlusal surface is scored separately, then the scores are summed to produce a single interval-level value for each molar crown observed. The incorporation of the five early stages renders the system sensitive to gradations within samples that do not display extensive dentine exposure. The maximum composite wear score for a molar occlusal surface which show no exposed dentine is 16 (a score of 4 in each quadrant), and the maximum composite score for a molar occlusal surface which show only a thin rim of enamel around the outer edge is 36 (a score of 9 in each quadrant).

As shown in Table 3.26 (see *infra*), only two of the first molars in the dentitions of individuals aged 20-30 years at death show any exposed dentine: the molars scored 17 and 21, both of them showing small areas of dentine exposed on one cusp. None of the second or third molars show any exposure. For individuals aged 30-40 years at death, the wear scores are more variable. The first molar composite wear scores range from 14 (moderate wear on the cusps) to 35 (more than one fourth of each quadrant showing exposed dentine).

UL Tomb & TP #; MNA *Sep.* & Cat. #	Age	Sex	Max I/C/PM/M	Man I/C/PM/M	U & L Teeth	N Teeth
Northwest Cemetery/Complex A						
NW 2	20-30	F	1/1/2/6	3/1/4/6	4/2/6/12	24
	30-40	F	1/2/4/4	1/2/4/5	2/4/8/9	23
	adult	M	0/0/0/0	3/2/2/4	3/2/2/4	11
NW 3	30-40	F	0/0/0/0	4/2/3/4	4/2/3/4	13
NW 4	40-50	M	0	man RM3	1	
	40-50	M	2/1/2/0	2/0/1/1	4/1/3/1	9
NW 5	30-40	F	3/2/4/5	3/2/4/5	6/4/8/10	28
NW 6	30-40	F	2/1/3/1	0/1/0/0	2/2/3/1	8
	adult	F	0/0/0/3	0	3	
	adult	F	0/1/0/0	0	1	
	adult	M	1/2/3/4	0/2/4/4	1/4/7/8	20
NW 9	50-60+	F	0/0/0/0	4/1/2/3	4/1/2/3	10
	40-50	M	4/2/2/1	0/0/0/0	4/2/2/1	9
	50-60	M	0	0/0/0/2	2	
NW 10, TP 5-85	40-50	M	1/1/4/1	3/2/3/3	4/3/7/4	18
NW 12	50-60	M	0/0/0/0	0/1/1/1	3	
	juvenile A,7-8	?	0	0/0/2dm1/2dm/2/2	8	
	juvenile B 6-7	?	0/0/2dm1/2dm/2/2(2)	0/0/2dm1/2dm/2(2)	16	
NW 13	40-50	M	2/0/0/0	1/1/3/0	3/1/1/1	7
NW 14	50-60	M	4/2/4/1	0/0/0/0	4/2/4/1	11
NW 16, TP.42.85	50-60	M	3/2/4/3	0/0/3/2	3/2/7/5	17
NW 17, TP.9.85	30-40	M	1/0/0/1	2/0/1/3	3/0/1/4	8
NW 18	40-50	M	2/1/1/1	0/0/0/0	2/1/1/1	5
	juv 10-12	?	4/2/2/0	0/1/0/3		
NW 21	60+	M	0/0/0/0	1/1/3/2	1/1/3/2	7
NW 34	40-50 A	M	0/1/1/0	3/2/3/1	3/3/4/1	11
	child 7-8 B	?	1/0/2/3d,3P	0/0/1/0	10	
	30-40 D	F	0/0/0/0	0/1/0/0	0	
	40-50 E	F	0/0/1/1	0/0/1/1	4	
Sepultura 25	50-60	M	0/1/0/0	0/1/3/4	1/1/3/4	9
	40-50	F	0/0/0/0	0/0/0/0	0	0
Sepultura 26	30-40	M	0/0/0/0	3/2/4/6	3/2/4/6	15
Sepultura 28	20-30	M	0/1/4/3	4/2/4/6	4/3/8/9	24

Total inds. = 69 Total Subadults = 13 Total adults = 56
Total inds. w/teeth = 33 Total teeth = 357
Subadults w/teeth = 4 N teeth in subadults = 55
Adults w/teeth = 29 N teeth in adults = 302
22 inds = 18 adults & 4 subadults (0-19 years) have 8 or more teeth to observe.

Table 3.23 — The Northwest Cemetery, Dental Data.

For second molars, scores range from 10 (no dentine exposure) to 27 (more than two quadrants show larger areas of exposed dentine). Four of the seven individuals with third molars show some small degree of dentine exposure.

Not surprisingly, individuals who died at 40-50 years of age showed substantial dentine exposure, more advanced in the mandibular than the maxillary molars. Only one first molar shows no exposed dentine, for a score of 16, but this male showed an exceptional

Sockets Observable (2)	Teeth Lost AM	Lost PM	Carious: I,C,P,M	Occlusal Wear (after Scott 1979)
max 16, man 16	0	max 6, man 3	max M1:+++, man:0	max M1:R14,M2:L12,R12,M3:L8,R8; man M1:L13,R115,M2:L10,R14,M3:L7,R11
max 15, man 14	max 1, man 1	max 3, man 3	max PM:++	max M1:L27,R34, M2:L23,R23; man M1:R35, M2:L23,R27; M3:L20,R16
man 16	2	3	C:+,PM:+, M:++	man M1:R19, M2:R17,M3:R13
man 16	3		man M2/M3: ++	man M2:L23,R20, M3:L12,R11
man 16	5	10	0	N/A
0 (all loose teeth)	N/A	N/A	0	man M2:R32
max 16, man 16	max 0, man 1	max 3, man 1	0	max M1:L16,R14;M2:L10,M3:8; man M1:L14, M2:L14,R12,M3:L8,R9
max 14, man 14	max 1, man 5	max 6, man 8	R PM1 max:+; LC man:+	max M2:R14
R max 8	0	max 5	0	max M1:R17,M2:R13,M3:R8
max 14	max 2	man 8	max LC:+	N/A
max 16, man 16	0	max 6, man 6	0	max M1:L23,R27, M2:R13,M3:R5; man M1:L24,R24, M2:L15,M3:R5
man 16	max 1, man 4	max 6, man 2	LM2/M3:+	man RM2:20; LM3:30,RM3:13
max 16	1	6	LPM1++, RPM2++	max RM2:20
man 13	man 2	man 9	0	man M2:R36,M3:36+
max 16, man 12	max 3, man 0	max 6, man 1	max L PM2:+	max M1:R30; man M1:L30,R30, M2:L17,R18;M3:L15,R10
max 16, man 16	max 12, man 5	max 3, man 8	0	man M2:L14
max 7, man 7	0	6	0	man M1:L4,R4
max 7, man 7	0	max 6, man 6	0	max M1:L4,R4; man M1:L4,R4
max 4, man 13	max N/A, man 2	max N/A, man 1	max 0, man PM 1:++	N/A
max 16	LR M1, LR M2	L M3	max R PM1 ++	max R M3: 12
max 3, man 0	N/A, N/A	N/A, N/A	max R PM1&2:++	max M1:L27,R27,M2:R23;man M1:L32, R32
5 teeth/sockets, 2 loose teeth			0	max M2:L18; man M2:R10,M3:R10
max 6, man 0	0	1	0	max M1:R32
max 0, man 4	0	7 max, 4 man	0	max M1:L13,R13,M2:L10,R10; man M1:L12,R12,M2: L6,R6
max 8, man 4	max N/A, man 1	max N/A, man 3	0	man M2:L29
max 7, man 14	max 4, man 5	max 0, man 0	0	man M1:R25
max 9, man 0	N/A	N/A	0	N/A
max 0, man 11	max N/A, man 4	max N/A, man 6	0	N/A
max 0, man 16	N/A, man 3	max N/A, man 7	max R I1:++	
max 16, man 13	max 11, man 2	max 4, man 3	max 0, man M1:+++	man M1:R33,M2:R26
max 16, man 16	max 8, man 9	max 6, man 7	0	
max 0, man 16	max N/A, man 0	max N/A, man 1	0	man M1:L21,R22,M2:L18,R20,M3:L16,R18
max 16, man 16	max 1, man 0	max 0, man 0	0	max M1:L21,M2:L12,M3:L4; man M1:L16,R17,M2:L13,R13, M3:L4,R4

Total inds. = 69 Total Subadults = 13 Total adults = 56
Total inds. w/teeth = 33 Total teeth = 357
Subadults w/teeth = 4 N teeth in subadults = 55
Adults w/teeth = 29 N teeth in adults = 302
22 inds = 18 adults & 4 subadults (0-19 years) have 8 or more teeth to observe.

Table 3.23 (cont.) — The Northwest Cemetery, Dental Data.

degree of ante-mortem tooth loss: all his maxillary teeth were missing and the sockets resorbed. Almost all second and third molars show some exposed dentine. The molar wear scores for those who died aged more than 60 years range from 26 to 32 for first molars, denoting very little enamel left on the occlusal surfaces. Only one second molar and one third molar show no exposed dentine; the highest score was for a mandibular second molar (39) whose occlusal surface consisted almost entirely of extremely dense secondary dentine.

UL Tomb/MNA *Sepultura*	Age	Sex	Max I/C/PM/M	Man I/C/PM/M	Teeth (1)	Sockets Observable
The Church						
Sepultura P	30-40	female	1/1/3/4	4/2/3/4	22	max 16, man 13
Sepultura E	adol 15-17 (ind B)	?	1/2/0/3	0/0/0/0	6	max 5, man 0
	adult (ind C)	male	0/2/4/1	4/2/4/2	19	max 14, man 16
	child 6-7 (ind D)	?	0/0/1/3	0/0/0/0	4	max 4, man 0
	30-40	male	1/1/1/1	0/0/0/1	5	max 8
Sepultura A	40-50	female	3/1/2/4	3/2/4/2	21	max 5, man 16
Sepultura B	30-40	male	0/0/0/0	1/2/3/3	9	0 max, 16 man
Sepultura D	30-40	female	4/2/4/4	0/0/0/0	14	max 15
	45-60	male	0/1/3/3	0/0/0/0	7	max 15
Tomb C; *Sepultura* 7-A	adol 16-18	female	0/1/2/6	1/1/1/6	18	max 16, man 16
Tomb CC; *Sepultura* 4-A	30-40	female	1/0/4/4	1/1/2/1	14	max 15, man 10
Tomb CC; *Sepultura* 10-A	child 5-6	?	0/0/0/0	0/1/0/8	9	max 16, man 10
	juvenile 6-7	?	4/2/0/8	0/0/0/0	14	man 10
	infant 1.5-2	?	0/0/0/4	1/0/0/4	8	max 12, man 8
Tomb DD; *Sepultura* 6-A	adult	female	0/1/4/2	1/2/4/5	19	max 16, man 16
	40-50	male	0/0/0/0	4/2/3/2	11	max 16, man 16
	adult	male	0/0/3/0	0/0/0/1	4	max 16, man 16
	adolescent 14-16	?	2/1/1/6	0/0/2/3	15	max 16, man 5
Tomb EE; *Sepultura* 5-A	adult	female	0/0/0/0	0/0/1/2	3	max 0, man 8
	30-40	male	0/0/2/3	2/1/4/3	15	max 8, man 11
	40-50	male	0/0/2/2 R	1/1/2/1 R	9	max 8, man 10
Tomb W; *Sepultura* 2-A	20-25	female	0/0/0/0	0/1/1/2	4	max 0, man 13
Tomb X; *Sepultura* 1-A	50-60	female	0/0/0/0	0/1/4/2	7	max 16, man 16
	50+	male	2/2/4/4	0/2/4/2	20	max 15, man 12
TP.1.86	adol 17-19	male	4/2/3/6	4/2/4/4	27	max 16, man 16
Tomb 3	30-35	female A	N/A	2/1/2/1	6	max N/A, man 10
Tomb 3	30-35	male D	1/0/2/2	2/2/4/5	19	max 7, man 16
Tomb 3	40-50	male E	1/1/1/3	4/2/4/6	22	
	juvenile 8-12	?			13	
Tomb 8	30-40	female	0/0/1/3	1/1/1/5	11	max 15, man 16
Medieval Chapel Burials						
Contentor 4769, v.2	adult 30-40	female	2/2/4/5	2/2/4/6	27	max 16, man 16
Tomb 2	30-40	male	0/1/3/2	2/0/3/6	17	max 15, man 16

Total inds = 78 Inds w/teeth = 34* Total teeth = 419
Total subadults = 28 SAs w/teeth = 9 N teeth in subadults = 114
Total adults = 50 Adults w/teeth = 25 N teeth in adults = 305
14 adults w/teeth (14/32, 44%) and 7 subadults (0-19 years) (7/9, 78%) have 8 or more teeth to observe

*Medieval Inds: 2 adults, 44 teeth; both have >8 teeth

Table 3.24 — The Church Precinct, Dental Data.

Lost AM (2)	Lost PM (3)	Carious: I,C,P,M	Occlusal Wear (after Scott 1979)	Comments
max 1, man 0	max 6,man 0	max 0,man 0	max M1:L23,R21//,M3:L18,R15; man M1:L23,M2:L24,M3:22,R20	
N/A	max 5	0	max M1:, M2:2	
max 4, man 2	max 3, man 0	max 0, man M3+	max M3: R16; man M3:L18, R18	
N/A	N/A	0	max dm2:1, M1:4; man N/A	
max 2	max 2	max PM 1&2,++	max M1:5, man M1:6	
max 2, man 5	max 2, man 0	max 0, man 0	max M1:L28,R27, M2:R16; man M2:L18,R18	
man 3	man 4	man PM 1++	man M2:R21, M3:R15	
max 0	max 1	max 0	max M1: L18,R17,M2:R13,M3:R11	
max 1	max 7	max M1:+	max M1:L26,R26,M2:R17	
max 0, man 0	max 7, man 7	max PM 2+, man 0	max M1:L10,R10, M2:L8,R6; man M1:L14,R134, M2:L6,R62	
max 0, man 2	max 6, man 3	max 0, man 0	max M1:L22,R22,M2:L18,M3:R11; man M1:L26	
		max 0, man 0	N/A	M1, M2 crowns incomplete in crypts
max 0, man N/A	N/A	max 0, man 0	N/A	M1, M2 crowns incomplete in crypts
N/A	N/A	max 0, man 0	N/A	
max 2, man 1	max 7, man 3	max C+,PM +, M1++, M2+; man 0	max N/A, man M1:L37,R35, M2:R38, M3:L36,R26	
max 16, man 5	max 0, man 0	max 16?, man C+, M2:++, M3++	max N/A, man M1:R16 **very light re max AM tooth loss	light wear on man M2 from no max teeth?
max 6, man 6	max 7, man 9	max 0, man M3:+	max N/A, man M:0	
max 0, man 0	max 0, man PM1+,M1+, M2+	max 0, man PM1+,M1+, M2+		
max N/A, man 2	max N/A,man 3	max N/A, man 0		
max 0 L, man 1	max 3, man 1	max 0, man PM1+, M1++	max M1:L31, M2:L21; man M1:L16	
max 0, man 0	max 4, man 5	max 0, man 0	max M1:R28, M2:R22; man M1:R32	
max N/A, man 1	max N/A, man 8	max N/A, man C+,M1+, M2+	max N/A, man M2:L8,R8, M3:L8,R7	
max 13, man 3	max 3, man 6	max 0, man both M1++		
max 1, man 2	max 3, man 2	max M1+++, man M1++	max M2:R35,M3:R22; man M2:L36,R39	
max 0, man 2	max 3, man 0	max 0, man L&R M2+		4 max incisors have crescentic lesions; man incisors and canines have substantial calculus deposits
max N/A, man 2	max N/A, man 3	max N/A, man 0		
max 0, man 1	max 2, man 3	max 0, man M3:0		
max 0, man 0	max 0, man 0	max 0, man 0	max M1:R24,L24,M3:L21; man M1:L24,R24,M2:L24,R24, M3:L20,R22	
max 0, man 0	max 11, man 9	max 0, man 0	max M1:R24,M2:L22,M3:L19; man M1:L28,M2:L16	
max 2, man 0	max 1, man 3	max 0, man M2:+,M3:++	max M1:L20,R18,M2:L16,R16, M3:R14; man M1:L26,R20, M2:L16,R17,M3L14	both max I2 absent:dental modification
max 2, man 0	max 6, man 5	max 0, man M2,M3	max N/A, man M1:L27,R27,M2:L20 R23,M3:L22,R21	

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14 adults w/teeth (14/32, 44%) and 7 subadults (0-19 years) (7/9, 78%) have 8 or more teeth to observe

*Medieval Inds: 2 adults, 44 teeth; both have >8 teeth

Table 3.24 (cont.) — The Church Precinct, Dental Data.

UoL Tomb/MNA Sep.	Age	Sex	Max I/C/PM/M	Man I/C/PM/M	Teeth
The Southwest Cemetery					
SW 4; *Sepultura* 7	30-40	male?	0/0/3/5	3/2/4/5	22
	juv 11-12	?	0/0/0/2	0	2
SW 8	30-40	female	2/1/1/0	4/1/4/1	14
	adol 13-15	?	1/1/4/5	0/1/4/5	21
SW 12; *Sepultura* 3	adult	male?	1/1/2/5	1/1/4/5	18
SW 13; *Sepultura* 2	40-50	male	0/0/1/3	3/2/4/1	14
	adol 12-13	?	2/1/1/3	0	7
SW 14; *Sepultura* 1	adol 15-17	?	2/2/3/4	4/2/2/2	21
Sepultura A	40-50	male	4/2/1/4	0/0/0/0	11
Sepultura F	20-25	male?	2/1/2/5	3/1/3/6	23
Sepultura M	30-35	male	4/1/4/4	1/2/3/4	23
	child 4-5	?	0/dc2/0/0/	0/0/dm1,dm2,PM1 crown	8

Total inds = 37 Inds with teeth = 12 Total teeth = 184
N SA's = 8 SA's with teeth = 5 SA Total teeth = 59
N adults = 29 Adults with teeth = 7 N teeth in adults = 125

Adults: 7/29 = 24% w/teeth
Sas: 5/8 = 63% w/teeth

All 7 adults (7/7, 100%) and 3 subadults (0-19 years) (3/5, 60%) have 8 or more teeth to observe

Table 3.25 — The Southwest Cemetery, Dental Data.

Age	Maxillary Molars			Mandibular Molars		
	M1 mean	M2 mean	M3 mean	M1 mean	M2 mean	M3 mean
20-30 years	F 14	F 12	F 8	F 15	F 14	F 11
	M 21	M 12	M 4	M 17	M 13	M 4
30-40 years	F 25	F 16.5	F 8	F 24.5	F 21.3	F 13.7
	M –	M 18	M –	M 22	M 15	M 14
40-50 years	F 28	F 16			F 18	
	M 26	M 22	M 21	M 24	M 24	M 22

Table 3.26 — Mean Molar Wear Scores, by Age (after Scott 1979).

In sum, despite the continual presence of stone grit in the Palma diet introduced during the processing of grains into flour, the molar wear in the Palma population can be classified as moderate, with substantial amounts of enamel remaining on many first molars even in the oldest individuals. There is considerable variation between the four adult age categories, but also within these categories (particularly for the older individuals), and there is no consistent variation between females and males. Therefore, the degree of molar occlusal wear would be an uncertain measure for estimating age at death for adult individuals, except in very broad terms (e.g., 20-30 years vs. 40+ years at death).

7.3.2. Ante-mortem Tooth Loss (AMTL)

Ante-mortem tooth loss was indicated by remodeling within an empty tooth socket; like molar occlusal wear, it is clearly age-progressive. Tooth loss by age and tooth type at Palma is presented in Table 3.27 (see *infra*). In the youngest adults (20-30 years at death),

Lost AM (2)	Lost PM (3)	Carious: I,C,P,M	Occlusal Wear (after Scott 1979)	Sockets Observable
max 0, man 0	max 4,man 9	max 0; man M2,M3+	max:R16/9/5; man L20/10/4; R20/X/6	max:2, man:5
0	max:2	0		max:4, man:0
max:0,man:2	max 0,man 1	0	N/A	max:4, man:13
max:0/man:0	max 1,max 5	0	man:R3/1/x	max:4 ,man:5
N/A	max 5, man 4	max 0, man PM++, M++	max:L17/16/X,RX/15/6;man:Lx/x/4	max:2; man:5
max:0,man:5	max 1,man 0	max M++, man M++	max:L17/14/12; man:RX/X/18	max:3,man:15
0	0	max N/A; man 0/0/0/M2+	man:R7/4/X	max:0, man:7
man:0, max:0	max 3,man 0	0	max:L12/8/X,R11/8/X;man:15/8/X	max:15, man:15
max:0, man 0	max 5, man 0	max 11, man 0	max:M119/M213/12	max 16, man 0
max:0, man:0	max 4, man 0	max 0, man 0	max:LX/X/X,R18/10/8; man:L17/11/9, R17/11/9	max:6, man:13
max:0, man:2	max 2, man 3		max:L31/13/8, RX/X/X;man:L28/9/X.R35/13/X	max: 15, man:15
max:0,man:0	max 3, man 3	max 0, man 0		max:0, man:6

Total inds = 37 Inds w/teeth = 12 Total teeth = 184
N SA's = 8 SA's w/teeth = 5 SA Total teeth = 59
N adults = 29 Adults w/teeth = 7 N teeth in adults = 125

Adults: 7/29 = 24% w/teeth
Sas: 5/8 = 63% w/teeth

All 7 adults (7/7, 100%) and 3 subadults (0-19 years) (3/5, 60%) have 8 or more teeth to observe

Table 3.25 (cont.) — The Southwest Cemetery, Dental Data.

tooth loss was 0.5 (2 teeth lost/4 individuals). Individuals aged 30-40 years at death lost an average of 1.82 teeth before death (33 teeth lost, 18 individuals); only four of the eighteen had no teeth lost ante-mortem. The fourteen individuals aged 40-50 years at death had lost a total of 69 teeth, for an average loss of 4.93 teeth; only four had no teeth loss ante-mortem. The ten oldest individuals in this dental sample, those aged older than 50 years at death, showed the highest rate of tooth loss, an average of 6 teeth lost per individual; only one individual showed no loss. Molars were the most frequently lost ante-mortem, followed by premolars, incisors, and canines; the last two were rarely lost ante-mortem because of their morphology (not conducive to carious destruction) and long roots.

7.3.3. Carious Teeth

Dental caries (from the Latin word *caries*, "rottenness", Dorland, 1977, p. 124) is a microbial disease that affects the calcified tissues of the teeth, beginning first with a localized dissolution of the inorganic structures of the tooth surface by acids of bacterial origin and leading to a disintegration of the organic matrix (Menaker, 1980, p. 212). *Lactobacillus acidophilus* and *Streptococcus mutans* are two of the microbes most widely responsible for this disease in human populations. Tooth crown morphology is a prime factor in the intraoral distribution of carious lesions: the larger, more complex crowns of the premolars and molars typically display significantly more carious lesions than do the smaller, simpler incisor and canine crowns. The reason for this discrepancy is that the pits and fissures of the posterior crowns retain the thin, sticky film known as "plaque" more tenaciously than do the relatively smoother surfaces of the anterior crowns. Plaque comprises a virtual "bacterial exosystem" (Menaker, 1980, p. 214) containing microbes and their acidic metabolites

UoL Tomb/MNA *Sepultura* and Cat. #	Age	Sex	Sockets Observable
20-30 years			
NW, TP.40.85/*Sepultura* 9, 2005.215	20-30	F	max 16, man 16
Sepultura 28/2005.220	20-30	M	max 16, man 16
Tomb W *Sepultura* 2-A, 2001.78	20-25	F	max 0, man 13
Sepultura F (SW), no Cat. #	20-25	M	max 6, man 13
30-40 years			
NW Tomb 2, *Sepultura* 9, 2005.215	30-40	F	max 15, man 14
NW Tomb 3, *Sepultura* 6, 2007.63	30-40	F	max 0, man 16
NW Tomb 5, *Sepultura* 3, 2005.209	30-40	F	16 max, 16 man
NW Tomb 6, *Sepultura* 1, 2005.205	30-40	F	14 max, 14 man
Sepultura 26, 2005.244	30-40	M	max 0, man 16
NW Tomb 34, ind. D	30-40	F	max 0, man 11
None; *Capela Sep.* P	30-40	F	max 16, man 13
Capela Sep. E	30-40	M	max 8, man 0
None; *Capela Sep.* B	30-40	M	0 max, 16 man
None; *Capela Sep*. D	30-40	F	max 15, man 0
Tomb BB; *Sepultura* 4-A, 2005.227	30-40	F	max 15, man 10
Tomb EE; *Sepultura* 5-A, 2001.79	30-40	M	max 8, man 11
Tomb 8, TP.117.84; no MNA #	30-40	F	max 15, man 16
SW 4, *Sepultura* 7, 2005.240	30-40	M	max 2, man 5
SW 8	30-40	F	max 4, man 13
Sepultura M/2005.243	30-35	M	max 15, man 15
40-50 years			
NW Tomb 13, TP.7.85/ no MNA #	40-50	M	max 4, man 13
NW Tomb 4, *Sepultura* 5, 2005.212	40-50	M	max 0, man 16
NW Tomb 10, TP.5.85, *Sepultura* 4, 2005.210	40-50	M	16 max, 12 man
NW Tomb 9, *Sepultura* 2, 2005.208	40-50	M	16 max, 0 man
NW Tomb 18, TP.10&11.85, *Sepultura* 11, 2005.217	40-50	M	6 max, 0 man
Sepultura 25, 2005.218	40-50	F	max 16, man 16
NW Tomb 34, ind A, TP.18.85	40-50	M	max 7, man 14
NW Tomb 34, ind E, TP.18.85	40-50	F	max 0, man 16
None; *Capela Sep.* A	40-50	F	max 5, man 16
Tomb DD, *Sepultura* 6-A, 2005.229	40-50	M	max 16, man 16
Tomb EE, *Sepultura* 5-A, 2001.79	40-50	M	max 8, man 10
Tomb 3, ind. E, TP.59.83, TP.56.83; no MNA #	40-50	M	max 6, man 16
TP.33-85/SW 13, *Sepultura* 2, 2005.238	40-50	M	max:0,man:5
Sepultura A	40-50	M	max 16, man 0
50-60 years			
NW Tomb 12, *Sepultura* 8, 2005.214	50-60	M	max 16, man 16
NW Tomb 14, *Sepultura* 10, 2005.215	50-60	M	16 max, 0 man
NW Tomb 16, TP.42.85	50-60	M	max 3, man 0
Sepultura 25, 2005.218	50-60	M	max 16, man 13
NW Tomb 21, TP.13.85	60+	M	8 max, 4 man
None; MNA Capela Sep D	45-60	M	max 15, man 0
Tomb X, *Sepultura* 1-A, 2005.204	50-60	F	max 16, man 16
Tomb X, *Sepultura* 1-A, 2005.204	50+	M	max 15, man 12

Table 3.27 — Ante-mortem Tooth Loss, by Age and Tooth Type.

Complex/LC#	Teeth Lost AM, by Tooth Type	N lost AM
A/7	max 0, man 0	0
A/7	max M1, man 0	1
B/73	max 0, man L M1	1
D/119	max 0, man 0	0
	TOTAL TEETH LOST	**2**
A/7	max I2; man M1	2
A/12	man PM2, both M1	3
A/16	max 0; man M2	1
A/17	max PM 2; man PM 2, both M1 and M2	6
A	max 0, man 0	0
A/6	max 0; man L PM2,M1, R M1, M2	4
B/43	max M2; man 0	1
B/44	max both M1 and M2; man 0	2
B/47	max 0;man both M1, L M2	3
B/52	max 0, man 0	0
B/68	max 0; man M1, M2	2
B/71	max 0; man PM2,M1	1
B/104	max 0, man 0	0
D/78	max 0, man 0	0
D/82	max:0;man:M1,M3	2
D/120	max:0; man: I1,I2	2
	TOTAL TEETH LOST	**29**
A/8	max 0; man M2, M3	2
A/13	max 0; man PM2, both M1 and M2	5
A/18	max both M2, R M3; 0 man	3
A/19	max R M1; man 0	1
A/26	max 0, man 0	0
A	max I2,C, all 4 PM, both M1 and M2; man both I1	12
A/6	max 0; man I1, PM 2, M1, M2, M3	5
A/6	max 0, man both M1 and M2	4
B/46	max PM1, PM 2, L M2; man I1, both M1, both M3	7
B/70	all max teeth lost; man PM 2, both M1, L M2, M3	21
B/71	max 0, man 0	0
B/111	max 0, man 0	0
D/87	max:0;man:L&R M1, L&R M2, LM3	5
D/116	max:0, man 0	0
	TOTAL TEETH LOST	**65**
A/10	max both I1 & I2, both PM 2, all M1,M2,M3; man PM1, PM2, both M1, R M2	17
A/11	max both M1, both M2; man 0	4
A/24	max 0, man 0	0
A	max I2,C, all 4 PM, both M1 and M2; man both I1	12
A/30	max 0; man I1, M1	2
B/52	max 0; man 0	0
B/74	both I1, I2, all PM, both M1 & M2, R M3; man both M2, R M3	15
B/74	max M2; man both M	3
	TOTAL TEETH LOST	**53**

Table 3.27 (cont.) — Ante-mortem Tooth Loss, by Age and Tooth Type.

amidst decomposing food remains, the organic substrate on which they subsist. Left unchecked, carious lesions may expand to destroy tooth crowns and penetrate into the soft dentine beneath the enamel; this process leads to ante-mortem loss of the tooth.

In the Palma adults in the dental sample, the anterior teeth were the least affected: of 123 incisors counted, 1 was carious (0.8%), and of 82 canine teeth, 3 were carious (1.2%). The premolars showed a significant increase: 13 of the 187 teeth of that type were carious (4.3%). The molars, however, showed a carious rate almost twice that of the other tooth types combined: 11.4%. The pits and fissures of molar occlusal surfaces were the most common location of the carious lesions, but the second most common location was interproximal (between two adjacent teeth): six pairs of adjacent second and third molars showed carious lesions at that site.

Of the 48 adults examined for carious lesions, 50% of the four individuals in the youngest age category (20-30 years) showed these lesion and 45% (9/20) of the 30-40-year-olds were thus affected, but the highest rate was seen in the oldest group of adults, those aged 40 years or more at death: 15/24, or 62.5%. The overall carious rate was 54.2% (26/48 adults).

7.3.4. Comparisons with a modern Portuguese dental sample

Sofia Wasterlain and her colleagues Simon Hillson and Eugénia Cunha examined 600 adult dentitions in the Coimbra Identified Osteological Collections, curated by the Museum of Anthropology of the University of Coimbra (MAUC), Portugal (late 19th-early 20th centuries). These collections derive from three sources: the Medical School (MS, 585 skulls), the International Exchange (IE, 1075 skulls) and the Identified Skeletal Collection (IS, 505 skeletons). Age at death, sex, occupation, and other important demographic parameters are well documented for all the individuals in these series, and they provide invaluable comparative material for bioarchaeological studies for dietary reconstruction and other analyses.

These collections are actually quite appropriate for comparison with the dental sample from Torre de Palma, despite the chronological difference, a matter of some ten or eleven centuries, because of the strong continuities between these two samples as regards diet and dental care. The late 19th-early 20th-century diet among the non-wealthy social classes in Portugal (the source for the great majority of skeletal individuals in the Coimbra collections) consisted mainly of grains (eaten as bread or gruels) and dried or fresh vegetables and fruits, supplemented by small amounts of meat (mainly fish or pork) and olive oil. The grains (wheat, barley, maize, and rye) were mostly stone-ground, so a certain amount of fine grit was regularly introduced into the diet. Sugar was a rare luxury and honey a minor addition to these staples. The Palma diet was, so far as we can determine, very similar, except for sugar. Dental hygiene relied on traditional methods of cleaning the teeth (toothpicks, rinsing the mouth) because toothbrushes were expensive and uncommon. Professional dentists were also rare, and the most common treatment for dental problems was extraction of the offending teeth, often by barbers (Wasterlain et al., 2009, p. 11-12).

The purpose of the Coimbra study was to determine rates of carious destruction and ante-mortem tooth loss in this modern clinical collection. The authors emphasize the importance of considering tooth loss and caries rates by tooth type, as not all teeth are equally likely to be lost or to become carious. In the Coimbra dental sample, ante-mortem tooth loss (AMTL) increased steadily from 4.6% (calculated as the ratio of percentage of teeth lost before death to teeth present) in age group 1 (20-29 years at death) to 73.2% in age group 6 (70-79 years at death). Loss of molar teeth was especially marked from age group 5 (60-69 years at death) onwards. Canines were the least frequently missing teeth, and molars suffered AMTL with the highest frequency. This pattern of loss is identical in shape to the Palma pattern.

In the Coimbra sample, 27.9% (2666/9562) of the surviving permanent teeth and 92.6% (476/514) of individuals with permanent teeth showed cavitated dental lesions. Multiple teeth were typically affected: of 514 individuals with dentitions, only 17 (3.3%) had only one decayed tooth. The caries rates fell with increasing age, as more teeth were lost ante-mortem (the majority of them probably due to carious destruction). The frequency of carious lesions was surprisingly high among members of age group 1: 49.1% of all teeth in males and 53.6% in females in the youngest age group (20-29 years). At Palma, this same pattern was evident: two of the four individuals in this age category showed carious lesions in molars, but in no other teeth. In both samples, molars showed the highest carious rate, primarily in the pits and fissures of their occlusal surfaces or in the areas of contact with adjacent teeth.

8. Markers of Daily Life at Torre de Palma: Horse-Rider Syndrome

Ever since the discovery of the magnificent Horse Mosaic in the villa at Palma, there has been much speculation about the important role of horses at Palma. Iberia was famous in the western Roman Empire as a source of excellent, swift horses (Mackinnon, 2000-2001), some bred and trained for the immensely popular chariot races staged in cities throughout the Empire, some used for hunting deer and other fleet quarry, and others destined for the Roman military. What evidence do we have at Palma for equine husbandry at this site?

8.1. Human Skeletal Markers of Habitual Horse-back Riding

Four different categories of archaeological evidence for the importance of equine husbandry at Palma were listed in the section on Equids in the summary of the Palma zooarchaeological study (Section 7.2 of this Chapter). One additional set of observations from the human skeletons from Palma may offer supporting evidence about the importance of horses in daily life at Palma: a set of morphological features observed in human pelvic and thigh bones that have been interpreted by numerous researchers as markers of habitual horse-back riding (Syndrome du Cavalier). These features have been reported in the skeletons of Portuguese medieval knights buried at Évora (Santos and Umbelino, 1998; Umbelino and Santos, 1996), Pinel, and Palmela (Cunha et al., 2000), and they have also been identified in medieval individuals from Hungary (Pálfi and Dutour, 1995, 1996) and

France (Blondiaux, 1994). Theya Molleson and Joël Blondiaux (1994) described bioarchaeological evidence for horse-riding in Bronze Age Kish, supported by human skeletal markers and archaeological context. In the New World, these same features are seen in the skeletal remains of 18th- and 19th- century Native Americans of the Great Plains nomadic cultures, whose skill as mounted buffalo hunters and warriors was legendary (Miller, 1992; Reinhard et al., 1994). For all of these populations, horseriding was a major form of transport both in peacetime and in war.

The skeletal markers discussed by these authors appear on the femur and the innominate. Gyorgy Pálfi and Olivier Dutour named this set of markers collectively '*Syndrome du Cavalier*' (Horse-rider syndrome). At the proximal end of the femur, roughened areas may be visible on the superior surface of the greater trochanter for insertion of the gluteus medius. A circular or oval facet on the superior/anterior aspect of the femur neck may appear, resulting from pressure from the superior rim of the acetabulum on the neck. Hypertrophy (formation of a bony rim) and pitting in the fovea capitis of the acetabulum, the point of attachment for the ligamentum teres which secures the head of the femur within the joint, are common. Along the posterior femur shaft, the areas of insertion for the gluteus maximus, the quadriceps femoris, the pectinus, the adductor brevis, and the adductor longus along the linea aspera may be pronounced, as these muscles play an essential role in gripping the horse's back, particularly if stirrups are not used. On the distal end of the femur, the areas of insertion for the medial and lateral heads of the gastrocnemius and the adductor magnus may appear unusually rugose.

Associated features on the innominate include superior elongation of the superior rim of the acetabulum and pronounced areas of insertion on the superior crest and lateral aspect of the ilium for the gluteus medius and gluteus maximus, and on the lateral and inferior aspect of the ischium for insertion of the biceps femoris, semitendinosus, semimembranosus, and adductor magnus.

Roman horse riders used bridles, reins, and saddles but no stirrups, and this situation required repeated muscular contraction of the adductor muscles of the rider's thighs to control the steed. Stirrups were introduced into eastern Europe (Hungary) by the Avars around the 8th century AD; their utility for mounted hunters and warriors by providing a more secure seat and freeing the arms to wield weapons was quickly recognized and their use had spread widely throughout western Europe by the 9th century (Lazaris, 2005).

8.2. Horse-riding at Torre de Palma? The Evidence, by Sex

Mounted armed knights figure widely in artworks, historical accounts, and legends of Medieval Europe. All of the Portuguese Medieval examples of horse-riders from Évora, Palmela, and Pinhel are older adult males whose graves typically contain artifacts indicative of equestrian military activities such as weapons and spurs (Cunha et al., 2000; Santos and Umbellino, 1998; Umbellino and Santos, 1996). In the 10th century AD Hungarian Magyar skeletal sample, the distinctive skeletal markers appeared in 16.7% (14/85) of the adult males, many of whose graves contained "the osseous remains of horses and/or some pieces of harness" (Palfí and Dutour, 1996, p. 45-46). These authors also noted, "The skeletons in question are particularly robust, with well-marked muscular insertions but without any sign of general hyperostosis conditions (DISH). In comparison with the other male skeletons of the cemetery, the fractures, sprains, spondyloses, mechanical enthesopathies, spinal or extraspinal degenerative joint diseases are two or three times more frequent in this group." However, horse-riding was not restricted entirely to men: Blondiaux (1994) presents convincing evidence of a Medieval female "horse-rider" from Hockfelden, and Elizabeth Miller (1992; Reinhard et al., 1994) noted that some women in her 18th-19th- century North American Plains Indian sample showed the characteristic skeletal markers from frequent "horse-riding."

At Palma, all of the adults with femora and/or innominates suitable for observation of the skeletal markers described above were examined. Each set of observations was recorded on a form and each individual was scored as "positive" or "negative" for *Syndrome du Cavalier*. "Positive" cases which showed modification of both femoral and pelvic surfaces were further rated as "severe"; cases with visible involvement of only femoral or only pelvic surfaces (but not both) for muscle attachment were rated as "mild."

Of the 28 Palma women whose femora were evaluated, six (21.4%) showed modifications (an oval or round facet or extension of the femur head onto the anterior/superior neck of the femur and/or pitting of the fovea capitis. In four of these cases, the relevant pelvic surfaces were also observable, but none of the four showed elongated acetabulae (expanded superior-anterior borders of the acetabulum rim). All six of the female cases were rated as "mild." It was immediately evident that male cases far outnumbered the female cases: 24 of the 42 men (57.1%) showed one or more of the modifications of the femur anterior neck or head described above. Of these 24 cases, ten presented both femora and innominates for examination; of these ten, eight showed modifications in both areas, while two cases showed femoral head/neck modifications alone.

A good example of the marked femoral and pelvic changes may be seen in the skeleton of a large, robust adult male aged 45-60 years (Tomb 3, ind. C, TP.59.83) from a tomb in the western end of the Western Basilica in the Church. No artifacts were recovered from this burial, which had been disturbed by a later interment, but its location within this basilica (rather than outside the basilica walls or in one of the adjacent cemeteries) suggests a relatively high social status. Extensive remodeling is visible around the superior rim of the acetabulum and within the cup-shaped socket around the fovea capitis, the site of attachment for the ligamentum teres. The surface of his right ischium, the lowest part of the innominate bone, shows very rugged areas of attachment for the biceps femoris, caput longum, semitendinous, and adductor magnus muscles which steady the lower trunk are attached. The margins of the femur heads show bony lipping and a distinctive oval facet is visible on the anterior side of the femur neck, caused by repeated muscular contractions involved in flexing the thighs which press the rim of the hip socket against the femoral neck (Erickson et al., 2000).

This man and several other older Palma adult males also show hyperdevelopment of the bony crests and margins of arm and hand bones which serve as areas of attachment for the muscles and tendons used in manipulating heavy implements. The absence of military accoutrements such as spurs, pikes, or swords from this archaeological context suggests that these upper limb skeletal markers reflect repetitive use of other implements (e.g., iron-bladed wooden farming tools and weapons used in hunting).

8.3. Were Palma "Horse-riders" of High Social Status?

As discussed in Chapter II, according to the Christian preference for burial "*ad sanctos*" (burial near the saints or other holy individuals), interment inside the Church would have been the most prestigious location for tombs. Both the Church and the Northwest Cemetery yielded female and male cases of *Syndrome du Cavalier*, but the Southwest Cemetery included only male cases. In the Northwest Cemetery, 53% (9/17) of the observed males were scored as "positive", compared with 67% (14/21) of the males examined from the Church. Unlike the burials of Medieval knights at Évora, Pinhel, and Palmela described by Cunha and her colleagues or the Hungarian Magyar warriors examined by Pálfi and Dutour, none of the Palma burials contained any artifacts suggestive of military associations, so it seems that the Palma horsemen (and horsewomen) were secular riders.

8.4. A Caveat

Although the specific bony features described above can functionally be associated with a number of musculoskeletal movements of the hips and thighs (adduction, abduction, adjustments of the lower spine to maintain balance, etc.) involved in horseback riding, a note of caution must be sounded regarding isolated biocultural interpretations of these (and other) skeletal modifications. In 2000, Cunha and her colleagues (Cunha et al., 2000) reported similar alterations of the pelvis and femora of an adult skeleton from a Mesolithic hunter-gatherer population at the site of Moita de Sebastião that dates to c.5500 BC, at least several millenia before horse-riding was known to exist in Portugal (or, indeed, anywhere in the world). Cunha noted that while specific bony alterations may reflect repeated specific actions of specific muscles on the bony surfaces of attachment (in this case, repeated hyper-flexion of the hips and forceful adduction of the thighs as required to secure one's seat on horseback, particularly if riding without stirrups), each one of these individual actions may also appear in a wide variety of human behaviors other than horse-riding.

Recent studies of two distinctive forms of skeletal modification discussed in the earlier studies, i.e., "elongation" of the superior margin of the acetabulum (Erickson et al., 2000) and "imprints" or "facets" on the anterior aspect of the femoral head and neck (Radi et al., 2013), were aimed at developing and testing quantifiable methods of examination of these important features. J. D. Erickson and colleagues employed Fourier analysis to measure differences in acetabular shape between adult males from two Arikara villages in South Dakota, Larson and Leavenworth. They attributed the significant differences in acetabulum shape and size between the two samples to one specific cultural difference: while the Leavenworth sample represented 'classic 19th century Native American Plains horsemen who were widely documented as skilled warriors and buffalo hunters, the earlier Larson sample (dated to 1679–1733 AD) rarely, if ever, used horses for travel, hunting, or warfare.

Nico Radi and colleagues (2013) developed a detailed system for scoring different forms and degrees of macroscopically observed variations in the anterior aspect of the femoral head-neck junction – the "facets" or "imprints" of the acetabular rim onto the femoral neck described qualitatively in the earlier studies. They tested this system on a modern human identified skeletal collection from Bologna, Italy, consisting of 225 adults (101 females and 124 males) whose occupations (and by inference, their habitual activity patterns) were known. Their study quantified three distinctive features (Radi et al., 2013, p. 262):

(1) Poirier's facet, defined as a "lateral expansion of the anterior portion of the femoral head articular surface toward the anterior aspect of the femoral neck." The expansion surface is virtually smooth, on the same plane and in continuity with the articular surface of the head;
(2) Plaque, defined as an "imprint located on the anterior margin of the femoral neck close to the head. The plaque may be present in three shapes... and may be delimited, even partly, by a distinct border..." The authors emphasize that in their usage of the term "plaque," it does not denote an area of new bone formation on top of an existing bone surface.
(3) Cribra, defined as a "cortical discontinuity in a circumscribed area on the anterior portion of the femoral neck, next to the head."

Their conclusions? Poirier's facet is "very rare", and plaque "seems to characterize the normal condition of the femur" (being present in c. 90% of the femora examined, almost always bilaterally) and tends to increase with age, as do "other osteo-productive features at entheses and joints"; cribra is more common in women than in men and appears to decrease with age (Radi et al., 2013, p. 269-270). The authors "suggest caution in using [these features] as specific activity-related markers" (Radi et al., 2013, p. 270), although they certainly seem consistent with bony reactions to the suite of repeated movements (adduction, abduction, flexion, etc.) involved in horseback riding.

8.5. Conclusions

In sum, the presence of the specific femoral and pelvic markers described above in the skeletons of European Medieval knights, Hungarian Magyars, and Native Americans, may logically be argued to represent the effects of habitual horse-riding for two reasons:

(1) they are consistent with the documented biomechanical effects of specific muscular actions involved in horseback riding; and
(2) the artifactual evidence from their respective archaeological contexts is supported by independent historical and artistic testimony for this particular activity in this particular population segment.

We must remember, when inquiring whether two phenomena are causally linked, that "consistent with" is not the same as "exclusive to." "Horse-riding" should never be the default behavioral interpretation of these specific skeletal markers if convincing archaeological or historical evidence of appropriate cultural context is lacking, as demonstrated by Cunha's Mesolithic case. It seems quite reasonable to conclude that many of the adults at Palma (mainly men, but also some women) during the early Christian era frequently rode horseback, because the biological evidence and the cultural evidence are in complete agreement. The Palma horsemen were not Medieval knights like those from later centuries at Évora, Pinhel, and Palmela, but they apparently rode frequently for travel and hunting ... and probably also just for pleasure.

9. Paleopathology

The great majority of illnesses which afflict or kill human beings leave no trace at all on the skeleton, but a few types of pathological conditions do mark the bones in a specific manner sufficient to make diagnoses in dry bone possible. The following section presents examples of several major categories of skeletal pathology observed in the Torre de Palma skeletal series. All of these examples were identified through macroscopic examination of the bones, as other analytical tools were not available during the very limited time available during the initial cleaning and documentation of this series. In the future, the good state of bone preservation in the Palma skeletal series would no doubt yield additional observations of pathological conditions for future researchers who have access to radiographic and microscopic analytical methods.

Fig. 3.6 — Adult male with healed depressed cranial fracture (Photo by Maia M. Langley).

Fig. 3.7 — Adult male, Large Reburial, healed distal tibia shaft fracture. (Photo by M. L. Powell)

Fig. 3.8 — Adult male, healed tibia mid-shaft fracture. (Photo by Maia M. Langley)

9.1. Trauma

Two adults bore small well-healed cranial wounds of traumatic origin. The adult male aged 50+ years at death from *Sepultura* 1-A in the Baptistry displayed a well-remodeled small oval depressed fracture (24.8x11.7mm) visible on the right frontal, 30 mm anterior to the coronal suture (fig. 3.6). The base of the depression shows mild pitting, and the depression is not visible endocranially. Another adult male in the Small-Reburial (TP.21.85) showed a small depressed fracture visible on his right cranial vault, which apparently had healed with no effect upon the internal surface of the cranium.

Post-cranial fractures were more abundant but not common. A left tibia from a large adult in the Large Reburial (TP.119.84) displays a large bony callus, flattened medio-laterally and projecting posteriorly, on the inferior shaft (fig. 3.7). A small circular area of damaged cortex on the posterior aspect may represent ossification of inter-osseous tissue that connected the lower tibia and fibula shafts. The right tibia of the adult male in *Sepultura* 9 (NW 2, TP.40.85, MNA 2005.215.81) bears a large well-healed callus at midshaft (fig. 3.8).

9.2. Infectious Disease

Examples of inflammatory response to trauma or infectious disease are surprisingly rare within the Torre de Palma skeletal series. There are several examples of chronic osteomyelitis, infection of the internal bone tissue and marrow cavity, following traumatic fractures as seen in this tibia and fibula. But no evidence was observed of two major infectious diseases whose marks on the skeleton are distinctive: leprosy and syphilis. The presence of leprosy is well documented by both historic evidence and skeletal observations in the Classical and Medieval periods in western Europe (Roberts, in press), while the presence of syphilis before the famous outbreak of 1493 in Naples is still vigorously debated (Powell and Cook, 2005).

9.2.1. Tuberculosis … or brucellosis?

Skeletal lesions suggestive of tuberculosis were observed in two young adults buried in the Northwest Cemetery. A young adult female (aged 20-30) in NW11/*Sepultura* 7 bears three small well-remodeled contiguous oval lytic lesions on the upper inner surface of her left anterior superior iliac crest (fig. 3.9, left image). The younger adult male in *Sepultura* 28 (aged 20-30) displays patches of unhealed inflammatory reaction on the inner surfaces of three consecutive right ribs, as well as a remodeled lytic lesion on the body of an upper thoracic vertebra (fig. 3.9, right and center images).

Tuberculosis was well known to Greek and Roman physicians of the Classical era, and the Greek name for it, *phistis*, which means 'wasting away', accurately describes its terrible effect on its victims as it destroys lung tissue. Tuberculosis rarely affects bones, so if these lesions indeed represent tuberculosis, the presence of three cases indicates a much wider prevalence of infection. It is, in a real sense, an opportunistic disease, preying on the malnourished and those living in unsanitary conditions, such as the large, crowded,

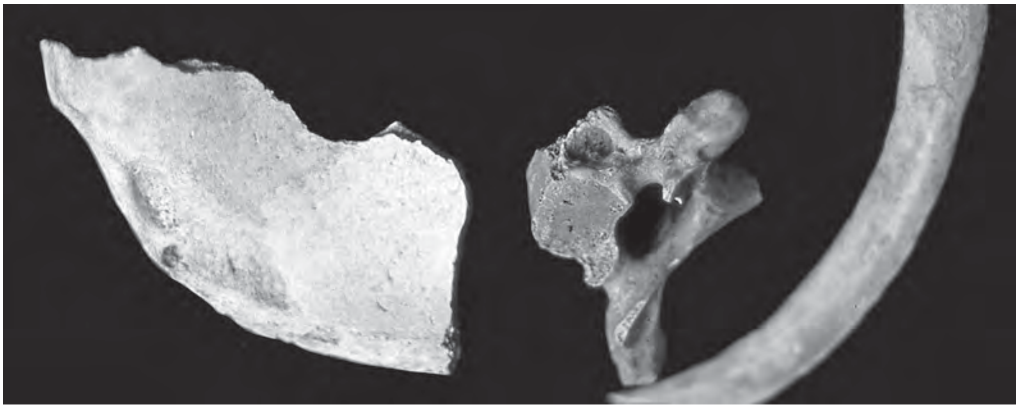


Fig. 3.9 — Tuberculosis or Brucellosis? (Photo by Mary L. Powell)

insalubrious cities of the western Empire. The nutritious diet at Torre de Palma would have provided a far healthier situation for its inhabitants, where infected individuals may have rarely suffered the ill effects of the disease.

An alternative diagnosis for the second individual described above would be brucellosis, a chronic infectious disease which can produce skeletal lesions similar to those of tuberculosis. Both diseases are caused by gram-negative bacilli, and both may be acquired by humans from infected domesticated animals: cattle (*mycobacterium bovis*), pigs (*brucella suis*), or goats (*brucella melitensis*), all of which were raised at Torre de Palma (see Chapter IV). Capasso (1999) reported brucellosis in 1st-century AD human remains from Herculaneum, noting that it was probably common throughout the Roman Empire due to the widespread consumption of milk products from sheep and goats. A more recent case was discovered in a Christian necropolis (13th-16th centuries) in Cacela Velha, Portugal (Curate, 2003-2004).

9.2.2. Osteomyelitis

One right rib fragment from a male aged 40-50 years (NW 4/ *Sepultura* 5) bears a small well-healed fracture callus just proximal to the curve of its body. His right and left tibiae and fibulae show marked inflammatory pathology. The entire diaphysis of the right tibia is grossly enlarged in its transverse dimension; the mixture of well-remodeled (sclerotic) and poorly-remodeled bone of the cortex indicates a long-standing inflammatory process still active to some degree around the time of death. A large oval lesion (103mm in length) with clearly-defined roughened margins occupies the center 1/3 of the shaft's anterior aspect and a broad shallow vascular groove runs across the posterior aspect just superior to the midpoint of the oval lesion on the opposite aspect. The entire shaft of the right fibula shows the same mixture of sclerotic and actively-remodeling cortex, with significant transverse expansion. The left tibia and fibula shafts show less transverse distortion, with actively remodeling cortex most evident along the central 1/3 of the lateral aspect of the left tibia, in the same anatomical region as the oval lesion on the right tibia. A break in the left fibula metaphysis reveals the original bone cortex enveloped in a layer of new bone around its complete circumference. In all four bones, the epiphyses are unaffected by the pathological process.

9.3. Hematopoietic Disorders

Skeletal pathology of any sort was rarely observed in subadults' bones from Torre de Palma, but two young children who died between the ages of 5 and 7 years (Tomb CC/ *Sepultura* 10-A) bore mild resorptive lesions in the upper walls of their eye orbits. Malaria has brought illness and death throughout the Mediterranean and Western Europe for millennia, and many populations in heavily endemic areas have developed genetic polymorphisms of blood cell shape which offer protection against the disease. However, individuals who are homozygous for this trait run the risk of developing severe chronic anemia, which can produce lesions like these and is frequently fatal.

9.4. Metabolic Disorders

Metabolic disorders that can affect the human skeleton are all related to nutrition, either a deficiency (e.g., iron) or a surfeit (e.g., Vitamin A) of some component of the diet or a physiological defect in the absorption of specific nutrients. Some of these disorders affect the entire skeleton, while others target selected regions. Examples of one generalized (Paget's disease) and three different localized forms of hyperostosis (Hyperostosis frontalis interna, Caffey's Disease (infantile cortical hyperostosis), and biparietal thinning due to metabolic malfunctions were identified in the Torre de Palma human skeletal sample.

9.4.1. Paget's Disease

A serious disorder often seen in elderly people of Western European ancestry (Mays, 2010; Menéndez-Bueyes and Soler Fernández, 2017) is Paget's disease, a metabolic disturbance of unknown etiology which causes anomalous, uneven localized or generalized production and resorption of bone that can eventually lead to stress fractures or impingement upon nerves or blood vessels (Gennari et al., 2019). An adult male aged 40-50 years at death from the Small Reburial (TP.21.85), a commingled mortuary deposit at Palma (described in Chapter II and Appendix I), was diagnosed with this enigmatic disorder, the oldest case reported in Portugal to date.

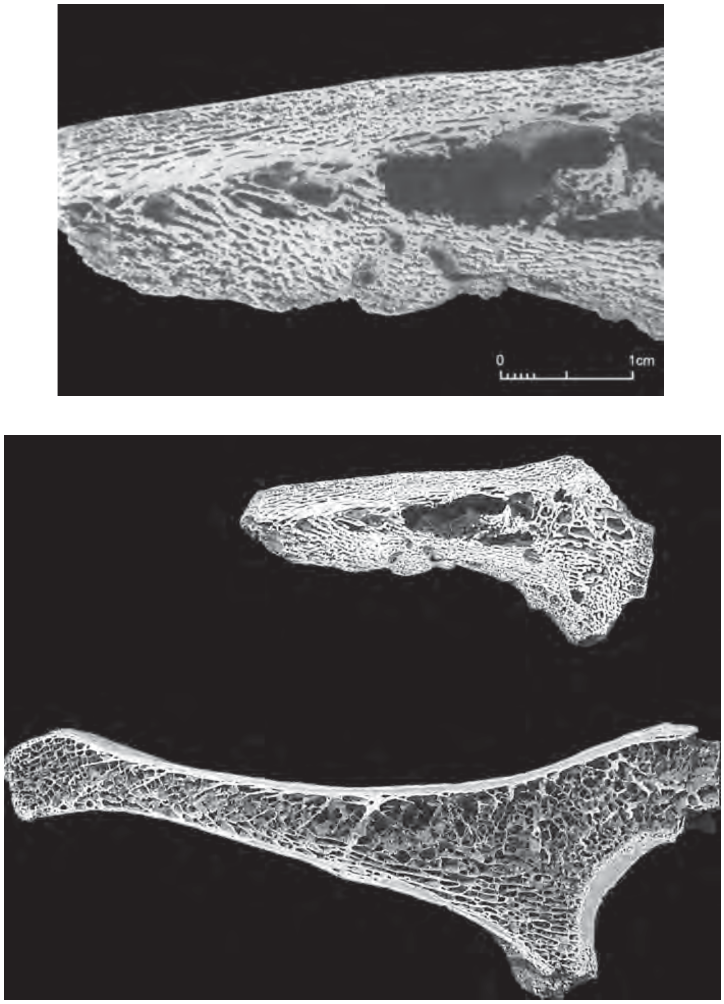
This individual is represented by incomplete and fragmentary portions of his skull, pelvis, and a few long bones (Appendix II, Table II, the Small Reburial). His estimated age of 40-50 years is based on the appearance of the right sacroiliac auricular surface (Phase 6, Lovejoy et al., 1985), and the estimate of male sex is based on pubic symphysis morphology, and the robusticity of the femur head (maximum diameter = 52.5mm, near the upper end of the male range at Palma) which neatly fit the acetabulum. Two radiocarbon dates were obtained from non-pathological bone samples taken from this elderly male: Cal AD 385 to 475 (Cal BP 1565 to 1475) and Cal AD 485 to 535 (Cal BP 1465 to 1415) (Beta Analytic, Inc). In addition, a relative temporal seriation for this individual was obtained by Mark Schurr, using chemical analysis of fluoride salts within the bone samples. The fluoride value (% F1 0.400) for this elderly male individual in TP.21.85 falls squarely within the range of values from the Northwest Cemetery (cf. Table 3.5), supporting the hypothesis that TP.21.85 represents a redeposit of individuals from that area.

Numerous fragments of cranial vault, including parietals and frontal and some occipital squama, probably belong to this individual. They appear a bit thicker than normal, with unusually thin outer and inner tables for the overall size. The diploe layer is thick and very finely textured, not normal in appearance. The mandible is not visibly affected. No other facial elements were recovered. There is no evident pathology in the broken femur shaft fragments, which reveal thick cortex but no layering or altered trabecular structure like that so prominent in the innominate fragments. The cortical surface is not pitted. A few robust fragments of tibia and fibula probably belong to this individual, but they show no pathology. Hands and feet are not represented, nor are the ribs or the vertebra, apart from the sacrum.

The broken fragments of both ilia and the left pubis show most clearly the chaotic, so-called "mosaic" appearance of fibrous bone formed in the blastic phase of Paget's disease that is considered diagnostic of this condition (Aaron, Rogers and Kanis, 1992; Cook 1980). Sections were prepared using a Buehler Isomet saw and thinned in cutting oil using 240 and 600 grit carbide paper. The bone is chalky and quite opaque even when thinned to 200 microns. No periosteal lamellae could be seen, and small fragments rather than osteon structures, predominate. The external cortex overlay a visibly dense zone, possibly a remnant of the original cortex. The fragments display a striking and symmetrical pattern of abnormal bone proliferation consisting of multiple thin layers of new cortical bone of a dense, granular texture laid down on the medial and lateral surfaces of the ilia (fig. 3.10a). These periosteal lesions are loosely organized, fibrous, and up to 6mm thick. The fragments show no remaining normal cortex, with no vestige of the original cortical boundaries on either surface, in contrast to thin cortex of a non-pathological ilium (fig. 3.10b). The underlying spongy bone displays coarsened and enlarged trabecular structure and there is fine, nodular new bone on the small recovered portion of the acetabulum; the trabecular plates lie perpendicular to the acetabular surface, coarsened and chaotic in orientation. The cortical bone is lamellar in organization, with the lamellae becoming coarser and less organized deeper to either surface. The outer surface of the cortex is very finely pitted, on both medial and lateral aspects of the ilia. The inner surface of the ilium is finely porous and roughened, particularly in the normally smooth region anterior to the origin of the iliacus muscle, and the iliac pillar is poorly defined as a result of the massive new bone formation. The medial cortex is particularly thick and lamellar in character. A portion of the first segment of this sacrum also displays this distinctive pattern.

Some Caveats

Differential diagnosis should include fibrous dysplasia and metastatic carcinoma, especially carcinoma of the prostate. The lack of large destructive foci and lesion location in the ilium and sacrum argue against fibrous dysplasia. Metastatic carcinoma of the prostate remains a possibility, given the marginal quality of the sections, but the absence of evidence for generalized bone loss elsewhere in the skeleton argues against that diagnosis.



a

b

Fig. 3.10 — a) TP.21.85 ilium fragment with thin layers of new cortical bone (Photo by Della Collins Cook); b) TP.21.85 ilium fragment (top) and non-pathological ilium (bottom). (Photo by Della Collins Cook)

It is important to report what we have not seen as well as what we see. We are unable to describe the boundaries between pathological and normal bone, given the fragmentary condition of this skeleton. The "flame like" or "blade of grass" boundary that is typical of the radiographic appearance of Paget's disease in the early destructive phases thus cannot be evaluated (Resnick and Niwayama, 1988, p. 2133). There are no visible destructive foci in the portion of the skeleton that was recovered. Alternatively, taphonomy may play a role in the absence of destructive lesions, an issue raised by several investigators who have failed to find the characteristic histology (Cook, 1980). Both the destructive lesions and the blastic lesions of Paget's disease are fragile in life, and this fragmentary skeleton was perhaps more exposed to post-mortem alteration than most, given that is comes from a secondary deposition. There was no protrusion of the acetabulum, a frequent feature of Paget's disease when the process has progressed to the point of plastic deformity of the bones of the hip (Guyer and Dewbury, 1978). No pathological fractures were evident, even though they are common in clinical reports.

9.4.2. Hyperostosis Frontalis Interna

Hyperostosis frontalis interna (HFI) is a nonspecific, generally benign condition characterized by the accretion of bone in the form of demarcated individual nodules or larger areas of coalesced overgrowth on the inner table of the frontal bone (Garralda et al., 2014). It has been reported in Neanderthals (Anton, 1997; Garralda et al., 2014), Neolithic burials in France (Devriendt et al., 2004), 1st-century AD skeletons from Pompeii (Lazer, 2009), a Meroitic early medieval tomb in Sudanese Nubia (Armelagos and Chrisman, 1988), medieval burials in Italy (Belcastro et al., 2006), prehistoric Native Americans (Everett, 2002; Mulhern et al., 2006), and other pre-modern populations (Aufderheide and Rodríguez-Martín, 1998; Ortner, 2003). The condition was first described by the Italian anatomist Morgagni in 1769, who associated it with obesity and virilism in elderly women (Morgagni-Stewart-Morel syndrome), but more recent researchers view it as separate from the other symptoms.

The identification of HFI in pre-19th-century populations is typically quite rare. It is most commonly seen in the crania of peri- or post-menopausal women, i.e., those older than 40 years at death. Hershkovitz and colleagues (1999) reported a prevalence of 24% (167 cases/699 observed crania) in females in two 20th-century North American skeletonized medical cadaver series, the Hamann-Todd Human Osteological Collection[2] (Cleveland Museum of Natural History, Ohio, USA) and the Terry Collection (Smithsonian Institution, Washington DC, USA). The youngest females (aged 20-29 years at death) showed a frequency of 11.8%, but this rate rose steadily with age, culminating in 44.2% in the oldest age group (80 years and older). Type A-rated cases (the mildest level in Hershkovitz et al.'s scoring system) accounted for 82% in females aged 50 years or younger, contrasted with 87% of Type D cases (the most severe) in females aged older than 50 years. Males in these two series showed far lower rates: 5.2%, or 52 cases/1007 observed crania, and the majority of cases were scored as Type A.

HFI has been grouped causally with various other metabolic or endocrine disorders that produce anomalous bone growth in the cranium. Differential diagnosis of suspected cases should include comparisons with the bony pathology of acromegaly and leontiasis ossea. Acromegaly (unlike HFI) affects portions of the post-cranial skeleton as well as the cranium; it typically results from a pituitary tumor in an adult that re-initiates the secretion of growth hormones. The cause of leontiasis ossea is less certain, but it is characterized by "long, continued excessive bone formation on the cranial and facial bones [which] leads to marked distortions of the normal features" (Ortner, 2003, p. 416), quite different from the internal cranial changes of HFI, not visible externally.

Hershkovits et al. hypothesize "functional disturbance of the gonads, i.e., faulty estrogen stimulation of or abnormal progesterone effects on the ovaries, or inadequate androgen stimulation by the testis" are responsible (1999, p. 322). In the cast of males, they suggest that Alstrom's syndrome (testicular atrophy) might account for male cases of HFI, and they note its numerous commonalities with breast cancer: "both are primarily female phenom-

[2] The Hamann-Todd collection was assembled (1893 – 1938) by two professors of anatomy, Carl August Hamann, Dean and T. Wingate Todd, in the Western Reserve University School of Medicine (now known as Case-Western University) in Cleveland, Ohio. It represents European Americans and African Americans who died in the Cleveland area during the very end of the 19th century and the first four decades of the 20th Century. This collection is present curated by the Department of Physical Anthropology at the Cleveland Museum of Natural History.

ena; both rise dramatically in frequency after menopause; both are associated with obesity and parity; both are modern phenomena; and both the frontal bone and breast are known to be target tissues for hormones such as estrogen and progesterone... Both age at menarche and the cumulative number of ovulatory cycles are considered to be major determinants of breast cancer risks." (1999, p. 322). Hershkovitz and his colleagues propose that the higher rate of HFI in 20th- century cadaver and autopsy population samples, compared with its relative rarity in earlier historic and archaeological populations, is due to different reproductive patterns: "Historic populations [i.e., pre-20th century] rarely manifest HFI since they were exposed to different menstrual and ovulatory patterns during adolescence and young adulthood. Menarche started at a later age and the onset of menopause was earlier. Historic females spent much of their reproductive period either pregnant or nursing. This implies minimal estrogen exposure," in contrast with 20th- century females who typically spent shorter portions of their reproductive periods in those conditions.

In the Small Reburial in the Northwest Cemetery (TP.21.85), portions of the frontal bones of two middle-aged women aged 35 years or older displayed small nodules of dense bone formed on the endocranial surface on either side of the internal crests of their frontal bones. None of the facial areas of the fragmented adult crania showed the pathological bony growth characteristic of *leontiasis ossea* or acromegaly, ruling out those differential diagnoses. The location and configuration of the lesions match the "Type A" category of HFI (the mildest manifestation) in the classificatory scheme of Hershkovitz et al. (1999).

9.4.3. Caffey's Disease (Infantile Cortical Hyperostosis)

One of the youngest subadults recovered from the Medieval Chapel, an infant in Tomb 4, presented extreme pathology and was subjected to a detailed analysis by Sarah Berrigan Holt. This individual had an estimated physiological age of three months (+/-8 weeks) using measurement and growth center appearance for the long bones and pelvic bones, and symphysis fusion for the mandible fragment, based on normal development standards (Scheuer and Black, 2005).

The left ilium (fig. 3.11a), femora, tibiae, and the left fibula of the infant in Tomb 4 show a marked pathological growth of porous new bone, distinct from the underlying cortex. This periosteal reaction is between 1 and 3mm thick surrounding the right femur diaphysis (fig. 3.11b). The unfused left segment of the mandible presents abnormal porosity and is noticeably thicker than the comparable mandibles in this sample (fig. 3.11c). There is a visible bowing of the left tibia (fig. 3.11d). There are no observed cloacae on any affected bone. No cranial fragments show observable pathology. Taken together, these pathological lesions are suggestive of a severe haematopoiec disturbance in this infant skeleton.

Differential Diagnosis

Several potential causes for this cluster of lesions were considered in the differential diagnosis. Hypervitaminosis A causes a breakdown of connective collagens that bind the

a

c

b

d

Fig. 3.11 — Infant in Tomb 4: a) left pelvis, showing new bone; b) right and left femur; c) mandible; d) left tibia shaft. (Photos by Sarah B. Holt)

periosteum to the cortical bone (Aufderheide and Rodríguez-Martín, 1998). The resulting hemorrhages prompt a rapid growth response similar to the fracture healing process that can, in extreme cases, result in a thick layer of subperiosteal woven bone (St. Clair et al., 2004; Walker and Shipman, 1996). In infants, tibiae and fibulae are commonly affected, but the pelvis and mandible are rarely affected; the new growth is generally locationally specific with the metaphyses less affected than diaphyses. The human body self-limits production of beta-carotene into Vitamin A, and overdoses are necessarily dietary, most frequently from consumption of the liver of carnivorous animals (Walker and Shipman, 1996). For a toothless infant, a diet of animal liver is unlikely at best, and although vitamin A can be transferred through breast milk, the mother's body would have absorbed the largest amount of excess vitamin A (Robb-Nicholson, 2003), mitigating the skeletal response of the infant and preventing the dramatic growth seen in this case

Scurvy was considered as a possible diagnosis, but only a near total lack of vitamin C in the diet results in pathological symptoms (Aufderheide and Rodríguez-Martín, 1998). In children a layer of unorganized lamellar bone on the cortex resulting from subperiosteal hemorrhaging forms as remodeling fails to take place. The deficiency causes an interference with collagen production beginning at the metaphyses of long bones and rarely including the diaphyses (Aufderheide and Rodríguez-Martín, 1998; Ortner, 2003). Cartilaginous growth centers continue to mineralize without osteoblastic proliferation and hypermineralized metaphyses with bony spurs present in severe cases, neither of which is evident in this infant.

Chronic anemia, either from acquired iron-deficiency or genetic disorders of hemoglobin, affects the skeleton in areas of red blood cell production (Aufderheide and Rodriguez-Martin, 1998; Larsen, 1997; Rothschild and Martin, 1993; Stuart-Macadam, 1987, 1992). The distinctive lesions of cribera orbitalia and porotic hyperostois are the primary diagnostic lesions in adult remains (Angel, 1966; Larsen, 1997; Aufderheide and Rodríguez-Martín, 1998). In adults, RBCs are primarily produced in the medullary cavities of long bones. Fetuses and infants experience such high oxygen demands for their rapid growth that mineralizing long bones cannot fully meet these needs. Haematopoiesis therefore occurs in several additional skeletal elements, as well as the liver and spleen (Forget and Higgs, 2001). In anemic infants, a hypertrophy of marrow to increase RBC production creates large areas of new, irregular bone growth, particularly in the diploe of the skull and the diaphyses of the long bones.

Other causes of chronic anemia include acquired iron-deficiency anemia, parasitic infection by helminths, and hereditary disorders of hemoglobin such as the α- and β-thalassaemias and sickle cell anemia. Chronic anemia may result from consumption of a diet heavy in non-heme foods, such as grains (Larsen, 1997), but even an iron-deficient mother will buffer her fetus from dietary anemia in the womb. Sickle cell anemia is most prevalent in sub-Saharan African populations, where a change in RBC shape prevents malarial parasites from building up in the blood stream. At least one Medieval adult Palma resident, (MNA 4769, v.2, the woman featured in the following Osteobiography), evidenced sub-Saharan ancestry, so this Medieval infant may have been at risk from the sickle cell disorder.

The change from fetal to adult hemoglobin begins just before birth (Forget and Higgs, 2001), and by 3 months of age, most infants have fully functional α 2 β 2 hemoglobin. If β-thalassaemia disrupts the synthesis of β-globin chains, iron transport is negatively affected at this phase of development. Skeletal deformation due to extramedullary haematopoiesis can be widespread with bossing of skull due to expansion of the diploic space, and subperiostial bone forming in "radiating striations, giving a typical 'hair on end' appearance" (Aufderheide and Rodríguez-Martín, 1998). Angel (1966) describes the shafts of subadult long bones presenting a "shell" of woven lamellar bone, a category of lesion present in this infant. The modern mean age of presentation for β-thalassaemia is 13.1 months (± 8.1 months) (Forget and Higgs, 2001). Reference to normal development standards may have underestimated the age at death of the Palma infant, if development was anomalous because of hereditary anemia which delays long bone growth, so this individual may therefore be well within the appropriate age range to display marked skeletal malformation from β-thalassaemia.

Caffey's disease (infantile cortical hyperostosis) is generally regarded as a skeletomuscular disorder that most often develops early in the first year of life, reaching the most severe stage around 5 months (Maclachan et al., 1984; Ortner, 2003; Pazzaglia et al., 1985). The inflammatory response of the periosteum during the development of the disease produces variable, often profuse subperiosteal bone formation on the diaphyses of long bones that can more than double the original bone width (Jaffe, 1972; Silverman, 1985). The long bones, mandible, and clavicle are the most affected areas. The metaphyses are not clinically reported as affected, but it is unclear in the literature whether this refers to cartilaginous metaphyses only or the growth plates of infant long bones. When Caffey's develops in infancy, it usually resolves within a year and is not a direct cause of death; however, an unrelated illness or accidental death during this time could produce a pathologically profuse skeleton. Radiographs of the Tomb 4 infant's long bones were assessed and compared to modern clinical images of Caffey's disease; although the modern images obscured some of the bone pathology changes due to soft tissue, the images showed marked similarities (Shelley Saunders, personal communication).

9.4.4. Biparietal Thinning

The cranium of the adult female (2005.204.3) in Tomb X/*Sepultura* 1-A in the Baptistry exhibits bilaterally located, symmetrical, broad shallow depressions centered on the sagittal suture just anterior to the parietal foramina (fig. 3.12). The advanced ectocranial fusion of the major sutures with the lines almost obliterated, the sacroiliac surface morphology (coarse macroporosity with initial breakdown of rim at apex), and age-related changes in the vertebrae indicate her age at death as 50-60 years.

Ethne Barnes (1994) notes that because most clinical cases of this rare condition have been observed in elderly individuals, the lesions have been linked with senile osteoporosis; she notes, however that "cases are known in individuals younger than thirty" (Camp and Nash, 1944). The disorder results from delayed development of the diploe in this region of the parietal bones, resulting in "hypoplasia or aplasia of the anlage of this spongy bone layer sandwiched between the inner and outer tables of the calvarium" (Barnes, 1994, p. 146). It typically presents bilaterally, but may appear unilaterally; asymmetrical cases have also been reported. The defect is sometimes accompanied by parietal foramina, although the two lesions do not result from the same formation processes. In lateral profile macroscopically and radiographically, the outer table of the parietal bone in the depressed areas appear to "melt" down towards the inner table (Lodge 1967, p. 410, fig. 5).

Fig. 3.12 — Biparietal thinning, adult female, Tomb X/*Sepultura* 1-A. (Photo by Maia M. Langley)

Advanced biparietal atrophy (thinning) is rare in the paleopathological literature, and the majority of reported cases come from ancient Egypt. In Brothwell and Sandison's compendium, *Diseases in Antiquity, A Survey of Diseases, Injuries, and Surgery in Early Populations* (Brothwell and Sandison, 1967), Lodge describes five Egyptian cases (1967, p. 405-412), Barnes illustrates this disorder in an adult female from Lisht in 12th-Dynasty Egypt (1994, p. 146-148, figs. 4.5 and 4.6), and Ortner (2003, p. 415, fig. 15-42) describes a similar case in an elderly male from the same site. Brothwell (1967 p. 413-416) also describes three cases, all middle-aged females from England, two from Saxon cemeteries and one from a Romano-British site. The Palma adult female is the first case reported from a Portuguese site; it closely resembles the two Lisht examples.

9.5. Dental Pathology

Diet-related forms of dental pathology such as carious lesions and ante-mortem tooth loss have been described in Section 7.3, Dental Evidence of Diet. The following section describes two unrelated forms of dental pathology observed at Palma.

9.5.1. Erosive Lesions

One individual (TP.1.86) in the Palma sample displays unusual erosive lesions at the cemento-enamel junction on the lingual aspects of the four maxillary incisors (fig. 3.13). The mandibular incisors are not affected. The crescent-shaped lesions have cleanly-cut margins; on the central incisors, they curve around the entire lowest margin of the crown enamel, while the lesions' arcs are shorter on the lateral incisor palatal surfaces.

Enamel erosion of this type has rarely been reported in the paleopathology literature; a notable exception is Alan Ogden's description of a case from an Iron Age adult from the site of Wetwang Slack in England (Ogden, 2008, fig. 13.12, p. 300), which exactly resembles the Palma case. As Ogden notes, "Regurgitation of acid from the stomach to the oesophagus can cause irritation of the musical lining, presenting as the 'heartburn' that up to 65% of people will have suffered in their lifetime..." Reflux past the upper esophageal sphincter leads to the release of acid into the oral cavity, and the refluxed acid may attack the palatal surfaces of the maxillary dentition. In modern dental practice, these lesions are often interpreted as symptoms of eating disorders such as anorexia or bulimia nervosa, alcoholism, or other conditions in which acid regurgitation frequently occurs. R.R.H. Jones and P. Cleaton-Jones (1989, p. 1277), in their review of dental pathology in bulimic women, document the "high prevalence of erosions and dental caries in bulimic patients..." resulting from "the decalcification effect of acidic vomitus during the vomiting phase of the disease, as well as reduced salivary flow."

Fig. 3.13 — Erosive lesions at lingual CEJ, maxilla. (Photo by David Brangers)

The Palma individual who bears these lesions is an adolescent male who was buried at the extreme eastern end of the Eastern Basilica of the Church precinct. His limbs are gracile, with minimal evidence of muscular development, and his degree of epiphyseal fusion suggests an age of 15 to 16 years at death, in contrast to his dental age estimate of 18 to 21 years (all four of his third molars are erupted). His orbital roofs show numerous large foraminae, suggestive of cribra orbitalia, but no other skeletal pathology is evident. Considering his early death, gracile build, possible evidence of a nutritional deficiency, and the absence of skeletal evidence of trauma injury, it seems possible that this person suffered from some illness that did not mark his skeleton but caused frequent digestive upsets, releasing stomach acid into his upper gastrointestinal tract and causing this unusual example of dental erosion. One other individual from Palma, an adult male aged 40-50 years at death recovered from *Sepultura* 3 in the Pombal Cemetery, displays similar erosive lesions on the lingual aspects of the cemento-enamel junction of his right maxillary incisors and canine teeth. His left maxillary anterior teeth do not show these lesions.

9.5.2. Deliberate Dental Modifications

Two maxillary fragments (TP.119.84, max #4 and max #5) and a partial mandible (TP.119.84, man #3) recovered from the commingled Large-Reburial from the Church precinct display changes to the permanent incisors that suggest deliberate dental modifications reported in individuals of known West African descent from other Medieval Portuguese contexts. The two maxillary segments fit together at the palatine midline; the canine teeth are moderately worn but not modified. The mandible shows modifications of both central incisors, and matches the maxillary segments for age, robusticity, and degree of occlusal wear. The modifications to the maxillary lateral incisors of this adult male resemble those described by Rute V. Alves and colleagues (2017, p. 67) in a young adult female buried in the cemetery of the Igreja do Carmo in Lisbon, sometime in the 17th-18th century: "All upper incisors presented removal of both mesial and distal incisal angles, being the alterations consistent with filing (cf. fig. 3a-b). There were no evidences of drilling with inlays, staining or ablation ... and the mandibular teeth were unmodified." The central maxillary incisors of the Palma male display a different configuration, their central portions being absent and only thin "spikes" of enamel remaining at the lateral margins. The two central mandibular incisors of the Palma male resemble the maxillary incisor modifications of the Carmo female, presenting as thin spikes of enamel "whittled" to sharp points. Similar mandibular modifications have been reported from Angola (Brabant, 1974; Jones, 1992; de Almeida, 1953; and others).

An adult female (MNA 4796, v.2) who was buried in the Church displays a quite different type of dental modification: ablation of both maxillary lateral incisors, with complete resorption of the sockets. A radiocarbon date of AD 1469–1648 (calibrated for eastern Portugal) was obtained from bone collagen from a carpal phalanx and a fragment from her mandible. Her cranial morphology and metrics, strongly suggestive of West African ancestry, distinguished her sharply from the other adult females from Palma. She is the subject of the "Osteobiography" that follows.

10. The "African Queen": An Osteobiography

If the aim of bioarchaeology is the reconstruction of past lifeways from human skeletal remains, then the term "osteobiography" ("life history as recorded in bone, from the Greek osteon = bone, Greek *bios* = life, Greek *graphia,* from *graphien* = to write") coined by Frank and Julie Saul (Saul and Saul, 1989, p. 288), seems highly appropriate for the study of specific individuals. The woman whose osteobiography is detailed here presents a challenging case for bioarchaeological reconstruction. She is represented in Palma accession #243 at the MNA only by a complete skull, the first two cervical vertebrae, and two finger phalanges. We do not know where she was buried in the Church, or if her entire skeleton was discovered, or if so, why it was not recovered. No field notes, drawings, or photographs have come to light that document her discovery. Yet she stood out among the numerous other incomplete skeletal individuals from Palma because of her atypical cranial and facial morphology, suggesting to subsequent investigators that she had "a hidden past". Her story deserves to be told in some detail, as she lived during a period of intense social turmoil as Portugal developed extensive trading and political connections along the west coast of Africa.

10.1. Discovery of "the African Queen"

In 1985, John R. Hale, visited MNA to examine archaeological materials previously excavated from that site. Hale was photographing a set of complete skulls displayed in a large *vitrine* in the MNA laboratory when he noticed that the last skull in the top row (MNA 4769, v.2) had a distinctly different appearance from the others: a long, low cranial vault instead of the high rounded vault typical of other Portuguese archaeological crania that he had seen, marked maxillary and mandibular prognathism, and bilateral absence of her lateral maxillary incisors. This unusual appearance recalled to his mind certain descriptions of craniofacial morphological differences between individuals of European and West African ancestry, and Hale immediately wondered if this particular individual might be from an African site.

The MNA had originally contained both ethnological and archaeological collections from Portugal and its overseas colonies (including sub-Saharan Africa), and Hale was worried that this skull might actually have entered the MNA as part of an ethnological collection from Africa and was subsequently mislabeled. However, when he saw the words *'Torre de Palma–Capela"* written on the right parietal, he immediately became curious about its origin.

A subsequent examination of the relevant Torre de Palma accession records by Maia Langley in the course of her doctoral research on the ceramics from the site indicated that all materials belonging to the ethnological collections from Africa had been transferred when the new *Museu Nacional de Etnologia* was built during the 1980s, so it now seems certain that this set of human remains had actually come from the Palma site.

When Powell joined the University of Louisville Torre de Palma Archaeological Project as Project Bioarchaeologist, Hale directed her attention to this anomalous individual. In 1999, as Powell and her assistant, Nathalie Antunes-Ferreira, began to clean this skull, they discovered two cervical vertebrae (C1 and C2) and two small carpal phalanges embedded in the soil around the base of the cranium. Therefore, although the catalog card for this individual (MNA series 243, *contentor* 4769, volume 2) lists the specimen as "*avulso*" (i.e., "isolated"), the presence of these non-cranial bones strongly suggests that the individual had been buried as a whole body (not just a skull) with flesh still covering the bones, probably with one hand resting on or near the face. Hale dubbed her the "African Queen."

10.2. Age and Sex Assessment

The cranium obviously represented an adult individual. All four of the third molars had fully erupted and one has been lost shortly before death. The teeth display light to moderate occlusal wear with very small islands of exposed dentine, suggesting an age at death of 30-40 years. No cranial suture fusion is evident ectocranially; the sutures could not be examined endocranially because the cranial cavity was still filled with soil. Over the years, the soil had hardened into a very dense ball; the most practical way to remove this material would have been to immerse the skull in water to soften the soil, but the MNA was reluctant to give permission for that procedure because of the risk that this very complete, well-preserved cranium would fall to pieces once the supporting soil had been removed.

The determination of female sex for individual MNA 4769, v.2 was based on features of cranial morphology considered to be reliable indicators of sex in adult crania and mandibles (Krogman, 1962): gracile supraorbital torus, thin superior orbital margins, relatively gracile mastoid processes, occipital condyles, temporal lines, and nuchal region of the occipital, and a rounded (not squared) chin.

10.3. Exploring the Ancestry of Individual 4769 v.2

The cranial morphology of this individual strongly suggests some degree of West African ancestry, but is this qualitative evaluation supported by quantitative data? Assessment of biological ancestry from a skeletonized cranium is not an easy task, even with well-preserved remains. Five different categories of biological evidence relevant to the determination of geographical ancestry were evaluated (Powell et al., 2012): craniofacial morphology, anthropometric craniofacial data, dental morphology and culture-specific artificial modifications of the dentition, developmental disorders that affect the shape and size of the cranium, and the analysis of ancient DNA.

10.3.1. Craniofacial Morphology

Individual 4769 v.2 displays several specific features of craniofacial morphology characteristic of sub-Saharan ancestry: marked dental prognathism (Brooks et al., 1990), guttered nasal border (Byers, 2002), broad, flared nasal aperture (Byers, 2002), a broadly arched "quonset hut" configuration of the nasal bones (Brues, 1990), and inverted posterior/inferior mandible ramus border (Angel and Kelley, 1990). In these features, this woman's skull differs markedly from those of the other adults from Torre de Palma (8 females and 11 males) in which the features can be observed. The marked maxillary and mandibular prognathism are perhaps her most distinctive features (fig. 3.14), but her broad "nasal gutter" is also quite distinctive: it stands in sharp contrast to the bony 'sill' that characterizes the lower margin of the nasal opening in the other observed Torre de Palma adult crania. The shape of her nose is more flared, and the smoothly rounded arch of her nasal bones matches the "quonset hut" shape described by Brues (2000) in contrast to the more sharply peaked nasal bones displayed by the other Torre de Palma adults observed for these features. Finally, the posterior/inferior borders of both of her mandibular rami show a slight inward curvature, comparable to that illustrated by Angel and Kelley (1990, p. 37). Not only is skull 4769 v.2 more gracile morphologically than the adult male crania from Torre de Palma sample, but it is also generally more gracile and pedomorphic (i.e., "child-like", with a distinctly rounded forehead) than other Palma female crania and mandibles.

Fig. 3.14 — Left profile view of skull of MNA 4769, v.2, showing maxillary and mandibular prognathism. (Photo by Maia M. Langley)

10.3.2. Craniofacial Metric Data

In 1962, Giles and Elliott pioneered a method for objective "race identification" (1962, p. 147) in skeletonized human remains utilizing discriminant function analysis of eight selected craniofacial skeletal measurements. Their reference samples consisted of 408 African-American or European-American adults of known sex, age, and race from two skeletonized medical cadaver series, the Hamann-Todd collection and the Todd collection as well as 150 Native American adults in the Archaic archaeological skeletal series from Indian Knoll[3], these were considered as representative of the African, Caucasian, and Mongoloid races, respectively. Their goal was the development of a multivariate statistical method that would enable forensic investigators to place individuals of unknown ancestry within one of these three categories.

Table 3.28 presents data for the eight measurements listed in Giles and Elliott (1962) from individual 4769, v.2 and 8 other adult female crania from Torre de Palma. The comparison shows that this woman's skull has a relatively longer, lower cranial vault than is typical in the Palma population. Her cranial index of 70.4 (calculated as maximum cranial breadth 132mm × 100/maximum length of 197.5mm) places her firmly in the dolichocranic (narrow or long headed) category (Bass, 1995, p. 70), a sharp contrast to the eight other brachycranic females (mean index 76.98). The breadth of her nasal aperture, 27.3mm, exceeds that of the other Palma adult female crania (mean = 23.3mm); this result matches the qualitative visual assessment of the shape of her nose. As plotted in Figure 3.15, her discriminant function score lies far outside the range of the other female scores, placing her near the very top of the "Negro" region of Giles and Elliott's scattergram plot, whereas the other Palma females cluster together inside the "White" region. These results confirm the initial visual interpretation of her craniofacial morphology as being very different from that of the other adult females from this site.

A second statistical assessment of the "African Queen's" craniofacial measurements was performed using a more recent multivariate statistical analysis program, FORDISC 3.0, developed by forensic anthropologists Stephen D. Ousley and Richard L. Jantz. Their database includes older cadaver collections in the United States such as the Hamann-Todd Collection[3] as well as data gathered though recent forensic cases in the U.S. (Ousley and Jantz, 2005). FORDISC 3.0 also allows for individual comparisons with the craniometric data from populations around the globe that are included in the database generated by Harvard anthropologist William White Howells (1908-2005).

The cranial measurements of the 8 Torre de Palma adult females and individual 4769, v.2 were entered into FORDISC and compared to "White females" and "Black females". Eight measurements were used in this analysis: maximum cranial length, maximum cranial breadth, bizygomatic breadth, basion-bregma height, cranial base length, basion-prosthion length, upper facial height, and nasal breadth. Cranial angles were calculated in FORDISC and were used in the final analysis. Cranium 4769 v.2 was classified as Black with a posterior probability of 100%, and the 8 other females were classified as White with posterior

[3] The Late Archaic site of Indian Knoll was excavated (1937-1941) under the direction of William S. Webb, Department of Anthropology, University of Kentucky, Lexington, Kentucky, USA. The human skeletal collection is curated at the W.S. Webb Museum of Anthropology at that university.

	1 G-O Lgth.	2 Max Wdth.	3 Ba-Br Hgt.	4 BZ Diam.	5 Pr-Na Height	6 Ba-Na Height	7 Ba-Pr Height	8 Nasal Breadth	9 Cranial Index	10 DF Score
4769 v.2, the *Capela*	**187,5**	**132,0**	**130,5**	**131,0**	**65,6**	**100,0**	**105,0**	**27,3**	**70,4**	**13,06**
Capela, Sepultura 1A	182,5	137,5	130,5	*	59,2	100,0	84,6	21,7	75,3	6,30
Capela, Sepultura 7A	186,0	146,0	136,5	132,0	66,7	104,5	92,5	25,2	78,5	7,43
Capela, Sepultura 6A	175,0	139,0	134,0	125,0	*	98,0	81,0	*	79,4	5,64
Capela, Sepultura D	177,0	142,0	125,0	*	62,2	98,0	91,0	23,1	80,2	7,50
Capela, Sepultura E	171,0	128,5	*	125,0	61,0	*	*	22,0	75,1	6,94
NW Cemetery, *Sepultura* 1	167,0	125,0	*	125,5	62,5	*	*	23,4	74,8	7,19
NW Cemetery, *Sepultura* 7	183,0	134,0	131,0	126,0	*	97,5	*	22,5	73,2	8,37
NW Cemetery, *Sepultura* 25	181,0	144,5	128,0	*	*	96,0	85,3	25,3	79,8	7,73
Mean Female w/o AQ:	**177,8**	**137,1**	**130,8**	**126,7**	**62,3**	**99,0**	**86,9**	**23,3**	**77,0**	**----**

* Sample mean inserted for calculation of DF score

Key:
1. G-O Length = Glabello-Ophistocranion Length. The maximum length of the skull, measured from the most anterior point on the frontal (glabella) to the most distant point on the occiput in the midline (ophistocranion) (Giles and Elliott 1962: 149).
2. Max Width = Maximum Width. The greatest breadth (euryon-euryon) of the cranium perpendicular to the medial sagittal plane, avoiding the supra-mastoid crest (Giles and Elliott 1962: 149).
3. Ba-Br Height = Basion-Bregma Height. Cranial height measured from basion (midpoint on the anterior border of the foramen magnum) to bregma (the intersection of the coronal and sagittal sutures). (Giles and Elliott 1962: 149).
4. BZ Diameter = Maximum Diameter Bi-zygomatic. The maximum width between the lateral surfaces of the zygomatic arches (zygion – zygion) measured perpendicular to the medial sagittal plane. (Giles and Elliott 1962: 149).
5. Pr-Na Height = Prosthion – Nasion Height. Measured from the lowest point on the maxillary alveolar border between the central incisors (prosthion) to nasion (midpoint of the naso-frontal suture) in the midsagittal plane. (Giles and Elliott 1962: 150).
6. Ba-Na Height = Basion-Nasion Height. Measured from basion to nasion (the midpoint of the nasofrontal suture in the midsagittal plane). (Giles and Elliott 1962: 150).
7. Ba-Pr Height = Basion-Prosthion height. Measured from basion to the most anterior point on the maxilla in the median sagittal plane. (Giles and Elliott 1962: 150).
8. Nasal Breadth = Maximum nasal breadth. The maximum breadth of the nasal aperture (alare – alare) measured perpendicular to nasal height (nasion-nasospinale). The latter landmark is the point where a line drawn between the most inferior points in the right and left segments of the lower margin of the nasal aperture intersects the midsagittal plane; the lowest landmark for the measurement of facial height. (Giles and Elliott 1962: 150).
9. Cranial Index = Cranial Index (Maximum width x 100) / Maximum length. This Index expresses the ratio between the maximum breadth of a skull and its maximum length as a percentage. (Bass 1995: 70).
10. DF Score = Discriminant Function Score (Giles and Elliott 1962).

Table. 3.28 — MNA 4769, v.2 Compared with Other Palma Females: Cranial Metrics.

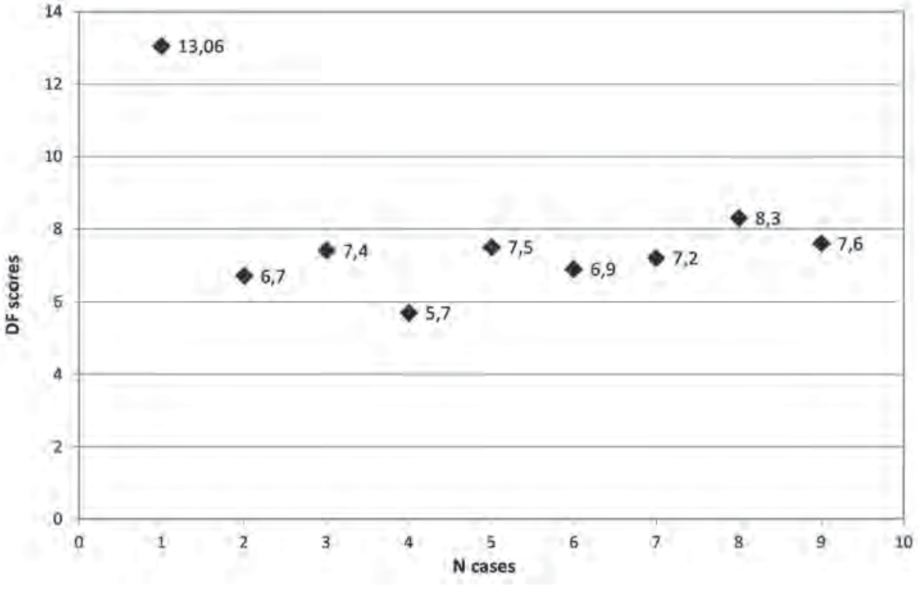


Fig. 3.15 — Plot of discriminant function scores of MNA 4769, v.2, and other Torre de Palma adult females.

probabilities of 95% or better. The very high posterior probabilities calculated (100% and 95%, respectively) strongly support the earlier assessment of African ancestry for 4769 v.2 and European ancestry for the other eight Torre de Palma females in this study.

In the next step, MNA 4769 v.2 was compared metrically to several African groups in the Howells database: Bushman, Dogon, Egypt, Teita, and Zulu. Unfortunately, this database did not contain data from any of the West African populations who were most strongly represented among the enslaved Africans transported to Portugal (Lowe, 2005), so it is not surprising that 4769 v.2 is not strikingly similar to any of the groups sampled: the closest match is with Zulu females (posterior probability = 52.7%). A possible explanation for this significantly lower posterior probability value is that 4769 v.2 was more similar in her biological ancestry to the American "Black" sample, many of whom undoubtedly had some degree of European admixture.

10.3.3. Dental Morphology and the Question of the Missing Maxillary Lateral Incisors

Analysis of dental traits for forensic determination of African versus European ancestry (Edgar, 2005) gives a somewhat mixed picture of Individual 4769 v.2. Her first maxillary molars show no Carabelli's cusp (an extra lingual cusp on the mesial-lingual cusp [protocone] of the upper permanent first molars), a feature typical of European dentitions, and there is considerable distal molar reduction: the second and third molars are progressively smaller, relative to the first molar, a feature which is surprising in someone of African ancestry as reduced cusp number in third molars is reported in only 20 percent of West Africans (Hellman, 1928).

Several other dental features, however, point to African genetic influences, e.g., her large maxillary central incisors (fig. 3.16) with remnants of a well-developed *tuberculum dentale* (an extra lingual cusp on the upper permanent incisors or canines), features that are common in persons of West African ancestry. Two features of the mandibular premolars: 1) lower anterior premolar cusp variation with lower first molar deflecting wrinkle (an elevated ridge extending from the mesial-lingual cusp [metaconid] toward the center of the occlusal surface of the lower permanent first molar) present; and 2) lower anterior premolar cusp variation and lower posterior premolar cusp variation) yield Bayesian posterior probabilities of 93% and 86% for African ancestry. If we follow Edgar's advice and limit ourselves to trait combinations with probabilities in excess of 85% no other pairs of traits are relevant, although many scores point to European ancestry. It seems likely, therefore, that this individual is of mixed African and European ancestry.

Culture-specific dental modifications are a useful marker of African *birth*, as distinguished from African ancestry (Handler, 1994). For this reason, the evidence for dental modification in this burial is particularly interesting. Individual 4769 v.2 is missing both her maxillary lateral incisors (fig. 3.16). The alveolar bone where the tooth sockets would have been visible is completely healed over, and there are no visible root remnants. There are no caries, decalcified patches, or erosions on the adjacent teeth that would point to caries as an explanation for the absent teeth. The absence of wear facets on the adjacent teeth suggests that the lateral incisors had been absent for many years, as does the condition of the alveolar bone. While agenesis of the lateral incisors is fairly common, people with agenesis have small central incisors and canines, and the remaining teeth are retracted, not procumbent, as hers are (Woodworth et al., 1985).

Dental modification is widespread among African populations and there is an enormous literature on patterns of avulsion, chipping and filing, age and sex associations, and cultural meanings. There appears to be no comprehensive review of this information, and most reports are anecdotal. By far the most common patterns reported are avulsion of all maxillary incisors, v-shaped notch between the upper central incisors, and tooth pointing (Jones, 1992). Few authors report frequencies, but the practice was nearly universal in some ethnic groups and patterns were to some extent ethnic markers (De Almeida, 1953). Powell et al. (2012) discovered no reports of the specific pattern that we see in Individual 4769 v.2 – avulsion of the upper lateral incisors but not of the central incisors – but archaeological discoveries of modified dentitions are known from regions in which the practice no longer exists (Haour and Pearson, 2005), and patterns have been discovered in fairly recent archaeological contexts that are not documented in ethnographic or medical studies of descendant groups (Brabant, 1974). It is not surprising that dental modification practices altered under the pressure of Islamic and Christian missionization, slavery, and colonial exploitation, and therefore we do not consider the lack of modern documentation for this novel pattern to be an impediment to our interpretation.

The central incisors show pronounced wear on the lingual surfaces that suggest use of the teeth as tools or for specialized food processing. Strikingly similar wear has been reported in crania from Senegal, in which it was attributed to foods introduced during the colonial period (Irish and Turner, 1997). Marked lingual surface wear has also been reported in individuals from Renaissance Cyprus, where it is attributed to flax or silk processing (Harper, 2006).

Fig. 3.16 — Occlusal view of MNA 4769, v.2 maxilla, showing ablation of both maxillary lateral incisors. (Photo by Maia M. Langley)

10.3.4. Ancestry versus Anomaly

Is it possible that the atypical craniofacial morphology of MNA 4769 v.2 (relative to other Palma adult females) was the result of a developmental syndrome? In his 1866 "Observations on an ethnic classification of idiots," Down proposed Ethiopian, Malay and American types in addition to his eponymous Mongolian syndrome (Down, 1866). The continuing controversy over the Flores hominids points to the importance of paying equal attention to ancestry and dysmorphology in evaluating skeletal remains which display unexpected features.

Sagittal synostosis (premature fusion of the sagittal suture between the two parietal bones) can result in a long narrow cranial vault with a sharp ridge along the closed suture. This condition might account for the dolichocranic appearance of Individual 4769 v.2, but there is no closure of the sagittal suture visible ectocranially. The medical term that describes this condition, scaphocephaly, comes from the Greek *skaphe*, boat + *kephale*, head), from the supposed resemblance of the ridged vault to the keel of an upturned boat. The vault is filled with soil so that the endocranial surfaces cannot be observed. Stewart (1982) has pointed out the relatively high frequency of scaphocephaly in African crania, and this may be related to the tendency of these populations toward dolichocephaly.

Endemic cretinism, a condition characterized by retarded physical growth and mental development due to thyroid insufficiency in infancy, was once common in parts of the Iberian Peninsula as a consequence of limited soil iodine in interior regions, as well as the iodine binding propensities of certain staple foods, most notably chestnuts (Fernandez, 1990). Cretinism is associated with distinctive skull proportions including microcephaly, prognathism, flat nasal bridge, and wide nose; these features are accompanied by an abnormally small, broad (brachycephalic) cranial vault and hypoplastic facial bones, the result of deficient cranial growth. There is no evidence for microcephaly in 4769 v.2 or brachycephaly.

Statistical comparison provides a more open-ended approach to the issue of anomaly versus ancestry: discordant Z-scores have been interpreted as a diagnostic criterion for facial dysmorphology. A bony, site-specific version of the Craniofacial Variability Index (Ward et al., 1998) for MNA 4769 v.2 produces low, concordant Z-scores, suggesting that she was not dysmorphic.

10.3.5. Ancient DNA Analysis of MNA 4769 v.2

Using standard ancient DNA methods and precautions (Kaestle and Horsburgh, 2002), approximately 175 base pairs (nt 16038-16213) of the first hypervariable region of the mitochondrial genome were successfully extracted and amplified from 0.1g of dentin sampled from the left maxillary first molar of MNA 4769 v.2. Compared to the Cambridge Reference Sequence (Anderson et al., 1981), the 4769 v.2 sequence for this region contained transitions at positions 16111 and 16124. These mutations are consistent with 4769 v.2 belonging to mitochondrial haplogroup L3, a haplogroup of African origin (Watson et al., 1996). A BLAST search of 4769 v.2's sequence against the National Center for Biotechnology Information's Genbank public database (Benson et al., 2008) resulted in 100% matches with seven sequences of either African or likely African (for example, Cuban) origin (U94015, AY210602, DQ517651, EU649825, EU649835, EU597512, and EU092735). Unfortunately, it was not possible to replicate this result from a second extraction attempt, nor to expand the sequenced region to obtain greater phylogenetic specificity. The decision was made not to resample, preferring to conserve the enamel morphology and lab resources, and therefore these results should be regarded as suggestive of an African origin for 4769 v.2 (fully consistent with the cranial and dental findings described above), but not conclusive according to the strict standards for verification of ancient sequence (Kaestle and Horsburgh, 2003).

10.4. Chronological Placement: Radiocarbon Dating and the Archaeological Context

A sample of bone from the mandible and a phalanx of 4769 v.2 were sent to Beta Analytical Laboratories, Inc. in Miami, Florida (USA) for radiocarbon dating. The results indicate that she died sometime between AD 1469 and AD 1648 (2 Sigma, calibrated for eastern Portugal using the calibration program developed by the Portuguese archaeologist António M. Monge Soares). Radiocarbon dating of mortar samples from the eastern portion of the Church at Torre de Palma indicate that construction was begun in the early 5th century AD and continued through the following centuries until it was abandoned in the 8th century (Hale et al., 1999-2000; Langley, 2006; Maloney, 1995; Maloney and Ringbom, 2000). A century after the 12th-century Reconquest of the Muslim lands in Portugal, a small chapel was built in the western portion of the old Western Basilica, where a portion of the eastern stone apse wall remained visible above ground, making the holy site (see Chapter II for more details). This chapel remained in use until at least the 16th century, according to ecclesiastical documents (Soares, Curvo and Lima, 1758, in Langley et al., 2007), and 16th -century coins have been identified amidst the burials of children beneath the floor of this chapel (Huffstott, 1999-2000). Indeed, at the time of the site's discovery in 1947, the low apse wall of the ancient church was still known locally as the *Ermida de São Domingos* (Langley et al., 2007). The final stages of the Portuguese archaeologists' excavations in the early 1970s were focused on the eastern area of the Church. This woman's MNA catalog number, 4769 v.2, was the last one entered for human remains from those excavations, which strongly suggests that her remains were discovered during the final days of F. de Almeida's explorations in the eastern portion of the Church.

10.5. Why Was This Woman Buried at Palma?

In the early 15th century, Portuguese explorers began charting the west coast of Africa, making frequent landfalls and establishing trading connections. A regrettable consequence of this exploration was the appearance of numerous enslaved sub-Saharan Africans in Portugal, whose numbers steadily increased over the next two centuries (Lowe, 2005).

In death as in life, these people were often treated with great disrespect, as attested by historical accounts (Earle and Lowe, 2005) and the recent excavation of a 16th-17th-century slave cemetery at Lagos, a city on the southwest coast of Portugal that was a major port for ships involved in west African exploration and commerce (Neves et al., 2009). Saunders' (1982) fascinating study of Black African slaves and freedmen in 15th-16th- century Portugal describes in detail the numerous occupations followed by Black Africans in both urban and rural locations throughout Iberia. One possible scenario to explain the presence of this Black African woman at Palma is that she was connected in some capacity (either enslaved or free) at the large Herdade de Torre de Palma, located c. 800m northwest of the ruins of the Church. Perhaps she was employed as a domestic worker at the large fortified farmhouse (the *Monte*) or was an agricultural laborer on the vast estate. The marked lingual wear on the maxillary central incisors may identify her as a textile worker or seamstress (Harper, 2006).

Enslaved Africans brought to Portugal were "Christianized" as a matter of course (Saunders, 1982; Earle and Lowe, 2005), and were frequently buried in sanctified ground. In Lisbon and Évora, for example, religious confraternities associated with São Domingos (Saint Dominic) were responsible for the charitable burial of both enslaved and free Black Africans (Saunders, 1982). The association of MNA 4769, v.2 with a locality remembered to the present day in local lore as a "hermitage" of the Dominican missionary order may be no accident. We will never know whether our "African Queen" was enslaved or a free woman of color, or how she came to Portugal. Her unusual form of dental modification (removal of the permanent lateral maxillary incisors, relatively early in her life) suggests that she was born in Africa, a supposition which does not contradict mixed African-European parentage, as suggested by other traits. In any case, at the end of her life she was regarded by the people around her as worthy of Christian burial, and was interred on the grounds of the old *Ermida de São Domingos*, a place of honor and respect, regardless of the social and economic circumstances of her earthly journey. Torre de Palma thus presents an exceptional example of long-term continuity in local use of sacred ground as cemetery space.

The skeletal evidence stable carbon isotope ratio (C^{12}/C^{13}) obtained from a bone sample from MNA 4769 v.2 falls within the lower range of carbon isotope ratios obtained from sampling the other Palma adult females, but it does not suggest that her diet differed greatly from that of other women buried here. Her skull displays no obvious signs of dietary insufficiency during growth: no cribra orbitalia or porotic hyperostosis of the cranial vault, and no macroscopically evident enamel defects. There are no signs of trauma, either recent or healed. The degree of occlusal wear on her dentition matches that of the other adults in her age bracket, further evidence of a similar diet. In sum, there is no skeletal or dental evidence evident to suggest that this woman was starved or maltreated during her lifetime, although this impression must perforce be based purely on cranial evidence and therefore provides a sadly incomplete picture.

The identification of 4769 v.2 as an individual with sub-Saharan ancestry is ironic, given the fact that Manuel Heleno had written his doctoral dissertation in 1933 on the history of African slaves in Portugal (Heleno, 1933). Had this skull been available to him, he probably would have recognized 4769 v.2 as a remarkable example of this history. In contrast to other regions in the African Diaspora, slave and free Blacks in Portugal were not confined to a limited range of occupations or markedly separated from the remainder of society (Saunders, 1982; Earle and Lowe, 2005). The diverse roles documented in historical sources tempt us to speculate about our subject's social identity: was she the African bride of a Portuguese trader in a marriage arranged to cement business ties, or the child of such a union? The child of a Wolof recruited for his equestrian skills? A Dominican religious or lay sister? A priest's or land-owner's concubine or offspring? An embroiderer or seamstress famous for her craft? Such women did exist in late medieval Portugal, and one of them may have lived out her life at Torre de Palma. It is perhaps most parsimonious to see her as a slave or free Black servant attached to the *Monte*. She is important because we have very little archaeological evidence of Africans in Portugal. Historical sources give us names of owners, a few names of slaves and freedmen, and locations of the ghettos where they lived, but their lives, deaths and burials have been lost to view.

IV. Animals and Industry at Torre de Palma: Zooarchaeological Analysis of Faunal Remains

MICHAEL MACKINNON

1. General Introduction and Methodology

Although zooarchaeology is increasingly advancing our understanding of animal use in Roman antiquity, its impact across the many sites excavated has not been felt equally. Several areas of the Roman Empire, including Gaul, Britain, Germany and Italy, have generally received more attention in terms of the animal bone remains, while other regions, such as Iberia and North Africa, have traditionally been neglected zooarchaeologically (King, 1999). Consequently, important research potential lies in zooarchaeological remains from sites in these historically under-represented areas. The site of Torre de Palma, located in the modern province of Alto Alentejo, in east-central Portugal, represents one such key site. More than 15,000 bone and shell pieces were retrieved over the course of the modern excavations at this site (1983 to 2000) by the University of Louisville Torre de Palma Archaeological Project, under the direction of Dr. Stephanie Maloney, the University of Louisville, Kentucky, USA). This chapter provides a detailed analysis of these remains and offers a detailed account of the contribution of animals to the diet and economy of this important Roman villa, the largest so far excavated in Portugal, and one of the largest in all of Iberia. At this stage, basic trends concerning aspects such as temporal changes in faunal resources, spatial distribution of animal bone waste across the various rooms and buildings of the site, and the use of faunal materials in dietary and economic aspects at Torre de Palma will be outlined. These results will then be placed into a broader scope, to shed light on how animal use at Torre de Palma compares, on a local scale, with patterns shown at neighboring sites (within an approximately 150km radius), as well as at a larger scale, with zooarchaeological evidence for sites and regions elsewhere in the Roman world.[4]

The Torre de Palma faunal materials were principally retrieved by hand during excavation; dry sieving was not extensively employed, although this technique was used in cases where deposits were producing large quantities of bone (e.g., the midden assemblages in the South Field), or where greater precision in recovery was required (such as in the cemetery contexts). Consequently, given the varied nature of faunal collection among archaeological contexts at Torre de Palma, the possibility of recovery bias favoring bones of larger mammals must be considered in zooarchaeological interpretations for the site (Barker, 1975; Payne, 1975), as larger bones are more likely to be retrieved in the absence of extensive sieving

[4] For earlier reports on portions of the Torre de Palma faunal assemblage, see Mackinnon 1999-2000 and 2000-2001. This current report supersedes results from those analyses. I am grateful to the director of the Torre de Palma excavations, Dr. Stephanie Maloney, for the opportunity to examine the zooarchaeological remains from the site, and for providing funding for this project. I am further grateful to the Archaeological Institute of America, Archaeology of Portugal Fund, for additional funding to support my zooarchaeological research of sites in Roman Lusitania.

operations. I would argue, however, that the impact of this potentially biasing factor is not significant. The excavators were extra vigilant during faunal retrieval and collected many bone pieces, both large and very tiny ones. It would appear that relatively little of what faunal material was available at Torre de Palma was missed during excavations. Consequently, the sample retrieved presumably represents a fairly accurate assemblage of materials that originally had been deposited, and that subsequently was preserved to be excavated.

The Torre de Palma faunal materials were examined at the site during the summer field seasons in 1998, 1999, and 2000. The bones are currently stored at the *Museu Nacional de Arqueologia* in Lisbon, along with the other materials recovered from the site, curated as MNA Accession 243 (Torre de Palma). During the analysis, all identifiable bone pieces that could be recorded to species level were catalogued. Ribs, vertebrae, and unidentified long bone and cranial fragments were not identified to species, but grouped according to size categories (e.g., large=cattle and red deer size; medium=ovicaprid and pig size), and tallied within the 'UNID' portion of the faunal sample. Taphonomic, age, sex, butchery, and metric information were recorded where possible.[5]

The taxa (Appendix III.1) were counted using NISP (Number of Identified Specimens) and MNI (Minimum Number of Individuals). The NISP method employed counted individual teeth within mandibles or maxillae. Thus, a mandible fragment with 3 teeth in it provides an NISP count of "4" (i.e., 3 teeth, plus mandible piece itself, equals a total of "4"). The MNI method took into account age categories.

2. Nature of the Deposits: Limitations of the Faunal Data

While zooarchaeological studies are certainly essential tools to help us understand the role of animals in antiquity, it is important to stress that the reconstructions and conclusions drawn depend upon the size of the samples analyzed, the circumstances of their deposition, and the nature and degree of contextual information available for each deposit.

Excavation work at Torre de Palma falls under two headings. First, much of the current work is really re-excavation to expose the main structures of the villa that were originally excavated in the 1950s-1970s under the direction of Dr. Manuel Heleno, Director of the *Museu Etnológico Dr. José Leite de Vasconcelos*, Lisbon. Since Heleno did not consistently save animal bones in his campaign, it seems likely that many of the bones recovered from the subsequent re-excavations represent mixed assemblages of remains from the course of occupation at the villa, that is from the 1st to the 4th-5th century AD. A more precise chronology for these re-excavated contexts is futile, given their disturbed stratigraphic nature and abundant mixing of materials, sediments, and soils from what were originally, and presumably, many separate chronological levels. A precise chronology for every context at the site is further hindered by the fact that many deposits contained no datable material. Although most contexts can be placed in some chronological order through a relative sequence, in the absence of good chronological ranges obtained from ceramics, coins, and other

[5] Aging systems follow Silver (1969) for epiphyseal fusion; and Grant (1982) and Payne (1987) for dental wear. Measurements follow the scheme devised by von den Driesch (1976). Sheep and goats were distinguished, where possible, using the criteria of Böessneck (1969), Payne (1985), and Prummel and Frisch (1986).

datable materials associated with each level and deposit, it is difficult to be very defined and detailed concerning temporal relationships.

The second category of work at Torre de Palma concerns the new excavations, directed by Maloney, of contexts and/or areas not exposed by Heleno in the earlier campaign. A number of good stratified and sealed contexts resulted from these new excavations, which in turn can aid in refining brackets of temporal change across the site. A significant portion of work in the South Field falls under this category, including excavation of a midden in this area. Fortunately, these South Field contexts, and especially the midden, yielded fairly sizeable quantities of animal bone, dated to different temporal periods at the site.

Although, realistically, it might be easiest to lump all contexts together and consider things under a broad, generalized, time bracket of 1st to 5th century AD (wherein the bulk of datable materials recovered from the site lie), such a practice does not promote any type of chronological comparison. In efforts to strike a balance in this dilemma, I have separated out some contexts where dates are provided (see below), and use these to assess changes in faunal resources over time at Torre de Palma. I also, however, denote a temporal bracket that considers a broader period of antiquity at the site, roughly the 1st to the 5th century AD, as a single, undifferentiated unit.

The issue of sample sizes also presents some concern and must be addressed. Although the cumulative number of animal bones collected from the Torre de Palma excavations exceeds an impressive 15,000 pieces, nearly 4,000 of which provided detailed information about species, age, sex, and so forth, these are aggregate figures for all the trenches and pits excavated. Most contexts, save perhaps the South Field midden, mentioned above, and a few choice other assemblages, yielded relatively small zooarchaeological samples. The bulk of what was collected, moreover, derives from rooms, courtyards, and other living/working areas in and around the complex. While the level of cleanliness might vary depending on the size, purpose, and nature of each room, in many cases one would expect conspicuous waste to be removed from most spots, at least while the areas were occupied. People might tolerate higher volumes of faunal rubbish in places such as workshops or kitchens (i.e., areas where one might presume animal processing and/or cooking to occur), or outdoor courtyards (i.e., also where processing activities might take place, or where waste could accumulate unnoticed); however, generally occupants would not be living in their own faunal waste. Nonetheless, the scraps left behind, and recovered archaeologically, are still invaluable in providing information about animal use at Torre de Palma, but it must be appreciated that most of the samples from individual contexts and levels at the site are very small, and potentially biased in this respect.

3. Temporal Analysis

3.1. Introduction and Initial Quantification

As noted above, establishing a complete and detailed chronology for every context at Torre de Palma is problematic. Nevertheless, at this stage, enough chronological data exist to examine general zooarchaeological trends over time. Overall, three temporal brackets are distinguished for the purposes of this zooarchaeological study: Early, Late and Unknown. Each is described below:

Early: 1st to 3rd century AD
- includes any contexts dated within this period, even if some have more restricted time frames (e.g., some dated as 1st to 2nd c. AD; others more broadly as 1st to 3rd c. AD; others more precisely as 2nd c. AD, or even more precisely as second half of 2nd c. AD, for example).

Late: 3rd to 4th/5th century AD
- similar rationale as above apply for this temporal bracket;
- latter phases of this period span into early Visigothic times; the site was occupied from the 5th to the 7th centuries AD, but there is little artifactual evidence available with which to establish a detailed chronology for this phase.

Unknown
- For a variety of reasons (e.g., no datable materials, disturbance, mixing, etc.), no date is provided yet for these contexts. Presumably, most of these date sometime within the temporal framework for the site as a whole (that is 1st to 4th/5th century AD); however, some levels may pre- or post-date this period (and indeed several are recognized as "Medieval to Modern"). Regardless, levels recognized by the excavators as modern fill are excluded from analysis and do not register as part of this "unknown" category.

Table 4.1. provides a summary of the NISP and UNID bone counts for each temporal period. Predictably, as the number of contexts comprising each period increases, so does its respective NISP and UNID count. At 457 contexts,[6] and over half the total NISP and UNID percentages, the "unknown" category clearly predominates. While this raises problems in terms of establishing clear temporal trends in the data, the samples from the Early and Late periods are still sufficiently large to allow for adequate comparisons.

Several animal taxa were identified from the faunal samples. Table 4.2. provides the NISP values for these, as grouped by the temporal periods outlined above, while Table 4.3. records the UNID portion for each temporal period.

Period	# of Contexts with Animal Bone	NISP	%	UNID	%
Early (= 1st to 3rd c. AD)	87	493	13.0	1218+	10.6
Late (= 3rd to 4th/5th c. AD)	109	1161	30.5	4451+	38.8
Unknown	457	2151	56.5	5809+	50.6
Total		3805		11478+	
+ lowest estimate; some contexts highly fragmented					

Table 4.1 — Summary of faunal counts.

[6] Any individual level or layer within an excavation unit or square is delineated as a separate "context" in this respect. Basically, each context was given a separate finds bag and recorded as such.

Tables 4.2. and 4.3. demonstrate several important points. First, mammalian bones preponderate, totally over 95% of the entire NISP sample. The mammalian category itself is comprised, chiefly (approx. 75.80%), of bones of the three principally consumed domesticates: cattle, ovicaprids (i.e., sheep and goats as a combined taxon), and pigs.

A second point, from the examination of Tables 4.2. and 4.3., is that rodent, fish, reptile, and amphibian bones are poorly represented, regardless of period. The dearth of rodent, reptile and amphibian bones is not unexpected, considering that these taxa were infrequently, if at all, consumed or utilized by ancient cultures. Many of the more common Mediterranean and European rodents (e.g., mice, voles), amphibians (e.g., frogs and toads), and reptiles (e.g. tortoises, snakes, lizards) are intrusive occupants to archaeological sites, burrowing into, hiding within, or otherwise infiltrating deposits, and normally after the site had been abandoned or destroyed. Moreover, their tiny and fragile bones often degrade more quickly post-deposition, or are missed during recovery. As noted above, excavators were vigilant in bone retrieval during the Torre de Palma campaign; however, only a few deposits were dry-sieved using screens of less than 1cm mesh size. Consequently, very small taxa, such as tiny lizards and mice, are infrequent finds.

Similar recovery and taphonomic concerns, as outlined for rodents, amphibians, and reptiles, might explain the lack of fish bones from the Torre de Palma excavations. Fish bones and scales are likely to be under-represented at a site unless flotation techniques are employed extensively (Wheeler and Jones, 1989). It is unknown how such a broad flotation program might have changed the results concerning fish for the Torre de Palma excavations.

TAXON*	**Early**	**Late**	**Unknown**	**ALL**
Cattle	63	138	264	465
Sheep/goat	141	367	587	1095
Pig	133	349	505	987
Equid	10	11	35	56
Canid	10	21	36	67
Camel?	–	1	–	1
Red deer	58	131	334	523
Roe deer	–	–	2	2
Fallow deer	–	2	4	6
Deer?/cattle?	6	30	47	83
Lagomorph	9	8	52	69
Hare	–	–	15	15
Rabbit	29	77	143	249
Boar?	–	6	12	18
Domestic fowl	10	11	77	98
Other avian	–	–	9	9
Rodent	–	3	9+	12+
Tortoise	1	–	1	2
Amphibian	–	–	2+	2+
Fish	–	–	3	3
Shell (Marine and Freshwater)**	17+	6+	14+	37+
Land snail**	6+	–	–	6+
TOTAL	**493+**	**1161+**	**2151+**	**3805+**

+ lowest estimate; some contexts highly fragmentary
* scientific names for taxa are provided in Appendix III
** note that shells were not recovered systematically during excavation

Table 4.2 — NISP values by temporal period.

CATEGORY			Early (n=87 contexts)	Late (n=109 contexts)	Unknown (n=457 contexts)	ALL
MAMMAL	SMALL					
		Rib	4	12	17	33
		Long bone	5	29	26	60
		Vertebrae	1	9	13	23
		Other*	1	–	–	1
	MEDIUM					
		Rib	169+	527+	882+	1578+
		Long bone	565+	2520+	2604+	5689+
		Vertebrae	73	264+	344+	681+
		Other*	116+	464+	571+	1151+
	LARGE					
		Rib	55	109+	221+	385+
		Long bone	145+	364+	750+	1259+
		Vertebrae	54	65	168+	287+
		Other*	19	71+	176+	266+
AVIAN			1	14	32	47
OTHER (includes shell)			10	3	5	18
TOTAL			**1218+**	**4451+**	**5809+**	**11478+**

+ lowest estimate; some contexts highly fragmented
* includes: scapula, pelvis, and cranial fragments

Table 4.3 — UNID values by temporal period.

A few fish bones were collected from the material, even from contexts not floated, so faunal recovery during the Torre de Palma excavations seemed quite good, even if not all tiny bones were retrieved and the sample is still generally biased in favor of bones of medium- and large-sized taxa. It might be argued, therefore, that the relative dearth of fish material in this sample does in fact reflect their limited dietary role for the occupants. Although Torre de Palma is linked to coastal areas to the west and south via Roman road systems, it would be very expensive to transport marine fish these distances, so few were probably imported. As for freshwater fish, several rivers dot the landscape around the site, but these were probably not a significant source of fish, if indeed they were exploited this way. Without an easily accessible source of fish, it is not surprising to find almost no fish bones at Torre de Palma. Their low frequency, moreover, resembles the situation among most inland sites in Iberia (and indeed among many inland sites across the Roman Empire).

A final point concerning the data in Tables 4.2. and 4.3. is that the basic patterns of taxonomic abundance shown in the NISP counts (Table 4.2.) are paralleled in UNID tallies (Table 4.3.). UNID bones from avian and small-mammal sources are very infrequent, with the bulk deriving from medium-sized (i.e., probably ovicaprid and pig) and large-sized (i.e., principally cattle, but also deer) mammals.

3.2. Temporal Analysis: Taphonomy

It is important to reconstruct the depositional and post-depositional histories of archaeological contexts to determine how these affect the preservation and composition of faunal samples. Taphonomic agents and forces, such as carnivores, wind, water, erosion, sunlight, soil acidity, plants, and so forth, can significantly modify and disturb archaeological bones. Such biases need to be understood and controlled to facilitate comparisons, both within sites and between them. Overall, bone preservation at the site was very good, owing in large part to the abundant underlying limestone in the area and ongoing erosion from the two large limestone hills located just above and east-northeast of the site, which lies embedded mid-slope at the base of these hills (Clarke, 1992, 1997; Langley, 2006), which created an alkaline soil environment. As shown in Table 4.4, the Torre de Palma bones bear few noticeable taphonomic traces, at least as concerns those agents that tend to cause the most damage to assemblages. Minor soil discoloration, root etching, and associated agents were ubiquitous across the site, but their impact was not severe enough to label them as major destructive agents. Rather, these are all-natural modifications related to the pedological and vegetative environment at the site. Outside of these agents, carnivore gnawing is the second most abundant taphonomic factor, but at about 5% its effects too appear rather minimal overall.[7] Traces of rodent gnawing are even rarer than carnivore damage. Their near absence may, in turn, relate to the low number of rodent bones recovered from the site. The area might not have been a favorable environment for them. Agents that require bones to lay exposed on the earth's surface for some time, such as sun-bleaching and exfoliation are also poorly represented. This factor, in conjunction with the high degree of soil and root staining, low incidence of carnivore gnawing, and basic overall taphonomic pattern, suggests that most of the faunal materials at Torre de Palma were buried rather quickly, and consequently protected from destructive surface post-depositional agents. Nevertheless, this is not to say that taphonomic conditions were uniform among all contexts at the site, for this was certainly not the case. Some deposits show slightly variable taphonomic evidence to suggest some diversity in burial environments existed. These cases will be examined in greater detail in the spatial analysis section of this report. Overall, the point to emphasize here is that when deposits are amalgamated as a whole, the incidence and prevalence of taphonomic agents noted is not extreme enough to claim massive post-depositional destruction of materials. Consequently, barring any removal of faunal remains from the area, the sample of bones collected likely closely represents what had originally been deposited at the site.

TAPHONOMIC AGENT	# of Traces Noted (out of Total NISP = 3805)	% Across Entire Assemblage
Carnivore gnawing	198	5.2
Rodent gnawing	4	0.1
Exfoliation, sun bleaching	50	1.3
Soil discoloration (dark staining)	1000+	26.3+
Root etching, soil staining	1000+	26.3+
Clean preservation (no marks at all)	122	3.2
+ lowest estimate; not counted extensively		

Table 4.4 — Frequency of taphonomic agents at Torre de Palma (all contexts and periods combined).

[7] It is unlikely that carnivores were so destructive on the faunal assemblage to render it extremely fragmentary and leave no few recognizable traces of gnaw marks on the bones.

	Early	Late	Unknown	ALL
#UNID per unit NISP	2.5+	3.8+	2.7+	3.0+
+ lowest estimate; some contexts highly fragmented so actual value is somewhat greater				

Table 4.5 — Number of UNID bone pieces per unit NISP by temporal period.

Table 4.5. presents a ratio of the UNID bone expressed per individual NISP bone. Elevated values here can indicate a more fragmented assemblage, which in turn might suggest more extreme taphonomic conditions operated at that time. Such a case might be argued for the Late period sample at Torre de Palma, since its score of 3.8 is noticeably higher than the Early and Unknown contexts, which hover near 2.5-2.7. However, a greater proportion of UNID bone to NISP bone can also arise from differential recovery biases, especially if one context is screened to retrieve all the tiny bone pieces, a situation that in turn can substantially increase the UNID portion of these assemblages. This appears to be the case for the Late period sample indicated below, since this period is dominated by a substantial midden assemblage (located in the South Field section of the site), which itself was sieved extensively. If this midden material is removed, and figures re-calculated, the values in Table 4.5. remain fairly close (all now register between 2.6-3.0 across time periods). Such a result helps support the notion that the faunal materials retrieved from each temporal period can be compared reliably. None of these re-calculated values is wildly divergent from the others to suggest that bone fragmentation was markedly dissimilar across time at the site. Fairly uniform taphonomic conditions and fragmentation effects seem to characterize each period, which in turn allows them to be compared with greater certainty that the data patterns are real, as opposed to being largely a factor of divergent taphonomic conditions among periods.

One final check of comparability among the temporal periods also concerns the UNID counts. Although the actual number of UNID pieces recovered, sorted, and counted in Table 4.5. varies among the periods, the relative frequency of the various categories (i.e., medium-sized rib, long bone, pelvis, etc.) remains fairly stable over time. Figures 4.1. and 4.2. display the relative frequency of UNID bones per category for the various time periods recognized at the site. Only counts for the medium-sized (fig. 4.1) and large-sized (fig. 4.2) mammal categories are shown, the data deriving from Table 4.3.

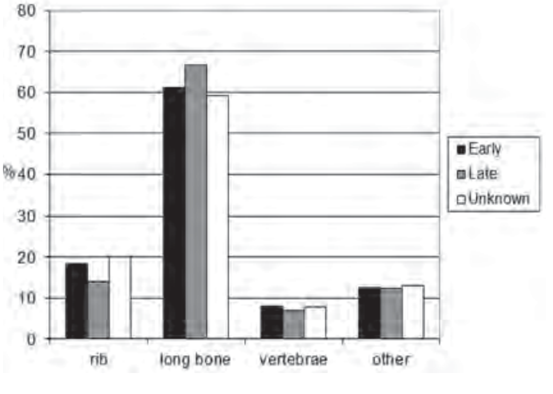


Fig. 4.1 — Frequency of UNID counts by skeletal part category and temporal period, for medium-sized mammals.

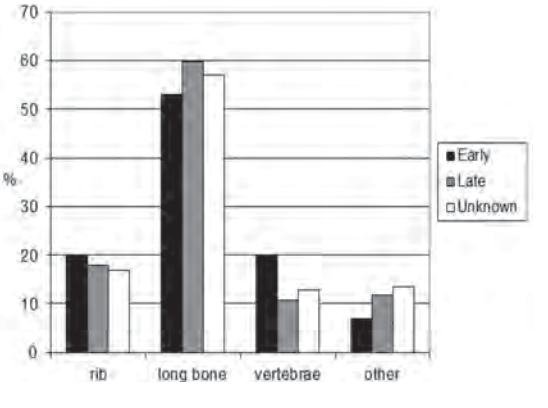


Fig. 4.2 — Frequency of UNID counts by skeletal part category and temporal period, for large-sized mammals.

As seen in Figures 4.1. and 4.2., the bars for all periods are fairly similar. The minor differences among them, in particular the higher frequencies for the long-bone category among Late period assemblages, are probably chiefly a factor of greater sieving of the midden deposit included in this period. Overall, the low disparity among the values in each skeletal part category supports an argument that the time periods are not markedly dissimilar in terms of the proportions of UNID bones, and so one can justifiably compare them without bias. Certainly, different *volumes* of trash may have accumulated across time, since the sample sizes and numbers of contexts comprising each period vary considerably; however, the analyses above suggest that the samples collected from each period do not vary significantly in terms of the *kind* of faunal waste that was disposed of and eventually excavated. It is implied, therefore, that as a whole, taphonomic and cultural conditions[8] were similar enough among periods to facilitate valid comparisons of the proportions of animal taxa found within each. The next step is to test to see how the proportion of taxa and bone elements represented within each period varies. In other words, are the same animals being exploited in similar ways across the ages at Torre de Palma?

3.3. Temporal Analysis: Contributions of the Principal Animal Taxa

General Overview

Table 4.1. lists the frequency of taxa represented across the various temporal periods at Torre de Palma. Several domestic and wild animal taxa clearly predominate, in terms of their NISP values, a pattern consistent across both time periods recognized. Among domesticates, cattle, ovicaprids, and pigs collectively account for 68% of the total NISP for Early period contexts and 74% for Late period levels. Deer, and most importantly red deer, are the next most plentiful wild animal taxon at around 12.13% of total NISP values between periods, followed by rabbits and other lagomorphs at nearly 8%. All other animal taxa figure poorly across both periods, with what might otherwise typically be fairly common and important animals, such as domestic fowl, dogs, and equids, barely accounting for 1.2% of total NISP counts.

The lack of canid and equid bones at Torre de Palma suggests that most of the material recovered derives from food and carcass processing waste. Dogs and horses were not normally consumed during Roman times, and, as such, their corpses tended to be buried, or disposed of outside of midden contexts. Moreover, since dogs and equids had a higher probability of being interred as whole carcasses, archaeologists tend to recover them as more or less complete skeletons, provided the archaeological context had not been disturbed significantly. Only isolated dog and equid bones were noted in the Torre de Palma samples, scattered across the site. Most of these were small fragments or loose teeth, which could have easily been incorporated into deposits as secondary peripheral waste.

[8] Similar "cultural conditions" in this case means that there has been no significant import or export of skeletal parts or taxa among periods. For example, if all pig heads were systematically removed from Early-period deposits, but not from any other temporal level, then this could skew the relative frequency values significantly and bias comparisons among periods.

Canids and equids are not the only domestic animals represented at Torre de Palma that were not typically consumed in antiquity. A possible camel tooth from Late period deposits probably derives from a work animal, which may have been, but more likely was not, eaten upon death. The tortoise bone noted from an Early period context likely comes from an intrusive, unconsumed individual, while most of the marine and freshwater shells recovered probably derive from non-dietary examples as well, even though the species represented, such as clams and oysters, can be eaten. It is more probable that many of these shells, especially those found in isolation, were variously collected, traded, or passed along, perhaps as curios or other cultural artifacts, eventually getting incorporated into the fill levels at the site. Some may have been remnants from past geological events as well. It is difficult to tell in all cases. Nevertheless, as so few were recovered at the site, it seems unlikely shellfish were consumed with any regularity at Torre de Palma. As with the dearth of fish bones, such a pattern is expected given the inland position of the site, and its dissociation from any rivers, streams, lakes, or oceans that may contain shellfish.

Consumable domestic mammalian taxa (e.g., cattle, ovicaprids, and pigs), and consumable wild mammalian taxa (e.g., deer, wild boar, rabbits and other lagomorphs) account for over 95% of the NISP samples from all periods at Torre de Palma. The proportion of consumable domestic and consumable wild NISP frequencies remains remarkably uniform between the Early and Late periods as well. By NISP counts, consumable domesticates represent 78.3% of the Early assemblages, and 78.9% of the Late assemblages, while consumable wild mammals account for 21.7% and 21.1% respectively across these two time periods. This strong uniformity lends support to the suggestion that general diets did not change, as a whole, over the course of Roman occupation at the site.

Examining the domestic mammalian taxa in more depth, however, shows some variation. Figure 4.3. displays the NISP frequencies for cattle, ovicaprids, and pigs across the Early and Late periods. With some minor fluctuations (notably a slight drop in cattle frequencies across time), the graphs are very similar, which supports the argument of dietary consistency over time at Torre de Palma, as outlined above. The pattern when MNI values are compared is quite different, however. Here, as displayed in Figure 4.4., the data show a significant increase in pigs going from the Early to the Late period, all of which comes, it appears, at the expense of cattle, which decline proportionately over the same time frame. Sheep/goat MNI relative frequencies stay quite consistent between periods.

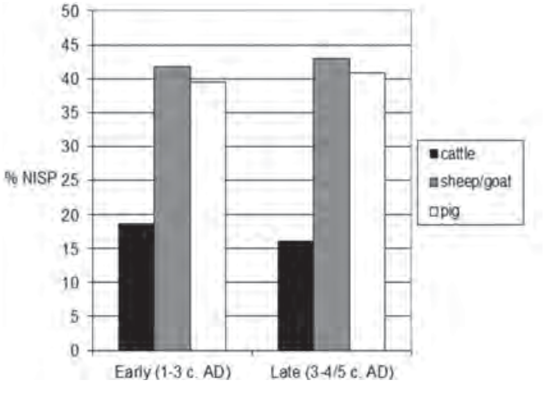


Fig. 4.3 — NISP frequencies for cattle, sheep/goat, and pigs for Early and Late temporal periods at Torre de Palma.

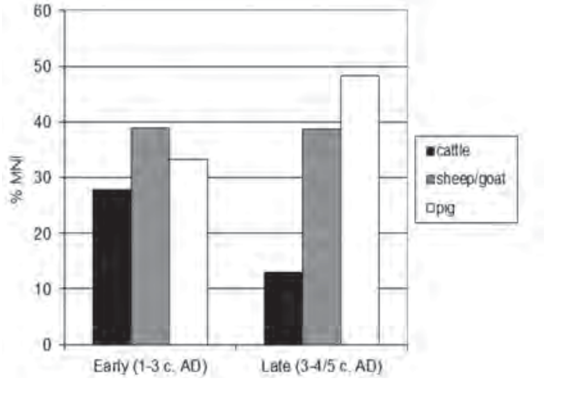


Fig. 4.4 — MNI frequencies for cattle, sheep/goat, and pigs for Early and Late temporal periods at Torre de Palma.

The discrepancy between NISP and MNI frequencies for these principal domesticates is difficult to explain. Overall, the results from either quantification system support the argument that the occupants at Torre de Palma practiced a mixed farming and husbandry regime throughout the life of the villa (i.e., from the 1st to the 5th century AD, in this case). All three principal domestic taxa are represented in significant numbers across time, regardless of quantifier. Still, NISP figures argue for more dietary consistency throughout the ages, while MNI counts suggest a marked increase in pork consumption during the 3rd to 5th century AD, and almost exclusively at the expense of beef during this time. Establishing which of these scenarios is more likely is problematic; a balance between the two might be the best alternative. Overall, pigs probably factored more importantly in the late antique diet and economy at Torre de Palma, but their contribution might be better tempered at a more modest rise of approximately 8.10% over the course of Roman antiquity, as opposed to the more dramatic 15% as implied by MNI figures. Even with this increase, however, cattle and ovicaprids still factored significantly in the diet and economy of late antique Torre de Palma, while the contribution of wild animals remained proportionately high across time as well. Each of these taxonomic categories will be examined in greater depth below.

3.3.1. Cattle

Depending on which quantification factor one views as more meaningful, the frequency of cattle at Torre de Palma drops either slightly (by about 2.5%, by NISP counts), or more sharply (about 15%, by MNI counts) between the Early and Late temporal periods recognized in this zooarchaeological analysis. Regardless of the magnitude of this decline, however, cattle appear to have remained a relatively important component of the diet and economy at Torre de Palma throughout its occupation. As plough and transport beasts, cattle would be instrumental, initially, in opening up land for cultivation, hauling goods, and providing leather, meat, and, less so, milk, to the growing population during the early phases of Roman settlement and expansion at Torre de Palma. Once population levels began to stabilize later in time, and the area had reached an apex for agricultural production, the need for cattle may have decreased somewhat. At this time, any cattle-herding operations that may have characterized some Iron Age and other pre-Roman operations in Iberia were probably replaced in Roman times by more sedentary, mixed-farming and stockbreeding activities, with a shift away from cattle to the keeping of smaller animals, particularly pigs.

While farming operations at Torre de Palma may have changed over time, cattle would still be needed as plough animals regardless of temporal period. The problem with keeping many cattle around at the site is one of cost. Maintaining cattle, even just a single ox, is an expensive task. Jongman (1988, p. 153) states that one ox in southern Italy needs c. 10.12 hectares of rough grazing. This places a great strain on farmers with limited landholdings. The basic premise is that humans and animals compete for food. In the case of cattle, therefore, the farmer would have to weigh the factors associated with providing sufficient fodder for his team of oxen or herd of cattle against the need to feed himself and the farm occupants with resources from his land. This is generally known as "the food-or-feed dilemma" (Lirb, 1993, p. 290.1). To cope, farmers could follow several options. First, they could replace plough cattle with mules or donkeys, both of which would consume relatively less food. Second, they could trim back, eradicate, or move their cattle elsewhere, where plentiful or cheaper land was available. Finally, they could reduce long-term maintenance concerns by sharing, renting, hiring, or leasing plough cattle. Whatever the option chosen, the net effect would see a reduction in the frequency of cattle in the zooarchaeological record over time, as is noted in the Torre de Palma material. No doubt some of the larger, cattle-herding ventures prominent in pre-Roman times in Iberia were scaled back or eliminated over the course of Roman times, as other husbandry (e.g., pigs and sheep/goats) and farming schemes (e.g., cash cropping, or specialization in olives, grapes, or fruit trees) gained prominence. As concerns the issue of sharing or leasing plough oxen, it is possible that as a large and prosperous villa, Torre de Palma capitalized on this venture, although we have no direct evidence of such contracts as exists for other areas of the Empire (see Lirb 1993 and Martin 1990 for discussion of ancient contracts involving animals). Nevertheless, plough oxen could have been kept at Torre de Palma and leased out as needed to neighboring farmers, who could not otherwise afford to own and maintain a team of oxen. If such were the case, however, these cattle would need to be housed and maintained at Torre de Palma during the off-season. Shelters would also be required to protect animals in the winter seasons, and for proper care of pregnant cows, as recommend by the ancient agricultural writers (Col. 6.3.1; 6.23.1). While several rooms across the site appear dimensionally and structurally equipped to suit such purposes (e.g., cobblestone-floored rooms in the Portico Building; Room XI, a cobblestone paved elongated room along the north end of the Atrium House; utilitarian rooms flanking the central courts in the South Hall and East Court complexes),[9] as yet one cannot definitely conclude that these rooms held cattle or any other animals for that matter. Moreover, with the exception of the Portico Building rooms, at most, only a few beasts could be housed in the above-described rooms from the Atrium House, South Hall, and East Court areas. Still, cattle could have been housed elsewhere at the site, in areas not yet explored archaeologically. One possible structure is the North Barn, a complex situated between the villa and the cemetery.

Determining the breed(s) of cattle used at Torre de Palma is problematic. Little is known about the varieties of cattle raised in Iberia during antiquity. The ancient Latin and Greek authors provide more details for animals in places such as Italy and Greece; what they do mention about Iberian animals is rather generalized. Strabo, for example, recognizes two important cattle-raising zones in Iberia—the lowlands of Turdentania or Baetica (Strab. 3.2.4.6), and northern Lusitania, north of the Tagus River (Strab. 3.3.5)—neither of which encompasses the central, interior lands around Torre de Palma. These Baetican and northern Lusitanian breeds may have been predominantly dairy cattle as well, if Strabo's (3.3.7; 3.5.4) comments about the excessive amount of milk delivered from cows in these areas can be believed. Although some dairy cattle may have been herded or kept around Torre de Palma, it seems more probable that hardier, beef or working breeds were maintained here. First, grazing lands in central Lusitania (where Torre de Palma is situated) were generally drier, hillier, and more scrub-like than in areas further south such as Baetica.[10] They are also not as lush as those in the mountainous zones to the north. The landscape

[9] Varro (*Rust*. 2.5.16) and Columella (6.22.1) note that the interiors of cattle stalls should be paved with stones, gravel, or sand, to prevent hooves from rotting.
[10] See Clarke (1992, 1997) for more on the environment around Torre de Palma, including reconstructions of ancient terrain and vegetation patterns using GIS data.

itself, therefore, restricts the scale of cattle herding that can be practiced successfully, and dairy breeds in particular would not thrive in the region around Torre de Palma.

A second reason why dairy cattle seem ill-suited for Torre de Palma involves ancient pricing. Polybius (34.8.7) mentions Lusitanian cattle when quoting the price of a calf (5 *drachmae*) and a plough ox (10 *drachmae*) from this region. Although Polybius' writings predate Roman occupation at Torre de Palma by several centuries, the prices he quotes for these Lusitanian cattle are much lower than those of contemporary Rome, a condition that would have encouraged export trade and cattle ranching operations in Lusitania at this time. If this continued into Roman times, then it is possible that Torre de Palma played some role in marketing beef and working cattle (as opposed to dairy cattle) to other areas of the Roman world.

Some information about the breed(s) of cattle exploited at Torre de Palma may be obtained from an examination of bone measurements. Table 4.6. presents a summary of the ranges, means, standard deviations, and samples sizes for cattle bone measurements for the site. Only measurement categories with samples of at least 10 are listed. To increase sample sizes, all periods including "unknown" are pooled in these listings, as a cursory investigation of statistics revealed no major discrepancies in measures across the periods.

BONE	Measurement	Range (cm)	Mean (cm)	Std. Dev.	Sample Size	Comparative Italian Mean (cm) and Sample Size
Astragalus	GLl	63.2-73.2	67.1	3.50	10	68.5 (n=84)
	GLm	59.0-68.0	62.6	3.28	12	62.9 (n=86)
	DL	35.5-39.9	37.5	1.54	11	38.5 (n=73)
	Dm	30.0-46.3	37.0	4.49	12	38.4 (n=29)
	Bd	41.4-45.8	43.5	4.49	12	44.6 (n=75)
Metacarpal	Bd	52.8-72.4	60.5	6.61	10	61.5 (n=75)
Phalanx 1	GL	52.6-65.7	59.1	3.54	40	59.3 (n=91)
	Bp	25.9-35.7	30.2	2.40	38	29.6 (n=67)
	Bd	25.0-33.8	29.0	2.36	38	27.7 (n=65)
	SD	22.1-30.8	25.6	2.14	32	24.4 (n=92)
Phalanx 2	GL	35.1-44.0	39.1	2.08	35	41.4 (n=157)
	Bp	26.3-34.0	30.2	1.94	39	30.4 (n=127)
	Bd	20.8-30.0	25.8	2.15	31	25.4 (n=118)
	SD	14.7-28.2	24.2	2.60	30	24.1 (n=89)

Table 4.6 — Bone measurement ranges, means, standard deviations, and samples sizes for cattle from Torre de Palma, alongside related means for Roman Italian cattle.

Although many of the mean values for the Torre de Palma cattle as shown in Table 4.6. lie slightly below similar averages for Roman cattle in Italy (presented in the final column in Table 4.6. See also Mackinnon [2004] for more on Roman cattle measurements), overall these differences are not highly significant. Moreover, sample sizes for the Torre de Palma material are relatively small for all but the phalanges categories, which themselves are not as reliable an indicator of general height or size of cattle, as are the longer limb bones, like the humerus, radius, femur, and tibia. Still, the substantial spread on some of the ranges, especially some of the width values (Bp, Bd, SD) for the phalanges, suggests that there was marked variation in cattle sizes at Torre de Palma. The degree to which this range is a factor of sexual size dimorphism (i.e., larger males and smaller females), or represents different breeds, however, remains inconclusive, especially in the absence of quality data to distinguish, clearly, the bones of cows, oxen, and bulls within the sample.

Age data patterns for cattle, tabulated on the basis of epiphyseal fusion (Appendix III.2), and dental eruption and wear (Appendix III.3), are fairly consistent across time at Torre de Palma. Adult specimens predominate most samples, representing about 75-80% of the individuals on the basis of MNI counts (between 50-75% survived beyond 36 months on the basis of fusion data in Appendix III.2), with no dramatic change between periods. This pattern is not surprising, given that many cattle in Roman mixed-farming and herding operations, such as is argued for Torre de Palma, were generally exploited for work purposes, and consumed at older ages. Still, the presence of some immature calves (i.e., less than 2 years of age) in the Torre de Palma samples suggests that at least some cattle were slaughtered for veal, and could be culled without jeopardizing the overall vitality of the herd. Although data are limited, the lack of any seasonal or annual patterning in the age patterns for the Torre de Palma cattle supports the notion that these individuals do not derive from an annual cull, as might occur if cattle were herded along seasonal rounds, over long distances. These younger individuals also appear to be in good health, which suggests that they were taken care of, and not subjected to work stresses, as older plough or traction individuals might have undergone. The point is that sufficient demand existed at the site to consume some calves on a fairly regular basis, and not feed solely on the occasional elderly work ox that was no longer useful for traction on the farm, and consequently slaughtered for its meat. Typically, only those who keep herds of cattle can afford to consume calves regularly without seriously jeopardize the vitality of the herd. While it is possible that the occupants of Torre de Palma could have purchased calves rather than slaughter their own (and thus avoid any of the breeding and herd vitality complications outlined above), such a scenario seems unlikely given the added expense to acquire and transport these calves. More probably these animals were coming from herds owned or maintained by the villa occupants.

Pathological conditions are rare among the cattle bones, which would indicate maintenance of generally good health among these animals. One molar tooth shows slight calculus deposition, a common ailment that is probably more frequent than indicated within the small sample of cattle teeth recovered. The remaining pathological traces are noted on lower limb elements, another typically common zone for skeletal troubles. An osteomyelitic infection has caused exostosis formation on a calcaneum, while two phalanges are slightly curved in shaped, probably due to some chemical and developmental ailment, such as osteoporosis, aggravated, or caused, perhaps, by excess stress placed upon the lower limbs, as would result from traction (e.g., pulling a plough or drawing a cart).

Figure 4.5. displays the frequency of four categories of skeletal parts for cattle calculated on the basis of NISP counts. Figure 4.6. provides the same information, but in this case derived from elemental-MNI (or MNE = Minimum Number of Elements) counts. Data here are only presented for the Early and Late temporal periods recognized. Full NISP statistics, including the skeletal elements that comprise each category are recorded in Appendix III.4. The predominance of head+teeth and extremity bones in the NISP tallies is expected given that representative bones in these categories survive well in the archaeological record, and that there are more bones to count in these categories than is the case with primary or secondary cuts. MNI counts help to standardize this trouble, but bring complications of their own

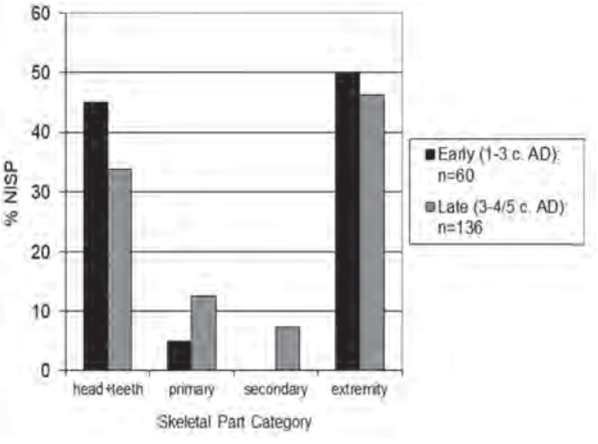


Fig. 4.5 — Cattle: NISP frequency of skeletal parts by temporal period.

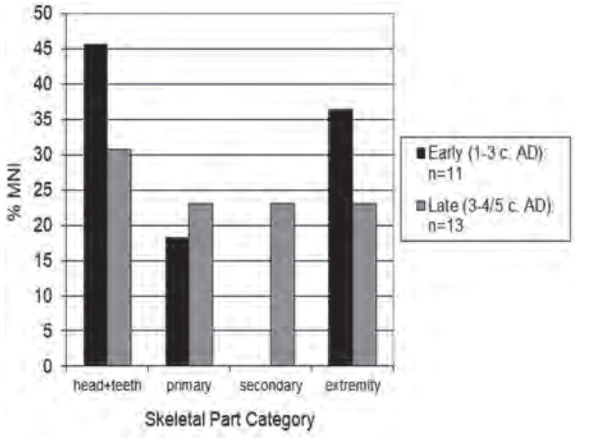


Fig. 4.6 — Cattle: Element-wise MNI frequency of skeletal parts by temporal period.

in the case of the Torre de Palma material, since most of these counts are less than 10, which can incur biases associated with small sample sizes. Nevertheless, when both the NISP and MNI figures are examined, the data tend to support the hypothesis that whole cattle were generally killed, consumed, and disposed of at Torre de Palma. This argument is stronger for the Late period, given the lower discrepancy among skeletal-part statistics here. In the case of the Early period, however, the data (although limited), indicate some skewing towards the head+teeth and extremity categories. Part of this may be due to sampling, taphonomic, and recovery biases, but it is also possible that this represents some differential deposition at this Early period. The recovered material from the head and extremities is typically a by-product of initial slaughter and butchery processes, while the "missing" primary and secondary cuts may have been removed (perhaps exported from the site) and deposited elsewhere.

A typical ox, cow, or bull provides a large amount of meat, typically in excess of 175kg. By comparison, a standard Roman ovicaprid averages about 28kg of meat, while a Roman pig yields about 50kg (Mackinnon, 2004). Considering these sizeable volumes, it is unlikely that individual households in antiquity would have purchased and slaughtered any of the animals above (even a small sheep or goat), unless they planned to share or otherwise distribute the meat among a group of people. Certainly, cuts of meat could be smoked, salted, or otherwise preserved, but these processes are difficult to infer from the available archaeological and architectural data at Torre de Palma. In the case of beef, the presence of all parts of the cattle skeleton in the Torre de Palma faunal assemblages denote some whole animals, so food sharing or mass, short-term consumption of meat could have occurred on occasion. Given the large size of the site, no doubt a whole calf, cow, ox, or bull could be consumed by the resident population of elites, workers, and slaves living and/or working there.

The meat weight figures listed above also become important when one wishes to convert NISP and MNI statistics into estimates of available meat provided by the animals represented. Using the system where MNI counts are multiplied by the meat weight estimates above (i.e., cattle 175kg; ovicaprid 28kg; pig 50kg) yields the following meat totals, and relative percentages (in parentheses), by period:

– Early period: 875kg beef (=64%); 196kg mutton (=14%); 300kg pork (=22%)
– Late period: 700kg beef (=39%); 330kg mutton (=19%); 750kg pork (=42%)

These figures attest to the importance of beef in the diet at Torre de Palma, particularly during the Early period, where it accounts for nearly two-thirds of the meat from domesticated animals. Although the frequency drops significantly during the Late period, beef still accounts for a large overall percentage, about twice that of mutton it would appear, and around the same as pork. Thus, while fewer cattle may have been kept or herded at the site in relation to pigs or ovicaprids, throughout the course of occupation at Torre de Palma, beef still formed a major part of the diet for the occupants, during all periods.

Finally, while cattle contributed both to the economy (as working beasts) and diet (as providers of beef) at Torre de Palma, their bones may have been used for other purposes, including handicraft operations. A number of finished worked bone objects, as well as several unfinished or partially worked bone blanks, rings, pins, and other items were recovered from many levels across the site. Cattle long bones, especially the metapodials, typically formed the raw material for bone working in antiquity, and these tend to figure predominantly among the Torre de Palma cattle bone assemblages. Metapodials and limb extremity bones, however, can also be associated with hide processing activities, since, as meat "waste" bones these elements are often left within the hide in its transfer to the tanner. Several of the cattle foot bones and metapodials from the Torre de Palma sample show cut marks generally indicative of skinning and hide removal. As will be discussed in greater detail later in this report, a similar cut mark pattern is exhibited on several deer lower leg bones as well (which incidentally predominate skeletal part categories for that taxon too). Both lines of evidence support the hypothesis that hide processing occurred at Torre de Palma. Deer and cattle skins were probably brought to the South Field area of the site (where these extremity bones predominate) with feet still attached. These bones are associated with poor-quality meat and are generally ignored by butchers, but they are an excellent source of neats-foot oil—a fine, thin oil ideal for treating leather (Serjeantson, 1989).

3.3.2. Sheep/goats

The representation of sheep and goat bones in the Torre de Palma sample is remarkably consistent across the two time periods recognized in this analysis, for both quantifiers. Sheep/goat frequencies average about 42% of the contribution for consumable domestic mammals by NISP counts (fig. 4.3) and about 39% for MNI counts (fig. 4.4).[11] There is further consistency in the large predominance of sheep over goats in the materials recovered from both periods, but these values do vary depending on the quantifier examined. Sheep are more common than goats by a factor of 3 or 4 to 1 when MNI values are examined for Early and Late contexts, respectively; however, these MNI samples are rather small in both cases. In terms of NISP counts, the sheep dominance is more marked. Here, sheep outnumber goats by a ratio of 10:1 for Early deposits, but the ratio drops to 6:1 for Late period levels. Nevertheless, when both NISP and MNI figures are averaged across all contexts and time periods (including the "unknown" category) sheep outnumber goats by approximately 5:1.

[11] These values are less, however, if converted to meat weights. See discussion above in the "Cattle" section of this report.

The relatively high frequency of sheep over goats at Torre de Palma is somewhat unique among Roman sites in Iberia, especially those in Lusitania and Baetica. Most comparable sites here register sheep:goat ratios of less than 2:1; some even record a predominance of goats over sheep. Presumably, the elevated levels of sheep over goats for Torre de Palma reflect an economic concentration on wool production, with supplementary exploitation of milk and meat from sheep. Although goats are hardier than sheep, their hair is generally inferior to sheep's fleece. Female goats do, however, produce more milk than ewes do, so had milk been the principal commodity exploited from the Torre de Palma ovicaprids, one might expect to find more goats represented in the faunal assemblage.

Age and sex patterns for sheep and goats add further support to the importance of wool exploitation at the site. Statistics for epiphyseal fusion, and dental wear, are recorded in Appendices III.6, III.7 and III.8, respectively. Adult ovicaprids, many of which had their third molars erupted and in advanced stages of wear (e.g. M_3 stages E, F, and above, using the Grant [1982] system), predominate over subadult and juvenile individuals (i.e., those with deciduous teeth still in place) by ratios of about 3 to 1 during both temporal periods. Few "middle-aged" sheep and goats (i.e., individuals roughly between 1 to 3 years of age), appear in the sample, so it would seem that ovicaprids not slaughtered as immature lambs or kids were subsequently raised to older ages. Generally, the chief reason to keep sheep and goats into this older demographic is to exploit them predominantly for wool or hair. Mature females could also be milked, and this resource too seems to have been procured, as mature female ovicaprids outnumber mature males by ratios of about 2 to 1. Still, the presence of several young individuals attests to the slaughter of lambs and kids as well. It is difficult to infer seasonal patterns of culling, however, since no distinct peaks in the age distribution data occur, which can be correlated to specific times of the year.

Reconstructing sheep and goat herding schemes on the basis of available data from Torre de Palma presents challenges. A number of husbandry options are available, ranging from year-round stall-feeding at a farm site, to localized herding over a short range, to large-scale, long-distance transhumance. While all forms were certainly practiced during Roman times across the empire, there is much regional, temporal, and cultural variation to consider within all of the systems. Localized stall-feeding and herding practices involving sheep and goats were likely ubiquitous, especially if one considers the importance of small- and medium-sized farming ventures across many parts of the Roman world.

The situation with long-distance, large-scale transhumance in Roman Iberia, however, is more complicated. While uncontested, documented, and reliable proof for such ventures in Spain does not exist until Visigothic times, Gómez-Pantoja (2004) has argued that indirect evidence for transhumant herding and seasonal grazing of flocks is available from earlier Roman times as well. He cites a long history among Spaniards in exploiting marginal agricultural areas as pasture fields, and moving herds between such fields to avoid adverse ecological conditions (Gómez-Pantoja, 2004, p. 1). Moreover, many of the drove roads (*cañadas*) used to link areas of northern and southern Iberia, and to move herds along in transhumant journeys, appear to have been established well before Visigothic times. One major route noted funnels through what are now the cities of Badajoz (ancient, Pax Augusta) and Mérida (ancient, Emerita Augusta). Torre de Palma is about 50km or so from this major transhumant route, perhaps close enough to be connected as an outlying, peripheral grazing area for transhumant flocks, but given the rather hilly and forested landscape in the Torre de Palma region, it seems unlikely that the area served as a major transhumant feeding ground.

While the evidence for transhumance in Roman Spain is conjectural, and any potential position of Torre de Palma within this scheme still undetermined, several lines of zooarchaeological evidence would argue that the bulk of the ovicaprids comprising the Torre de Palma sample were not herded in this fashion. First, the presence of lambs, under a year old (and of variable ages within this year-bracket as well), might suggest that some flocks never grazed too far from the villa. In this manner, the villa occupants could access a constant and convenient supply of lambs as demanded throughout the year at the site, an option otherwise unavailable to them had entire flocks traversed through the area only annually during transhumant journeys. Second, although "middle-aged" ovicaprids comprise an under-represented age category, they are still present at the site, indicating that they too were being slaughtered, again perhaps to fulfill local, year-round demands for meat at the site. Finally, had no flocks been locally maintained or pastured on a year-round basis, but rather traversed through the Torre de Palma area only seasonally as part of large-scale, long-distance transhumant operations, one might expect very distinct age clusters for the sheep and goat bones recovered at the site. These clusters would tend to lie in noticeable annual pockets (e.g., 6 months, 18 months, 30 months, etc.), depending on when within their annual mating and birthing cycle flocks would be congregating in the Torre de Palma area. Such annual peaks are not evident in the faunal sample from the site (note, for example, the progressive decline across fusion categories in Appendix III.5) indicating that sheep and goats were of mixed, unpatterned ages, as might occur in more free-ranging localized flocks, which mated on less rigid schedules, as opposed to stricter schemes followed by more structured transhumant herds.

If, as suggested above, the Torre de Palma occupants had access to sheep and goats throughout the year, then it follows that at least some ovicaprids were readily accessible in the local territory. The significant contribution of lambs and immature sheep in the Torre de Palma sample is especially important corroborating evidence here. Young animals, such as these, could not travel on foot over great distances (and could only be carted into the site from such distances at great expense), so their presence might indicate convenient acquisition from a local source, most probably the site itself. Keeping flocks year-round in the local area around Torre de Palma would be advantageous not only to supply meat, milk, and wool, but also as a source of manure to fertilize fields.[12] While small flocks of up to 20 or so sheep may have been locally maintained in otherwise unremarkable or multipurpose yards or rooms around the site, larger flocks would presumably require more substantial housing. No sheep pens or similar structures have yet been excavated at the site. Such enclosures would definitely be advantageous, especially in corralling large herds; however, they do not always leave distinct archaeological traces (e.g., in cases such as perishable wood fencing). Moreover, these complexes (if indeed required) may have been located outside the site, perhaps in upland areas or on less agriculturally important land in the surrounding region.[13]

Sheep and goat sex ratios from Torre de Palma provide minimal information. In the

[12] Cattle manure (but not that from pigs) also rates highly as a fertilizer, according to the ancient agronomists (Col. 2.14.1; Varro, *Rust*. 1.38.3).

[13] Ethnoarchaeological investigations of shepherding and transhumance in the Mediterranean context provide a good basis of comparison for ancient practices. The studies of Moreno Garcia (2001) for Medieval Spain, Barker and Grant (1991) for Italy, and Chang and Koster (1986) and Halstead (1991) for Greece are several key examples.

entire ovicaprid faunal sample, only two bones could be securely sexed, with a final tally of 1 male and 1 female. It is possible that this male could be a castrate, but this could not be determined on the basis of current data.

Table 4.7. records the ranges, means, standard deviations, and samples sizes for sheep/goat bone measurements for Torre de Palma, alongside comparative mean values from Roman sites in Italy. Again, as was the case with cattle measurements above, only categories with samples of at least 10 are listed; all periods, including the "unknown" temporal group are pooled.

With one exception (M_3 breadth, where means are equivalent), all of the sheep/goat mean values listed in Table 4.7. are below their respective Italian equivalents. On average, therefore, the ovicaprids from Torre de Palma are smaller than Roman sheep from Italy. Why is this the case? It seems unlikely that this is a factor of sexual size dimorphism, where the Torre de Palma sample is represented almost entirely by typically smaller female ovicaprids, while the Italian sample is predominantly males. This is not the situation for either assemblage, and indeed, as noted above, both a male and a female ovicaprid were identified from the Torre de Palma sample. It is more likely that the size discrepancy reflects regional variation in ovicaprid breeds, with relatively larger varieties bred in Italy, and generally smaller varieties kept at Torre de Palma. Such a phenomenon, however, needs to be examined within the context of size variation in animal breeds across the Roman world. It is widely recognized that some of the largest breeds of domestic livestock, including cattle, sheep, goats, and pig, appear first in Roman Italy, before spreading outward across the empire (Audoin-Rouzeou, 1991a, 1991b; Mackinnon, 2004). The smaller size of the

BONE	Measurement	Range (cm)	Mean (cm)	Std. Dev.	Sample Size	Comparative Italian Mean (cm) and Sample Size
M_3	L	20.8-24.3	22.4	1.25	16	22.0 (n=131)
	B	7.1-9.2	8.3	0.64	25	8.3 (n=132)
Scapula	BG	18.4-25.5	20.9	1.88	13	22.3 (n=61)
Humerus	Bd	29.1-35.0	31.0	1.76	14	32.0 (n=94)
Radius	Bp	26.0-34.2	30.9	2.12	16	31.7 (n=177)
Tibia	Bd	22.3-29.6	26.2	1.79	29	27.2 (n=209)
Astragalus	GLl	26.4-36.6	29.0	2.59	15	29.9 (n=148)
	GLm	24.7-29.0	26.7	1.41	11	27.8 (n=142)
	DL	13.0-24.7	16.0	2.76	14	16.8 (n=118)
	Dm	13.3-26.6	16.4	3.42	12	17.7 (n=96)
	Bd	15.6-20.4	17.5	1.32	14	19.3 (n=61)
Metacarpal	Bp	19.0-27.2	22.6	2.29	11	24.2 (n=256)
	SD	12.2-15.1	13.7	0.98	13	14.7 (n=54)
Metatarsal	Bp	18.3-22.7	20.0	1.27	11	21.5 (n=202)
	SD	10.2-16.5	12.1	1.64	17	12.5 (n=84)
Phalanx 1	GL	28.8-43.3	35.3	3.2	17	39.4 (n=212)
	Bp	10.2-16.0	12.3	1.6	16	13.4 (n=195)
	Bd	9.7-14.5	11.7	1.38	20	12.6 (n=208)
	SD	8.7-12.7	10.3	1.17	11	10.7 (n=215)

Table 4.7 — Bone measurement ranges, means, standard deviations, and sample sizes for sheep/goats from Torre de Palma, alongside related means for Roman sheep/goats from sites in Italy.

Torre de Palma sheep and goats, therefore, may simply be a fact of the delayed arrival of improved breeds from Italy, if indeed larger varieties were introduced to Iberia along this route. The ancient author Columella (7.2.4) states that Baetican sheep from southern Iberia could command great prices, and comments on schemes of importing breeding animals from Tarentum (in southern Italy) and Africa to mate with these sheep. Strabo (3.2.6) adds that Baetican rams are bought for breeding purposes at the high price of one talent apiece, an indication of their great value and important role as brood stock in the quest of better-quality wool.

Another explanation for the smaller size of the Torre de Palma sheep and goats is that perhaps the animals raised at the site were not subjected to as rigorous breeding schemes to maximize size and weight as seems to be the case for some contexts in Roman Italy. Domestic sheep, goats, cattle, and pigs all occur in sufficient quantities at the site to argue that Torre de Palma practiced a somewhat generalized and diversified farming and animal husbandry economic scheme, as opposed to specialization in any single venture, or concentration on one type of animal species. Without a specific focus, perhaps less emphasis was placed upon maximizing breeding schemes of one particular animal taxon. Consequently, smaller sizes among individual taxa might prevail, since herders were not devoting full attention to selecting the largest individuals for breeding. This is not to say, however, that breed manipulation stagnated at Torre de Palma, but that it might not have progressed as quickly as possible had the villa specialized more fully in raising one or two animal species.

It appears unlikely that the smaller overall size of the Torre de Palma sheep and goats relates to poor health. Overall, there are very few pathological markers on the sample of ovicaprid bones from the site. Such evidence suggests that the sheep and goats from the site were in generally good health. No post-cranial pathological traces are noted; signs are restricted to the dentition. Several teeth exhibit slight calculus deposition, a rather minor and ubiquitous condition among sheep and goats from many ancient (as well as modern) sites. An infection and abscess along the roots under the second and third mandibular molars of a mandible was also noted in the sample, but again dental ailments, including similar infections and abscessing, are relatively common among most zooarchaeological assemblages.

The distribution graphs for sheep/goat skeletal parts (fig. 4.7 and 4.8) provide mixed results, depending upon the quantifier examined. Complete NISP data for Figure 4.7. are provided in Appendix III.4. All parts are represented; thus, at least some whole ovicaprids were killed and consumed at the site, during both periods. The predominance of the head+teeth category in the NISP graph (fig. 4.7) probably relates to the fact that teeth are both abundant and durable, so many more of them survive archaeologically to be counted. These biases, however, are reduced to some degree when MNI frequencies are examined (fig. 4.8). Here, the proportion of head+teeth is fairly comparable to the values for primary and secondary cuts, which implies that those sheep/goat bones typically associated with initial slaughter and carcass processing waste (e.g., the head, stripped of meat and with brain removed probably), as well as bones associated with the latter stages of carcass dismemberment and preparation for consumption (e.g., bones such as the ribs, vertebrae, and long bone sections, chopped into cuts), were perhaps eventually discarded together in some communal midden. It does not appear as if mutually exclusive dumps were designated for the specific faunal waste products that would result from individual stages in the slaughter-dismemberment-butchery-filleting-consumption continuum.

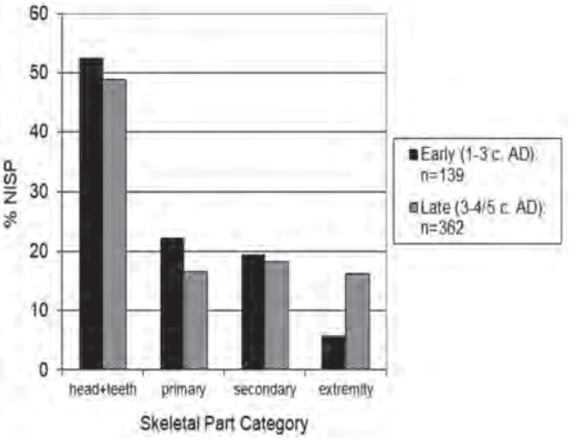


Fig. 4.7 — Sheep/goat: NISP frequency of skeletal parts by temporal period.

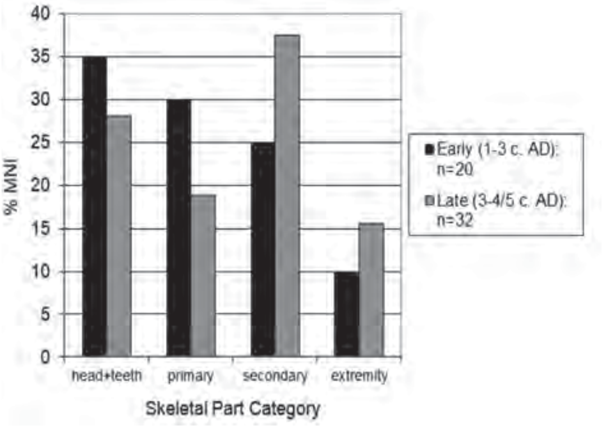


Fig. 4.8 — Sheep/goat: Element-wise MNI frequency of skeletal parts by temporal period.

Although the representation of head+teeth, primary, and secondary cuts in the sheep/goat sample from Torre de Palma suggests slaughter of whole animals and undifferentiated deposition of the various skeletal waste products that result from the carcass dismemberment, butchery, and consumption activities that ensue, there is a noticeable lack of extremity bones recorded, especially from Early period contexts. This is surprising, especially since this extremity category includes some of the most durable and abundant bones of the sheep/goat skeleton, such as the metapodials, carpals, tarsals, and phalanges. These bones appear frequently among other Roman sites, including cases in Iberia. Moreover, the low frequency of sheep/goat extremity bones at Torre de Palma contrasts markedly with the high predominance of this category for cattle and deer at the site. While part of the absence of sheep/goat extremity bone at Torre de Palma may relate to recovery biases (sheep/goat carpals, tarsals, and phalanges are relatively small bones, but still large enough to retrieve without the use of screens), it is also possible that this phenomenon has cultural causes. If, for example, sheep and goat hides were removed from the animal during carcass butchery, and subsequently exported from the site, or at least moved to an area of the site where the waste bones inside these hides (typically the lower leg bones, including the metapodials, carpal, tarsals, and phalanges) would not eventually be deposited with other waste materials from sheep/goat butchery and consumption, then one would expect to find the extremity category under-represented in the Torre de Palma ovicaprid sample. Perhaps these bones lie in contexts as yet unexcavated at the site, or were removed totally from the site. An argument was proposed earlier that the high frequency of extremity bones for cattle (and deer, as is discussed below), coupled with the evidence of cut marks on these cattle and deer extremity bones relates to hide processing activities at Torre de Palma, where cattle and deer leathers were tanned and prepared. It is possible that, by contrast, some sheep and goat hides (with lower legs attached) were exported, and processed off-site. This would account for the lower than expected values for sheep/goat extremity bones as displayed in Figures 4.7. and 4.8. On the basis of recorded values, it appears that, if this were indeed the case, it was occurring with greater relative frequency in the Early period than during Later phases of occupation at the site.

The arguments made above about sheep hide processing, may link in some capacity with issues of wool exploitation. Sheep-raising and the wool industry had a long history in Iberia; most references to Iberian sheep in the ancient tend to revolve around wool. Woolen cloaks of the Celtiberians, as described by Appian (*Hisp.* 42), were demanded in large amounts by Roman armies by way of tribute (App. *Hisp.* 54; Livy 30.3.2). The golden-coloured wool of sheep reared in Baetica is noted and prized by a number of authors (Juv. 12.41; Mart. 5.37, 9.61, 12.63, 12.65, 14.133; Pliny *NH* 8.191; Strabo 3.2.6). Excellent wool also came from sheep in the area around Salacia (modern Alcácer do Sal) in south-western Lusitania, near the Atlantic coast (Strabo 3.2.6; Pliny *NH* 8.1.91). The good, international reputation of Iberian wool seems to continue through to Late Antiquity as well, as suggested by its inclusion in the price list of the Edict of Diocletian (25.3). Given these comments, therefore, it is possible that some sheep and goat hides from animals slaughtered at Torre de Palma were processed off-site, perhaps even transported some distance to areas such as Mérida (to the west), Baetica (to the south), or Salacia (to the west), for further processing. The transfer of sheep and goat hides may have occurred alongside the export of any excess wool from the site as well.

3.3.3. Pigs

Pig bones comprise about the same percentage as those of ovicaprids by NISP counts in both periods recognized at Torre de Palma (approximately 40%, see fig. 4.3); however, the situation is different when MNI values are compared (fig. 4.4). Here, there is a significant increase in their relative frequency, from about 33% to over 48%, practically all of this rise at the expense of cattle. There are limited faunal data from Roman sites around Torre de Palma with which to judge these trends, but overall throughout Iberia zooarchaeological studies typically reveal an upsurge in the frequency of pigs coincident with Roman contact in the area. Generally, this increase comes at the expense of cattle, and presumably reflects an augmented demand for pork, a favored meat of the Romans. Which scenario best reflects the situation for pig production at Torre de Palma: continuity as shown by NISP results in Figure 4.3., or increase over the course of time from the 1st to the 4th-5th centuries AD? Given the trend of rising pig percentages for many sites in Iberia, I would argue the latter; however, the trend at Torre de Palma may not have been as dramatic as shown in the MNI graph here (fig. 4.4). If one considers the aggregate demand for pork at a large villa complex like Torre de Palma, let alone production to supply any extended regional area, pig husbandry could bring great wealth, provided costs could be minimized. Although pigs can feed on practically anything, their most convenient and cheapest feeding grounds are woods with oaks, beeches, and other deciduous trees (Col. 7.9.6). Where these resources are scarce, pigs can be fed (although at greater expense to the farmer) on fodder crops, fruits, roots, barley, beans, grains, or other plant materials (Varro, *Rust.* 2.1.17, 2.4.6; Col. 7.9.7.9). Given these options, the occupants at Torre de Palma probably exploited the forests in the vicinity of the site to some degree for pig feed (e.g., nuts, acorns, leaves, etc.), and capitalized somewhat on the Roman demand for pig and pork products by increasing hog production at the site over the course of antiquity.[14]Nevertheless, it seems that potential demands for more pork from the site never outstripped the need to maintain mixed farming and animal husbandry

[14] Clarke (1997) includes a significant amount of woodland (including expanses of cork oak) in his environmental reconstructions of classical land use at Torre de Palma. Large tracts of these woodlands lie as close as 1-2km from the villa, according to his hypotheses.

ventures at Torre de Palma. In other words, specialization (solely or significantly) in one economic enterprise, such as pork production, never was implemented, even if it could have potentially been a viable option. Although shifts in the relative contribution of domesticates, especially cattle and pigs, appear over the course of Roman occupation at Torre de Palma, ultimately the lack of marked resource specialization in the faunal data suggest that self-sufficiency in a variety of animal resources (e.g., pork, beef, mutton, and lamb meats, as well as milk, wool, hides, and traction), brought on only through mixed husbandry operations, was key to the economic livelihood of the villa occupants.

Survivorship data from fusion (Appendix III.8) and dental wear patterns (Appendix III.9) reveal that most were slaughtered at around 1.5 to 2.5 years of age. At this time, pigs reach their maximum weight; keeping them to elderly ages is economically unsound because they eat more than they gain in pounds. This age pattern is fairly common among Roman sites throughout the Mediterranean. The absence of very young suckling pigs, up to six months of age, in the Torre de Palma sample, however, is noteworthy since these provide succulent meat, particularly prized by the Romans. Immature bone is more susceptible to post-depositional destruction, but had the remains of any suckling pigs been interred at the site, I would expect some to survive. Their absence instead suggests they were uncommon food-fare. Whether or not sucklings were consumed and deposited elsewhere at the site in currently unexcavated sections, or if husbandry schemes were such that full-weight brood-stock pigs were the herding focus, is difficult to judge. The latter scenario finds support in the near balanced boar and sow ratio, as shown by counts of the dimorphic canine teeth (23 males and 25 females by NISP counts of pig canines from the entire faunal assemblage across the site). The age distribution for these teeth reveals preferential slaughter of younger males, keeping females as breeders; but more males attained older ages than would be required as brood stock. Such a pattern suggests a more casual herding operation, with less control over the early slaughter of boars; although, is it also possible male pigs were castrated and allowed to reach older ages to increase their fat content.

Table 4.8. records the ranges, means, standard deviations, and sample sizes for pig bone measurements for Torre de Palma, alongside comparative mean values from Roman sites in Italy. Again, as was the case with cattle and sheep/goat measurements, only categories with sample sizes of at least 10 are listed; all periods, including the "unknown" category are pooled.

BONE	Measurement	Range (cm)	Mean (cm)	Std. Dev.	Sample Size	Comparative Italian Mean (cm) and Sample Size
M_3	L	27.8-34.0	32.0	1.89	14	30.3 (n=69)
	WA	14.0-17.6	15.2	0.99	15	14.6 (n=41)
Calcaneum	Bd	18.6-28.8	22.4	2.69	10	21.5 (n=41)
Phalanx 1	GL	22.0-38.7	32.3	3.75	17	33.4 (n=72)
	Bp	10.0-19.1	15.9	2.09	17	15.2 (n=72)
	Bd	7.3-17.3	14.5	1.97	24	13.7 (n=90)
Phalanx 2	GL	20.0-28.8	22.9	2.49	18	21.5 (n=58)
	Bp	14.0-18.3	16.2	1.30	17	15.3 (n=52)
	Bd	12.3-16.5	14.1	1.23	16	13.0 (n=52)
	SD	12.5-14.9	13.5	0.79	12	12.6 (n=46)

Table 4.8 — Bone measurement ranges, means, standard deviations, and sample sizes for pigs from Torre de Palma, alongside related means for Roman pigs from sites in Italy.

While the Torre de Palma cattle were similarly sized to their Italian equivalents, and the Torre de Palma ovicaprids were smaller, on average, than Italian ovicaprids, the data in Table 4.8. indicate that, overall, Torre de Palma pigs were larger than Roman Italian pigs. This is striking, especially in light of the fact that the largest breeds of all domestic livestock (i.e., cattle, sheep/goats, and pigs) tend to appear first in Italy. Why are Torre de Palma pigs larger, on average, than Italian examples? The answer probably lies in a suite of factors including breed of pig, nutrition, and overall attention to quality pig production in Iberia. Although Iberian pigs are cited in only a few references in the ancient texts, what is written about them is very favorable. Two key areas of pork production singled out in the ancient texts are Northern Spain and Lusitania. Strabo (3.4.11) praises the excellent hams, which are cured by people in northern Spain, while Martial (13.54) requests bacon from the Cerretanian region, also in the north. Lusitanian pigs receive even more praise and admiration. Varro (Rust. 2.4.10) recounts a story about an exceptionally large Lusitanian sow, whose overweight ribs were sent to a senator in Rome. Polybius (34.8.7.8) states that a fat Lusitanian pig weighing 100 *minae* costs 5 *drachmae*, equivalent in price to a calf, and half that of a plough ox. The reputation of Lusitania as an excellent pork-producing region accords well with the data from Torre de Palma indicating fairly large-sized pigs. These animals were probably well taken care of and fed, to encourage maximum growth and good development. Pigs can forage rather cheaply in oak forests, feeding off of acorns and other woodland materials. Such resources are plentiful in central Lusitania, in general, and particularly within a 20km radius around the site of Torre de Palma. There is a long tradition of fine pork production in this area of Iberia; even current pig herders allow their animals to pannage through forests during the fall as a means to fatten them quickly before slaughter, as well as to impart a fine taste upon the pork itself (Parsons, 1962).

No pathological conditions were identified from the sample of pig bones retrieved at Torre de Palma. This suggests that individuals were in fairly good health. The large size attained by many, in conjunction with the absence of traces of enamel hypoplasia[15] is a further indication that pigs were well-fed and nourished. Still, it is important to note that many pathological conditions in animals leave no skeletal signs unless they have afflicted the individual for a long period of time. Since many of the pigs from Torre de Palma were killed at younger ages (below 3 years predominantly), few skeletal pathological conditions may have advanced to the critical stages necessary for osteological traces.

Skeletal-part distribution patterns (figs. 4.9 and 4.10) indicate disposal of all sections of pigs at Torre de Palma, but with a predominance of head+teeth elements especially. Even if we allow for taphonomic and elemental biases (i.e., pigs have more bones comprising this skeletal section, and teeth are very robust), the data still show an over-representation of the head+teeth category. This is highlighted in the MNI graph in particular (fig. 4.10). MNI is supposed to correct for over-representation among parts, but even with this in place there is a marked abundance of pig remains comprising the head+teeth category than for any other skeletal part. The under-representation of primary, secondary, and extremity parts for pigs suggests some movement of pork cuts, with post-cranial sections taken elsewhere (perhaps removed off-site, or at least not deposited with the remaining trash recovered from the site), leaving behind more refuse from the initial stages of pig butchery to be excavated.

[15] Enamel hypoplasia is a dental pathological condition, appearing as a pitted or indented horizontal line around the tooth, coincident with a period of stress experience by the animal during the development of the tooth.

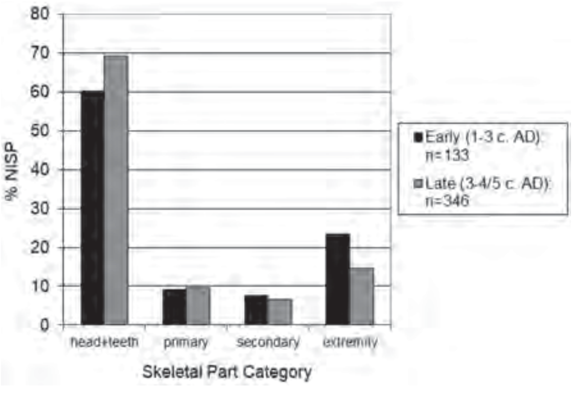


Fig. 4.9 — Pig: NISP frequency of skeletal parts by temporal period.

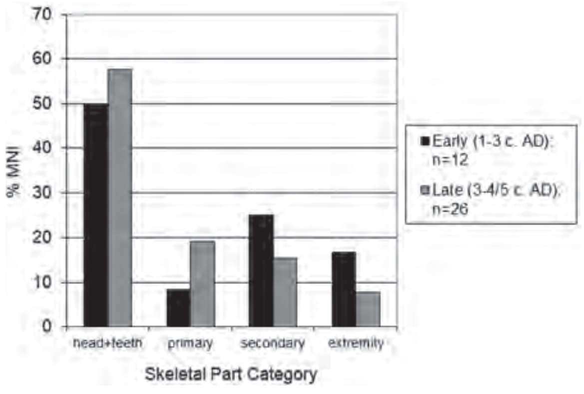


Fig. 4.10 — Pig: Element-wise MNI frequency of skeletal parts by temporal period.

3.3.4. Minor Domesticates: Equids and Canids (and Possible Camel)

As noted above, the bones of canids and equids are poorly represented in the Torre de Palma samples, but not unexpectedly since these normally unconsumed taxa were generally not discarded with food waste, but interred elsewhere. As yet, however, no complete canid or equid burials have been found at Torre de Palma.

Several canid bones were retrieved from various contexts around the site. Teeth predominate, followed by bones principally from the lower legs. Mixed age groups are represented; however, the bulk of the bones derive from mature canids, most of them older than at least one year of age. Three size brackets were noted from the available pool of bones that provided withers heights estimates: (i) a small-sized group around 37.40cm, similar in height to a small terrier; (ii) a medium-sized approximately 51.54cm; and (iii) a medium-large example registering a height of about 64cm. The broad range of heights represented here clearly reflects different breeds of domesticated dogs at the site, ranging from smaller (perhaps household) pets to larger, more utilitarian breeds (e.g., guard dogs, sheep dogs, hunting dogs, etc.). The diversity of dog breeds is well marked by Roman times, across the empire (Harcourt, 1974), so it is not surprising to see such variety in canid sizes at Torre de Palma.

The small sample of equid bones recovered at Torre de Palma consists mainly of isolated teeth and fragmented sections of long bones. Such materials might easily have been scattered over parts of the site through chance and taphonomic factors. Although both younger and older individuals are noted, mature equids predominate. Similarly, horses, asses, and mules register, but horses comprise the majority. Size estimates are difficult to record from these incomplete pieces, but withers height measurements could be calculated from two bones: a metacarpal and a metatarsal. These bones provided estimated withers height of 141.7cm and 137.0cm, respectively (using the system of Kiessewalter [1888]). Under the Vitt (1952) system both bones lie within the 128.136cm range, and can be classified as "smallish" in size. While probably not racing horses, these "smallish" individuals would be well-suited for everyday riding.

The lack of equid bones at the Torre de Palma contrasts with other indicators of stabling and breeding horses at the site. Horses were certainly popular at Torre de Palma, and it is postulated that the owner amassed some wealth in their breeding. Several lines of evidence support this conclusion. First, a mosaic depicting victorious steeds decorates a room in the Peristyle House. Second, one structure, called the Portico Building, is consistent with modern stable designs in terms of paving (cobble stone flooring) and room dimensions.[16] Third, an ancient hippodrome is outlined in the field to the southeast, beyond the site. Finally, horse teeth outnumber those of donkeys and mules in the small collection of isolated equid dentition recovered from the site. Donkeys and mules made better (and cheaper) pack and work animals than did horses, which in turn were chiefly reserved for more prestigious duties such as riding and racing. Horses, consequently, at least in a villa setting such as Torre de Palma, tend to imply a wealthier occupation. The strength and value of Iberian horses are widely advertised in the ancient texts, throughout the Roman period. They had a reputation for being high-spirited and fast (Col. 6.27.7; Just. *Epit*. 44.3; Plin. *NH* 8.166; Sil. *Pun*. 3.380.1; Solinus 23.7; Varro *Rust*. 2.1.19; Nemes. *Cyn*. 252; Oppian *Cyn* 1.278; Veg. *Mil*. 3.6.4, 7.1), and made excellent cavalry mounts (Caes. *B Gall*. 7.55.3; Just. *Epit*. 44.2.5; Sil. *Pun*. 1.222) and circus racers (*CIL* VI.6238, 10053, 10056; Symmachus *Ep*. 4.62, 7.106, 9.23; Veg. *Mil*. 3.6.4).

One tooth may derive from a camel, although it is fragmentary and requires further investigation to identify accurately. If indeed it is camel, it would represent a fairly special find, although not totally unique, since bones of camels are noted elsewhere in Roman Iberia (Cardoso, 1992). Camels were chiefly used as pack or show animals during Roman times, though much more rarely in areas of the Empire outside of their natural North African and Near Eastern habitats.

3.3.5. Wild Animals

The frequency of wild animals in the Torre de Palma assemblage remains consistently high across time at the site. On the basis of NISP figures, wild animals contribute between around 22% of the total number of bones attributable to consumable mammalian taxa, regardless of time period. This is a significant amount, especially when compared to other regions of the Roman Empire. Comparable sites in Italy, for example, register less than 5% wild animals in similar counts (Mackinnon, 2004), and values for other regions of the Empire, such as Gaul, Germany, and Britain, rarely exceed the statistics for Torre de Palma.

The main wild animal taxa exploited at Torre de Palma are deer and rabbits, in that order. Miscellaneous taxa including rodents (mice, voles, mustelids) and tortoises, all of no apparent economic significance to the site occupants, given their paltry NISP counts, round out the wild animal faunal sample. Red deer comprise over 98% of the deer assemblage, the remaining proportion represented by the occasional roe, and fallow deer bone. The presence of fallow deer in the Torre de Palma sample is especially noteworthy, since these animals are not indigenous to the region and would need to be imported. There is controversy, however, over when fallow deer were introduced to Iberia. Two bones from the Torre de Palma collection derive from Late period levels (i.e., 3rd to 4th-5th centuries AD), while the

[16] The function of the Portico Building, however, is controversial. Maloney and Hale (1996) have argued that its layout is also consistent with those of ancient granaries. Soil samples from rooms in the Portico Building are currently being tested to determine archaeobotanical, micromorphological, and chemical composition (including levels of phosphates and other compounds associated with plant or animal resources).

remaining examples fall under the "unknown" temporal category, and currently cannot be dated, reliably, to a specific century. Assuming then that the fallow deer bones from Torre de Palma derive from animals hunted in the area, then it can be concluded that fallow deer were introduced to Iberia in the 3rd century AD at the earliest (Davis and Mackinnon, 2009).

Age data for the red deer sample indicate predominantly mature individuals, but with the occasional younger calf noted. Moreover, there is no apparent patterning to this age distribution in relation to time period or geographic area of the site. Hunting or trapping adult deer would certainly involve more effort and skill than would be the case with younger, weaker, and slower immature deer. It is possible, therefore, that occupants at Torre de Palma did not seek the easiest route in terms of wild animal capture.

Table 4.9. lists the ranges, means, standard deviations, and sample sizes for red deer measurements from Torre de Palma. Only cases with sample sizes of at least 10 are included, which here is restricted to the astragalus bone. There is some variation in measurements, indicating a fair range of sizes, part of which might be due to sexual size dimorphism. One metatarsal bone yielded a withers height estimate of 79.6cm (using the system of Godynicki [1965]), which is relatively tall for red deer. It seems that deer were well-nourished and able to attain substantial heights. In support, no deer bones showed any pathological conditions.

BONE	Measurement	Range (cm)	Mean (cm)	Std. Dev.	Sample Size
Astragalus	GLl	46.3-55.8	55.2	3.23	11
	Dl	26.7-30.1	28.7	1.33	11
	Dm	25.1-30.3	28.1	1.57	10
	Bd	30.0-33.8	32.2	1.52	11

Table 4.9 — Bone measurement ranges, means, standard deviations, and sample sizes for red deer from Torre de Palma.

Figures 4.11. and 4.12. display the distribution of red deer skeletal parts across the two temporal periods noted, as calculated using NISP (fig. 4.11) and element-wise MNI (fig. 4.12) values. Although the trends across time are fairly consistent within each graph, dramatically different results for skeletal part categories arise depending upon the quantifier used. NISP statistics register a marked preponderance of limb extremity bones for red deer, a finding which infers differential distribution of parts, that is, removal of other skeletal parts to different spots, or an influx of deer extremity bones to the site. According to element-wise MNI counts, however, the limb extremity percentage is proportionally similar to values for both primary and secondary cuts, which suggests no over-representation of any of these categories. The head+teeth category is poorly represented, regardless of quantifier; thus, there is a stronger case that deer heads were disposed of in a different spot, or in a different fashion, than the rest of the deer skeleton. Such a distribution would result if these heads were discarded with the slaughter and initial carcass dismemberment waste.

Butchery marks on the red deer bones might help clarify the situation regarding the processing of red deer carcasses. Although many red deer long bones from the Torre de Palma sample display similar chop and cut patterns as noted for other animals, such as cattle, specifically a predominance of using the cleaver to disarticulate bones at their anatomical joints (translating into chop marks at the proximal and/or distal ends of bones like the humerus,

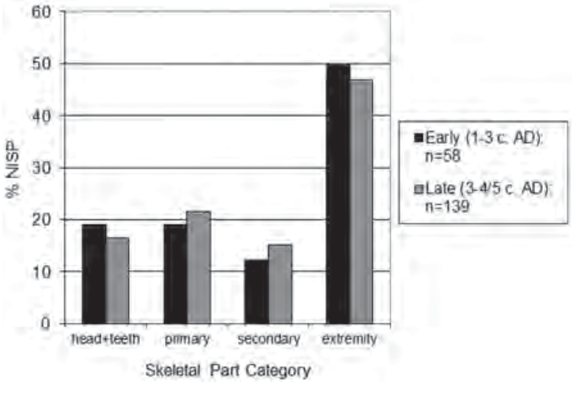


Fig. 4.11 — Red deer: NISP frequency of skeletal parts by temporal period.

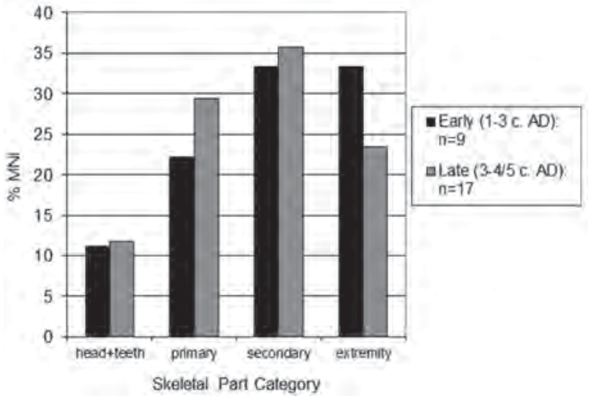


Fig. 4.12 — Red deer: Element-wise MNI frequency of skeletal parts by temporal period.

femur, tibia, etc.), there is also evidence from processes such as skinning and hide removal left in the red deer bones. Overall, there is a greater incidence of cut marks noted on the Torre de Palma deer bones than on those from similarly-sized taxa like cattle. Most of these are concentrated on the lower leg elements, such as the metapodials and phalanges, which predominate skeletal-part categories for that taxon as well, at least according to NISP counts. These data support the hypothesis that some hide processing occurred at the site. Deer skins were probably brought to the site (or at least to the area near the midden that contained these bones) with the feet still attached. Foot bones are associated with poor-quality meat, and are generally ignored by butchers. Many hides delivered to the tanner, therefore, arrive with the feet still in place. The tanner or hide processor subsequently removes these, and may even boil the foot bones to extract neats-foot oil (Serjeantson, 1989). Strabo (3.3.7) notes how the Lusitanians used to make boats out of tanned leather (at least up until 136 BC), so they certainly had multiple uses for this material. If cattle were scarce, and sheep and goats largely reserved for wool, then it seems natural that the occupants at Torre de Palma would exploit other animals, and especially deer, for leather.

Rabbits are the second most abundant wild animal taxon from the Torre de Palma faunal assemblages. Hares are also identified, but in much smaller quantities.[17] Samples include bones from the entire rabbit (and hare) skeleton, with no apparent bias by temporal period or geographic areas of the site. Moreover, there is a mix of immature and adult individuals, as noted in the fusion data, but again, as with the case for deer, mature rabbits and hares comprise the majority. The occupants at Torre de Palma appear to have hunted or trapped adult rabbits and hares. They were certainly ubiquitous animals in the area, a fact not missed by the ancient authors. Strabo (3.2.6) comments on how these animals damaged plants by eating the roots and how they are pests throughout almost the whole of Iberia. Aelian (*NA* 13.15) is amazed at how quickly they breed.

Rabbits and hares complicate some zooarchaeological reconstructions because, as noted above, these animals can burrow into archaeological levels, and artificially inflate or skew counts for some assemblages. Thus, one must consider taphonomic evidence in each

[17] The species of hare is difficult to determine on the basis of available data. The morphologically similar African Hare (*Lepus capensis*) and European Hare (*Lepus europaeus*) both inhabit Iberia, although the latter is currently much rarer in the area (Burton, 1991).

context to determine if the rabbits represented were hunted by the culture in question, or had simply burrowed into and subsequently contaminated these archaeological deposits. In the case of the Torre de Palma material, there are some contexts at the site (such as a well in the Northeast Building) where rabbits are likely intrusive, but in the majority of cases rabbit bones were found as isolated fragments and pieces, as would result from jumbled ancient rubbish. Unless there is substantial upheaval of levels, burrowing rabbits tend to be retrieved as fairly whole, articulated skeletons, as opposed to isolated, fragmentary pieces of bone. The presence of cut marks on some rabbit bones further indicates that most of the rabbits from the site were culturally derived, as opposed to intrusive burrowers.

BONE	Measurement	Range (cm)	Mean (cm)	Std. Dev.	Sample Size
Tibia	Bd	12.3-14.4	13.6	0.58	12
Humerus	Bd	7.9-10.1	8.4	0.56	14
	Bd	11.8-13.3	12.6	0.46	11

Table 4.10 — Bone measurement ranges, means, standard deviations, and sample sizes for rabbits from Torre de Palma.

Table 4.10. provides a short summary of rabbit measurements for the site. Only those categories with samples sizes of at least 10 are listed. The sizes are comparable to those of other rabbits from contexts in Iberia.

Fewer traces of butchery marks occur on the Torre de Palma rabbit bones, compared to other, larger taxa; however, what data are available suggest some disarticulation of legs (e.g., cut marks at joints). Given the smaller size of rabbits, it is possible that more of them were prepared and cooked as whole carcasses, as opposed to sectioned cuts of meat. The degree to which rabbit fur was used is a different story. Some skinning marks on rabbit limb bones suggest delicate cutting, perhaps to remove furs, but these marks are too few to indicate any mass use of rabbit fur at Torre de Palma. Such marks might also relate to filleting of meat from the bone.

While wild rabbits and hares can be hunted and trapped, rabbits can also be domesticated and kept in hutches or warrens, facilities of which were known to the Romans (Varro, *Rust*. 3.12.1.5). Was this the case at Torre de Palma? This is difficult to answer, but it seems unlikely for several reasons. First, no such complexes have been recognized at the site. Second, rabbits were certainly very common in the area, and presumably relatively easy to hunt, trap or capture. It might not have been worth the effort to maintain them under more controlled settings if sufficient numbers could be acquired by trapping them in the wild. Finally, metric data shows no significant size discrepancy in the Torre de Palma rabbits compared to examples from other sites in Iberia, that might suggest special breeding of rabbits at the site (i.e., to promote larger sizes, fatter individuals, etc.).

Although ancient textual references are neither abundant nor specific as regards wild game in Iberia, what are available suggest that the region was relatively prolific in terms of this resource. The two wild animals most commonly associated with Iberia in the ancient texts are deer and rabbits, and not surprisingly these two taxa predominate wild animal counts among zooarchaeological assemblages from Iberia. Strabo (3.4.15) says that the whole of Iberia produces many deer, and that Turdentania (or Baetica) has a great abundance of game (Strabo 3.2.6). Polybius (34.8.4) makes a similar sweeping statement when he announces that Lusitania is a very productive land, where, because of the favorable climate, animals are plentiful. Martial (1.49) invites his readers to seek the sunny shores of Tarraco, in east Iberia, during December, where they can hunt boar, deer, and hares. Appian (*Hisp*. 54) proclaims that Roman troops in Spain (c. 150 BC) subsist on wheat, barley, and quantities of venison and rabbit's flesh. The specific mention of the venison and rabbit here corresponds well with their predominance among the wild animal taxa from Torre de Palma.

3.3.6. Birds

On the basis of their poor representation, it appears that domestic fowl contributed little to the economy at Torre de Palma, although bird bones do not survive as well as those of mammals, and they may be under-represented. There is a mix of ages and sexes among the domestic fowl bones – both younger and older individuals, hens and roosters – vindicating a fairly generalized breeding and culling scheme, as might result from keeping a small collection of birds in a coop or, in less controlled circumstances, allowing birds to rummage more freely within a courtyard or back lot at the site. Presumably, both meat and eggs (and most probably feathers as well) were exploited as required by the villa occupants, although it does not appear that fowl were marketed beyond the local level, given their minimal contribution to the meat diet at the site overall. Durable long bone representatives from the wing and leg dominate the sample, but this is probably a taphonomic issue, and does not reflect selective discard of specific sections of domestic fowl. Presumably, entire birds were butchered, consumed, and disposed of at the site, with the skeletal waste products deposited in generalized dumps. Although one rooster tarsometatarsal bone exhibits an osteomyelitic infection along its shaft, the remaining domestic fowl bones show no pathological traces. Most, therefore, appear to have been in good health.

Other avian taxa identified from recovered bones include stork (*Ciconia* sp.), small passerines (probably thrushes, *Turdus* sp.), and a possible duck (*Anas* sp.) and goose (*Anser* sp.). None of these taxa occurs with any significance (most are represented by one or two elements), and indeed all may be intrusive. Ducks and geese currently frequent a pond near the site. A similar case may be argued for the stork, which is also a summer migrant to the area, and frequently spotted around the site. Even factoring in for taphonomic and recovery biases, however, it appears that wild birds very rarely (if at all) contributed to the economy and diet at the site. This observation contrasts with the high contribution made by wild mammals. Perhaps hunting fowl and birds did not carry the same prestige, or success rate, that accompanied the hunting of mammalian game such as deer, rabbit or wild boar. It may also be the case that if hunting on horseback was encouraged that mammals were the typical game sought. Birds are not normally hunted while on horseback.

3.3.7. Fish

Fish are represented by three small vertebral fragments. The species is unknown, but judging by the small size of these pieces, they probably do not derive from a marine specimen. While fish bones tend to be under-represented at sites where sieving and flotation are not employed extensively, their dearth in the Torre de Palma sample suggests that they formed a very insignificant part of the overall diet.

3.3.8. Marine and Freshwater Molluscs

Shells from several varieties of marine molluscs, including oysters (*Ostrea edulis*), cockles (*Cardium edule* and *Glycymeris* sp.), winkles/topshells (*Monodonta turbinata*) were noted in the Torre de Palma sample. A few examples of freshwater clams (likely *Unio* sp.) were also identified. None of these taxa appears with any regularity, or in sufficient quantities to argue for significant cultural harvesting of molluscs for dietary or economic purposes. Oysters are most numerous, but still represented by less than 20 shell fragments overall (yielding an MNI count of 5), so again there is no basis to argue such specimens made any regular dietary contribution. The cultural connection for some of these marine and freshwater shells recovered from Torre de Palma is further questioned in that some shells (not the oysters, however) appear to be partially fossilized, and may not be related to Roman occupation at the site, but rather may have a geological origin.

3.3.9. Land Snails

Land snails were not systematically retrieved during excavation, so it is impossible to examine their roles. Nevertheless, key taxa found in secure ancient deposits include *Rumina decollata* and *Eobania vermiculata*. Both are common today in the area, and their presence in these ancient contexts may imply that similar environmental and climate circumstances characterize both ancient and modern times at Torre de Palma.

3.4. Temporal Analysis: Butchery and Cooking

An analysis of the cut, chop, and saw marks on the animal bones provides some clues about carcass butchery and cooking at Torre de Palma. First, there is no faunal evidence to confirm the method of slaughter. Normally, an animal's throat is slit, allowing it to bleed to death. Second, the cleaver appears to be the tool of choice in carcass dismemberment. Saws were not used in this respect, but reserved for horn and antler removal (2 cases), or in preparing a deer metatarsal for subsequent bone-working (1 case). Third, both medium-sized (e.g., pig and sheep/goat) and large-sized (e.g., cattle and deer) carcasses were disarticulated in a similar manner. Legs were disarticulated by chopping at the joints, such as between the distal humerus/proximal radius margin, or the distal end of the tibia. Midshaft chops were extremely rare. A few examples of bisected vertebrae (about 20% of the entire vertebrae sample) from both size groups (large and medium), suggests that many animals were split down their backbone into right and left halves. Although this involves force and effort, it is beneficial since it facilitates removal of internal organs and cleaning of the central cavity. It also provides stability and balance for further work on the carcass, be it placed on a table or hanging. Some of the larger vertebrae (presumably from cattle) had also been chopped transversely as well as bisected. This would help parcel the spine into smaller units for sale or further butchery.

Many of the Torre de Palma bones also show traces of knife marks, indicative of fine-tuned cutting and filleting procedures. The bulk of these are located on the lower leg bones, such as the metapodials, phalanges, and carpals/tarsals, especially of larger mammals like cattle and deer. The implication here is that these derive from skinning and hide removal, where more delicate cuts would be placed to peel off these coatings, without ripping or otherwise mangling them.

Overall, the butchery data for Torre de Palma conform to those for most Roman sites across the Empire, in terms of tool kit, methodology, and placement of cuts; however, the Torre de Palma sample does show a lower incidence of the use of saws in carcass dismemberment than might be expected. Nevertheless, the butchers at Torre de Palma seem to be skilled individuals, with a sound knowledge of skeletal anatomy. The frequency and positioning of cuts on the bones appear too standardized to suggest household butchery of whole animals, where one might anticipate much greater variability in cut depth, placement and number. Rather, it seems that most carcass butchery was done predominantly by those who had at least some experience with these procedures.

Finally, there is no conclusive evidence from the animal bones to determine methods of meat preservation and storage at Torre de Palma. Much of the meat may have been consumed fresh. Salting and smoking methods could be used to preserve meats; however, traces for these escape the zooarchaeological record. Cooking, too, is a difficult aspect to reconstruct solely from the animal bone evidence. There are a few examples of burnt bones in the sample, but never enough to suggest that roasting of whole animals or at least bone-in cuts of meat predominated. Filleted cuts of meat, on the other hand, could be roasted and leave no traces on the bones themselves. Boiling might have been the common method of cooking large cuts of meat (with bones attached). Boiling or stewing bones and meat might have been preferred overall, especially if inhabitants favored soups and broths, and wished to collect the fat that floated to the top of the pot for other recipes or purposes; indeed several examples of bones with spiral fractures indicate that some bones were chopped midshaft while green, presumably to extract the marrow, which could be best collected through boiling. Boiling also helps tenderize the meat, which could make tough cuts from older cattle and ovicaprids more palatable.

4. Spatial Analysis

4.1. Introduction & Contexts Examined

As noted earlier, while a temporal analysis of faunal remains certainly helps determine broad changes in the role of animals over time, such a procedure tends to combine contemporary deposits of similar time brackets no matter where they occur at the site and examine these as temporal units. This can sometimes homogenize or mask differences that the individual assemblages might exhibit, especially if these samples derive from a variety of depositional contexts. To examine the spatial distribution of bones from Torre de Palma, the various trenches excavated have been grouped by building or region of the site, using

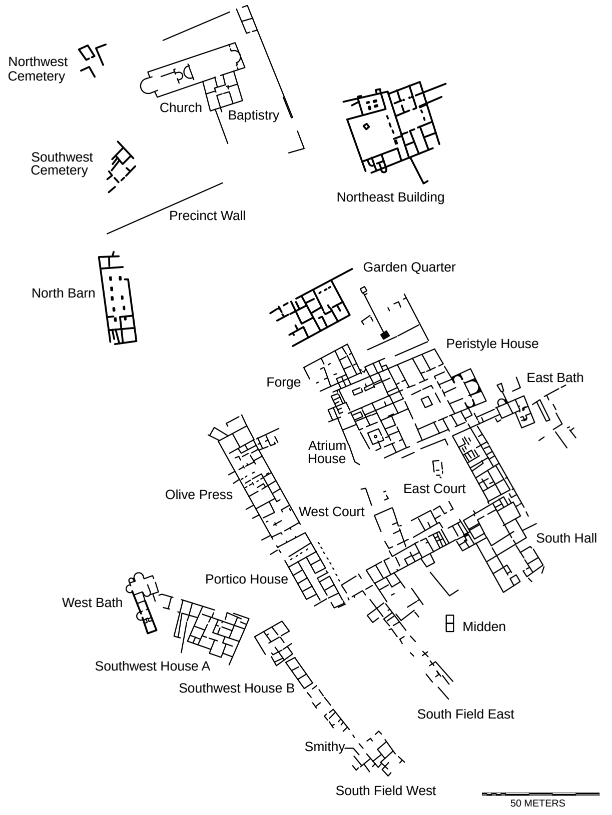


Fig. 4.13 — Archaeological Site of Torre de Palma.

the following categories:

– Church
– Northeast Building
– Peristyle House
– Atrium House
– East Court & South Hall
– Olive Press
– Garden Quarter
– South Field West
– South Field East (Midden)
– East Bath
– West Bath
– Southwest House A

Figure 4.13., the plan of the Torre de Palma site, shows the location of each of these areas. Each context presents a different depositional circumstance, which certainly contributes to any variation among the faunal materials between them. While it is ideal to examine each of these spatial zones separately for each period recognized at the site, this was not possible on a practical scale, since dates were not available for many contexts, and the resulting subdivisions would produce fairly limited samples for each temporal/spatial group. Consequently, I have amalgamated all temporal periods for each spatial context listed above, and consider this analysis as broadly identifying spatial variation at the site over an extended period of time. Cases exist where one of the spatial zones recognized above might contain more bones from a particular temporal period (e.g., the South Field midden chiefly contains materials dating from the 3rd to the 5th centuries AD), while other contexts (such as isolated waste in the Garden Quarter) might span a longer time range. Where possible, I shall note these differences. Finally, even though the layout of some buildings may change over time due to construction and remodeling, I consider most of these structural modifications had only minor impact in altering the room function. Cases of major alternations, construction or disuse, however, will be noted should this critically affect the faunal assemblages deriving from these contexts.

Table 4.11. presents the NISP relative frequency of various animal taxonomic groups as divided by the site building or region categories listed above. Major domesticates are listed in separate columns; canids and equids are combined; the "consumable wild mammals" category includes deer, rabbits, and other lagomorphs. NISP total sample sizes among these contexts vary considerably, from 42 in the Garden Quarter to 1743 in the East Court and South Hall complex. Over half of the spatial category clusters noted above contain less than 200 NISP, so statistically one must be cautious in drafting definitive conclusions from the data. Moreover, with the exception of the midden deposit from the South Field East, there is a strong correlation between area, number of rooms, and depth and extent excavated

within each category and the resulting size of the faunal sample retrieved, so in large part comparisons based on the absolute size of each sample are misleading. In sheer geographic size, the East Court and South Hall complex dwarfs medium-sized complexes, such as the Olive Press and Atrium House regions, which in turn are larger, spatially, than either Bath. Still, even with this caveat in place, the very low quantities of bones from the Church and Bath contexts, in particular, suggest that rubbish did not accumulate in these areas to the extent that it may have elsewhere at the site, such as in the East Court, South Hall, and South Field contexts.

There are a number of statistics to consider in Table 4.11., so I shall aid analysis by examining each spatial category individually.

CONTEXT	NISP Sample Size	% Cattle	% Sheep/goat	% Pig	% Canid & Equid	% Consumable Wild Mammals	% Avian	% Other
Basilica	95	–	24.2	40.0	–	8.4	26.3	1.1
Northeast Building	211	6.6	33.6	16.1	10.0	32.2	0.5	0.9
Peristyle House	427	11.9	31.1	26.7	1.2	21.1	4.0	4.0
Atrium House	167	21.6	38.9	24.0	1.2	11.4	2.4	0.5
Garden Quarter	42	19.0	21.4	16.7	2.4	28.6	11.9	–
Olive Press	172	30.2	25.0	18.0	5.8	19.2	0.6	1.2
East Court & South Hall	1743	15.2	26.3	25.8	2.6	27.1	2.5	0.5
South Field East (Midden)	442	9.3	31.7	28.3	4.3	22.2	0.9	3.3
South Field West	270	12.2	33.0	34.1	4.4	13.7	1.5	1.1
East Bath	113	16.8	19.5	23.9	–	38.1	–	1.7
West Bath	115	10.4	36.5	25.2	7.8	14.8	1.7	3.6
Southwest House	111	22.5	30.6	22.5	–	20.7	0.9	2.7

Table 4.11 — NISP frequency of animal taxa from Torre de Palma by building or region.

4.2. Individual Contexts

Church

At 95 NISP, the faunal sample recovered from the church is very small and rather insignificant. Although excavations in the Eastern Basilica section yielded the most bones, with only a few pieces retrieved from trenches in Apses 2 and 3 of the basilica, much of the faunal material recovered overall derives from mixed, unstratified deposits, and thus cannot be dated specifically. Moreover, some taxa, such as rabbits and rodents, appear intrusive in the area so there was certainly disturbance among the levels here. Nevertheless, the church faunal sample is unique among assemblages from the site in several respects. First, no cattle bones were identified (although a fragment of a deer radius was recovered, and two rib fragments of a large mammal were catalogued). This may simply be a factor of keeping the church area cleaner than other spots and collecting any conspicuous animal bone waste that accumulated. Second, all of the ovicaprid bones from the church levels derive from very young lambs, under 1 year of age. No goats were identified. Whether or not this predominance relates to Christian religious connections for lambs is intriguing, but speculative at this point in the absence of more faunal data. Interestingly, the bulk of the pigs represented from the church deposits are also younger individuals. Finally, the church assemblage is noteworthy in its elevated percentage of domestic fowl bones. The NISP value of 25, accounts for at least 6 individual birds, a fairly high figure compared to other contexts from the site. Again, the significance of this phenomenon is unknown.

Northeast Building

The Northeast Building faunal assemblage is rather scrappy in relation to other samples from the site. Large pieces are relatively rare, and a considerable portion of the sample is unidentified medium-sized mammal long bone and rib pieces. Despite its fragmented nature, however, the Northeast Building sample contains a mix of bones, both from various taxa, and from skeletal regions within these taxa, especially as concerns the domesticates. In other words, there is no predominance of one skeletal part over the other, as would result from selective body-part deposition, but rather a jumbled mix of different elements spread rather unsystematically across the area. The high frequency for wild animals in the NISP scores here (32.2%) is deceptive, since it is skewed heavily by a collection of over 50 rabbit bones (nearly 25% of the entire NISP sample size for the Northeast Building) found in a well in Room IV (fig. 4.14) of this building. These may be intrusive, given that the well was not sealed. A similar complication plagues the elevated value for the horse/canid category. Cranial and dental elements of two horses (a young one and an older one) were also recovered from this well. While this well produced the single most abundant assemblage of bones from the Northeast Building, a second concentration of bones was found during excavations outside of the SE wall of this complex. That more faunal materials appear outside of this building or within the excavated well indicates that the living and interior areas of this building were likely kept clean of rubbish over the course of occupation. Moreover, it appears that the building did not serve as a major dumping ground for waste after its abandonment, given the relative dearth of faunal materials uncovered, over what can be considered a fairly large area.

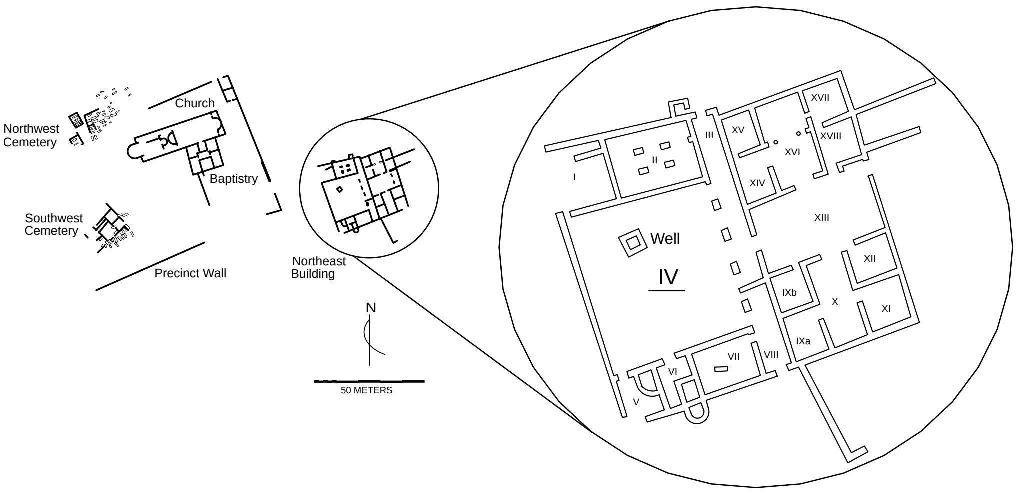


Fig. 4.14 — Northeast Building Faunal Assemblages.

Peristyle House and Atrium House

The earlier Atrium House and the later Peristyle House comprise the main residential sections of the site. Both of their assemblages contain a good mix of faunal materials, from a wide range of domestic and wild animal taxa. Neither house, however, displays any sort of selective deposition in terms of skeletal parts within these taxonomic groups. In other words, each contains a scattering of bones from the entire skeleton of the taxa in question, especially the consumable domesticates (i.e., cattle, sheep/goats, pigs). There is no overwhelming predominance of skeletal parts associated with higher-quality primary meat cuts, as might be expected if only these sections were transported to, and consumed within, the residential dining areas of the Atrium and Peristyle Houses. Age patterns for the taxa represented also do not conform totally to predicted cases for elite dining. There is a fair percentage of younger domesticates represented, notably in the Peristyle House, but the majority killed are still adults. Nevertheless, there are some distinguishing characteristics of the Atrium House and Peristyle House faunal assemblages to highlight. First, for its size, the Peristyle House sample has a fairly large range of wild animal taxa, which in turn comprise about 21% of the NISP component. Wild animals account for only half of this value (approx. 11%) in the Atrium House. If dietary ostentation can be measured by the diversity of wild animal resources, then the Peristyle House can claim a good range, including both red and fallow deer, hare and rabbit (non-intrusive for both taxa), and wild boar. The greatest concentration of wild boar bones across the whole site, in fact, derives from this context. A small group of oyster shell fragments (15 in total) is further indication of dietary wealth. These are not fossilized shells, but contemporary with the ancient deposits from the site. While nothing substantial in terms of their overall dietary contribution (if indeed they were consumed), these oysters would have to be imported from the coast to the site, presumably at great expense.

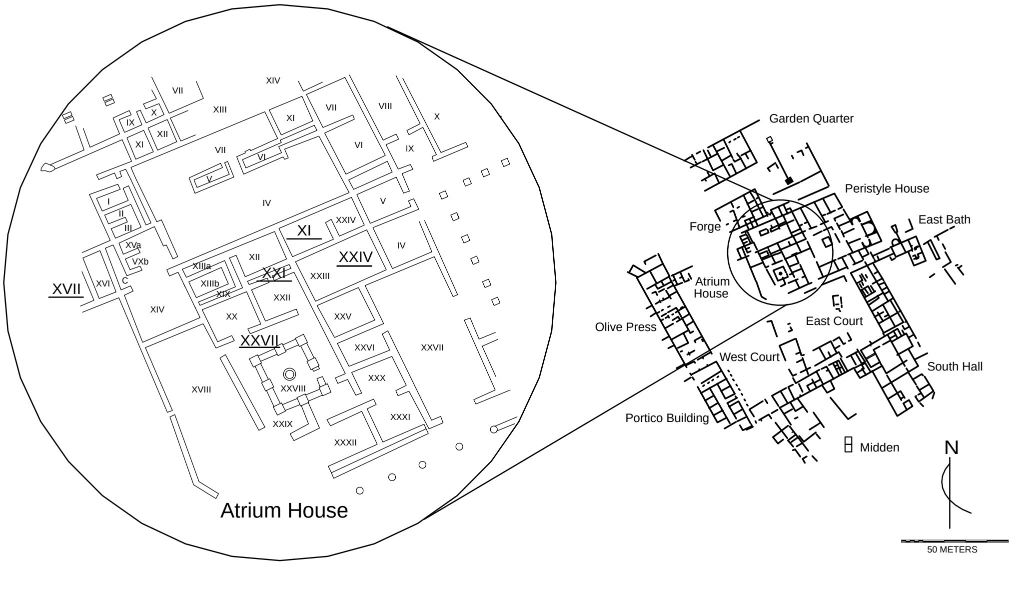


Fig. 4.15 — Atrium House Faunal Assemblages.

The Atrium House assemblage (fig. 4.15) is less diversified than its Peristyle House successor. It is also less wealthy in character than the Peristyle House assemblage, on the basis of a higher relative frequency of adult animals represented. The significance of the cobblestone flooring in Rooms XI and XXIV in the Atrium House is unknown. Hypotheses have been advanced that an animal, such as an ox or cow, could be housed here; however, this cannot be confirmed on the basis of available zooarchaeological data. These rooms were nearly void of any animal bones, and the few scraps retrieved were insignificant. Still, there is a high percentage of cattle bones overall in the Atrium House compared to other contexts at the site, so there may be some connection here.

Finally, the bulk of the faunal remains at both the Peristyle and Atrium House were not recovered from interior/residential rooms, but chiefly from exterior areas. Nearly half of the sample from the Peristyle House derives from Room II, the atrium courtyard in the center of the complex, while about one-third of the Atrium House deposit was retrieved from Room XXVII, the courtyard/well room of this House. Residents probably kept living areas free of waste but were less strict about the odd piece of rubbish that got deposited, accidentally or deliberately, in these courtyards. Outside of these courtyards, faunal waste also accumulated with some regularity in Rooms XVII (NISP of 34) and XXI (NISP of 31) of the Peristyle House. These rooms form part of the eastern 3-apsed section of the House, where the mosaics with the victorious steeds were recovered. Presumably, the higher quantities of faunal waste here relate to some cooking and serving functions for this section of the villa.

Garden Quarter

Very little faunal material derives from excavations in the Garden Quarter, and what was recovered is fairly non-distinct, i.e., a mix of domestic and wild taxa, scattered across the area in a somewhat random, unpatterned scheme. Taphonomically, however, the remains from the Garden Quarter tended to exhibit more, dark, organic staining on the bone surface, as might be expected if this area was more humid and contained more vegetation. It does sit in a lower lying area of the site, so it would receive drainage run-off from a larger area too, which might account for the darker, stained appearance of many of the bones from the Garden Quarter excavations.

Olive Press

There are two key points to address concerning the zooarchaeological materials from the Olive Press excavations. First, most of the bones recovered here (nearly 50%) do not come from the current rooms identified inside this complex, but rather from the rooms and field off to the west of this area. It appears that interior rooms in the Olive Press complex were kept clear of faunal rubbish in much the same manner as elsewhere at the site. Second, while bones from a variety of animal taxa and skeletal body parts are represented in the Olive Press assemblage, this context is unique across the site in its predominance of cattle bones and in the fairly high frequency of equid bones as well. Cattle are largely represented by the more durable elements—teeth and lower limb bones—and at least two adults and one younger individual comprise the MNI tally for this taxon. The predominance of cattle bones here may relate to a need to access work animals, perhaps to turn the olive press, or to haul or otherwise transport materials to and from the area. The fact that more bones were retrieved to the west of the Olive Press complex may imply some significance to this region as a stable or barn for working cattle.

East Court and South Hall

Nearly half of the bones retrieved from the entire site of Torre de Palma come from the East Court and South Hall area (fig. 4.16). This is not surprising given the great expanse of the structures here, and their attention during excavation. Overall, as a combined unit, the East Court and South Hall sample follows the general pattern for the rest of the site, in terms of taxa and skeletal parts represented. However, there are some distinguishing features to highlight. First, there are fewer ovicaprid bones recovered here, and a slightly higher frequency of cattle bones, relative to most other contexts at the site. This may relate to social class differences in diet, with the augmented contribution of beef signifying, perhaps, lower-status consumption in this area of the site. This argument becomes contentious, however, given that the East Court and South Hall assemblage also contains one of the highest frequencies of wild game across the entire site. Wild game has been linked to dietary wealth in Roman antiquity, but it is unknown to what degree lower status occupants at Torre de Palma were forced to hunt (as opposed to elitist choice in sport hunting ventures) as a means of acquiring meat for themselves.

A second noteworthy feature of the East Court and South Hall faunal sample concerns the skewed distribution of bones. Most rooms excavated within the complex yielded insignificant NISP samples of less than 25 bones, with the following exceptions: Room XXXIV (100 NISP), Rooms XXXVI and XXXVIa (180 NISP), Room XLVIII (234 NISP), and Room LXIX (165 bones). Room LXIX appears to be a central court, flanked to the east and south by Rooms XXIV, XXXVI/XXXVIa, and XLVIII. Presumably, rubbish was not routinely cleared from the courtyard Room LXIX, hence the higher concentrations of material here. Although the functions of many rooms in this South Hall are unknown, on the basis of zooarchaeological data, Rooms XXXIV and XXXVI/XXXVIa may have served as generalized workshops, where a variety of activities, even butchery could take place. Waste from these activities, as well as from any meals consumed in this work area, may have then accumulated more freely within this room, ultimately accounting for the large sample of bones retrieved. A similar argument might apply in part for Room XLVIII; however, the picture here might be more complex, given that, in addition to the regular trash from consumable taxa, this room also contained the greatest concentration of equid and canid bones from across the entire site. While the equid and canid bones retrieved here are very scrappy, predominantly teeth, and not in sufficient quantities to account for more than three equids and two dogs in total, they are still noteworthy. Dental elements help distinguish a horse and an ass, the latter of which typically served as a pack animal in antiquity. In light of this, part of the South Hall may have been outfitted as a stable for working beasts. Room XLIV has been conjectured as such (chiefly on the basis of its location at the corner of the complex and opening up onto

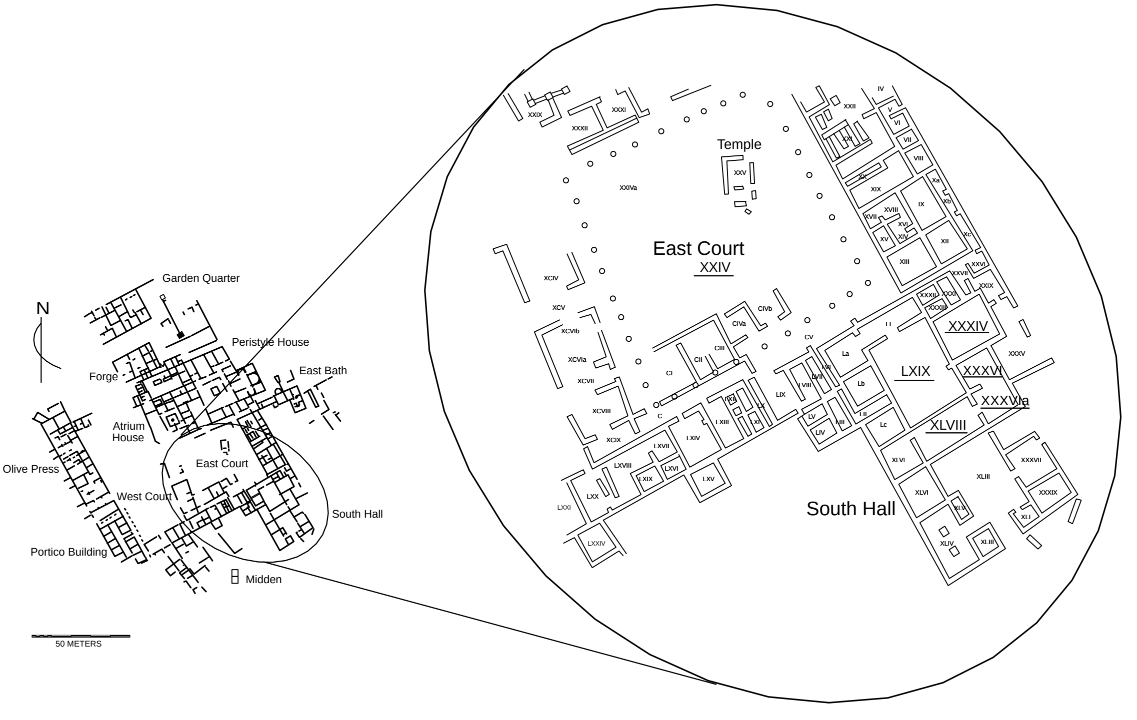


Fig. 4.16 — East Court and South Hall Faunal Assemblages.

a central courtyard), but few bones (and no equids) were retrieved from this room. This might be expected, however, if stables were routinely kept clean of rubbish, as the ancient Roman authors advise (Col. 6.30.2).

South Field East (Midden) and South Field West

The largest single concentration of bones collected from Torre de Palma comes from a midden (see fig. 4.13) located in the South Field East (S215E142). Parts of this midden were excavated during the 1998 and 2000 field seasons. Its full extent is not known, but the midden probably accumulated in an open, outdoor section, here at the current southern limits of the site. Further south from this midden the land slopes fairly steeply down to a ravine, so presumably this section of the site acted as a generalized dumping ground, with some waste pitched further down the ravine and the rest accumulating in a larger, "back-yard" midden. Whether or not the ancient occupants at Torre de Palma routinely spread this midden waste on the fields as fertilizer is unknown, but such a practice has been fairly common across the ages.[18] The midden soil was among the darkest and richest at the entire site, which attests to its significant organic content. The midden also yielded one of the largest frequencies of rodent, mouse, and miscellaneous small mammal bones (1.7% of all

[18] The ancient agricultural writers recommend all farmers maintain a manure/midden pile (Varro, *Rust*. 1.38.1-2). One argument put forth by survey archaeologists to explain fairly even distributions of artifacts on fields is that the material derives from ancient manuring, where waste from a midden is spread across a field.

bones collected while most other contexts had values less than 1%, although the effects of sieving must be factored in here), taxa that are typically drawn to garbage dumps.[19]

Taxonomically, the midden is fairly diversified, with the standard suite of domestic and wild animals represented. The assemblage does, however, have a somewhat elevated frequency of pig and wild animal bones, and a lower percentage of cattle bones than most other contexts. Many of the pig and ovicaprid bones from the midden are chopped or otherwise butchered; presumably these represent food waste from carcass processing and consumption. Moreover, all skeletal body parts of these medium-sized mammals are found in the midden, which might indicate that even if sections of carcasses were disseminated across the site, the remains from all stages in the slaughter-butchery-consumption continuum eventually ended up in the midden. This could also result if a significant portion of the sheep and pigs discarded in the midden came from whole animals, although this seems unlikely since many whole animals are roasted and there were few traces of this method of cooking found on the bones. Roasting on an open fire tends to leave burnt traces on the ends of long bones, as these joint sections are often broken or cut into larger segments and exposed to the fire.

The distribution of cattle and red deer body parts in the midden differs from that shown for ovicaprids and pigs. Here, post-cranial elements predominate, especially bones from the lower legs. These are typically waste products and have been associated with hide processing activities. It is possible that cattle and deer may have been slaughtered in a different location at the site, with parts of their carcasses eventually being deposited in the midden, with the exception of the heads, which would have been discarded at the slaughter location. Although no distinct slaughterhouses or butchery rooms have been identified at the site, there may have been separate areas where the slaughter and initial butchery of large animals, such as cattle and deer, took place, with medium-sized mammals processed elsewhere, possibly in the South Field section of the site.

The faunal sample from the South Field West contexts is similar to its South Field East (i.e., midden) neighbor in terms of taxonomic and skeletal part representation, but the South Field West assemblage is far less concentrated than the midden. The greatest accumulation of materials from the South Field West comes from Rooms III, VIII, and IX, which combined account for nearly 50% of the NISP component for this section of the site. The other rooms recognized here appear to be cleaner in terms of faunal waste. The significance of this is not known, as the function of the various rooms in the South Field West is still being debated. Presumably, occupants or workers in this area of the site could dispose of any faunal waste they produced into the nearby midden, located in the South Field East.

One hypothesis regarding the South Field section of the site is that is served as area where smithing, smelting, and other manufacturing or processing activities (fig. 4.13) took place. As a "productive" section of the site, therefore, this area may also have been the locus for animal butchery, hide preparation and tanning, bone handicraft, and related procedures. The location might be suitable. As a somewhat "smelly" enterprise, because of the chemicals used, hide processing suits this zone of the site, which is outside and

[19] The midden was more extensively sieved than other contexts, so this recovery bias must be factored into the higher frequency of rodent and small animal bones retrieved. Even with this bias in mind, however, there appears to be relatively more rodent bones in the midden than elsewhere at the site.

downwind of residential sectors. Identifying these specific operations solely on the basis of zooarchaeological evidence, however, is difficult, especially since the waste that has accumulated in this South Field area (including the midden) derives from no single activity, such as it being all primary butchery waste, or it being comprised of only those bones discarded as a result of tanning procedures. Rather, the bones recovered represent a mix of different events, as would result if waste from all activities was eventually deposited into a communal dump, and subsequently mixed about within this midden. This may be the case for Torre de Palma. Nonetheless, there are still some patterns in the South Field faunal assemblage that distinguish it from the remaining contexts at the site. Recall that the bones that have accumulated across the site, and outside the midden, generally represent scattered waste that was missed during routine cleaning of living floors or courtyards, or that accumulated sporadically after rooms were abandoned. The materials left behind in each spot still can provide clues about cultural discard patterns and, in turn, economic, dietary and husbandry information, but, as mentioned earlier, it is important to view all these deposits within the context of their deposition. The midden material is much more informative of cultural life at the site since it presumably represents material that was deliberately deposited by the site occupants, as opposed to waste that accumulated under more accidental, or tangential circumstances.

While analysis of the midden fauna provides dietary and economic data, it is impossible to extrapolate from these to distinguish, clearly, patterns related to different social classes, such as slaves vs. elites, at the villa. As noted above, the sample within the midden is fairly mixed, containing bones from a variety of skeletal parts, from a range of domestic and wild animal taxa. There is no clear predominance of a single taxon, or a single body part, which might help show a bias for either higher- or lower-class cuts of meat, or even a bias for a certain activity (e.g., predominantly slaughter waste, butchery waste, hide processing waste, etc.). Either meat diets did not vary much across any social class occupying the villa (an unusual occurrence), or that this midden acted as a dump for any faunal trash originally produced within a number of different areas across the site, be this materials typically associated with Roman elite diets (e.g., primary cuts of younger animals), poorer-class diets (e.g., tougher cuts from older animals), or even skeletal parts normally designated as processing and slaughter waste (e.g., head and limb extremity elements).

East and West Baths

Neither of these bath complexes yielded abundant faunal assemblages, a testament perhaps to keeping these areas clear of faunal waste (for hygienic reasons, no doubt), and their under-use, post-occupation, as garbage dump areas. Both assemblages are rather unremarkable in terms of taxonomic and skeletal part representation. Each contains a fair mix of domestic and wild taxa, with no marked predominance of one skeletal body part over another. The age distribution among the taxa is also quite mixed—mostly adults but also some younger animals represented. Spatially, the vast majority of the bones retrieved from these Bath assemblages derive from drain fills. This is expected, since any rubbish deposited would be readily flushed into these drains, where it subsequently can get lodged and protected until excavation.

Southwest House A

Although the Southwest House A faunal assemblage, like its neighbor, the West Bath, contains no dog or equid bones, the general pattern for taxonomic frequencies and skeletal parts is similar to most other areas of the site, and for the overall pattern at the site as a whole. Sheep and goat bones predominate, followed by pig and cattle, with a fairly sizeable quantity of wild animal bones noted, nearly exclusively from red deer and rabbit. The Southwest House A assemblage does, however, contain slightly more cattle bones than the site average, and in this respect resembles the Olive Press assemblage. The significance of these elevated values for cattle is unknown, but as conjectured earlier, if indeed this western area of the site housed working oxen and cows, then upon their death these animals may have been consumed by occupants in the immediate vicinity. Issues of social class may also factor into this distribution. The western section of the site may have housed lower status individuals, such as slaves and workmen, who may have consumed more sub-standard meats, such as beef from mature cattle, as opposed to the more succulent or choice meats, such as that from younger animals, and pigs especially. Recall that the faunal sample from the Peristyle House (arguably a wealthier residential section of the site) contained over twice as many pig bones as cattle bones by NISP counts.

5. Zooarchaeological Comparisons of Torre de Palma with Other Roman Sites in Lusitania

5.1. Introduction

There are few other Roman bone assemblages from Lusitania that can be compared with Torre de Palma. The location of these sites is shown in Figure 4.17., with references for individual reports provided in Appendix III.10. Only sites within an approximately 150.2km radius around Torre de Palma are included;[20] otherwise notable sites with zooarchaeological data lying outside this range (e.g., Celti and Munigua in Baetica) are omitted. There is tremendous variation among the sites presented in Figure 4.17. that must be considered. First, while one site, the Roman settlement at São Pedro, lies a short 5km from Torre de Palma, most are situated more than 50km from the site, the bulk of these either to the east, in the area around Badajoz, or to the west in the vicinity of Lisbon. Second, a number of sites are recognized in less specific terms as "settlement" as opposed to "villa" or "city" so the degree of correspondence in terms of the production and consumption of animals among these different types of sites is hard to determine. There is an assumption that animal husbandry operations are centered upon villas, with goods exported to urban centers. The role of "settlements" within this continuum is hard to assess. Moreover, no

[20] Although faunal remains were collected from the villa and basilica site at Monte da Cegonha, only a list of bones submitted for isotopic investigation is reported (Saragoça et al., 2016); thus no NISP counts for the entire sample are currently available. Nonetheless, among the taxa represented at the site are cattle, sheep/goat, pig, red deer and rabbit, all of which are also represented at Torre de Palma.

Fig. 4.17 — Location of Roman sites in Lusitania with zooarchaeological remains, for comparison with the site of Torre de Palma.

site truly represents a solely productive environment or a solely consumptive situation; occupants at "villas" need to eat, and waste from this activity gets deposited at these sites, alongside zooarchaeological clues that help infer animal husbandry patterns, and other economic aspects of animals use as well. Finally, one must always consider sample sizes and the amount of data presented when comparing sites. Many of the faunal assemblages from the sites used here are fairly small (e.g., less than 300.400 NISP), and potentially biased in this respect. Moreover, there is a great range in the amount of zooarchaeological data provided among these sites, with some yielding more detail about topics such as bone recovery conditions, sampling strategies, skeletal element distribution, aging, sexing, and animal size, while others do not. In light of these concerns, therefore, comparisons among sites, at this stage, will be somewhat generalized. I shall break down analyses here under two headings: 1) contribution of principal domesticated mammals; 2) contribution of wild and domestic animal taxa.

5.2. Contributions of Principal Domestic Mammals

Table 4.12. compares the NISP frequencies of the three principal domestic mammalian taxa – cattle, sheep/goat, and pig – among the Lusitanian sites considered here. As noted above, samples sizes vary tremendously; several sites register a total NISP value of less than 100. Consequently, this variation must be taken into account when drawing comparisons. Nevertheless, several patterns emerge upon inspection of the data.

There is clearly much regional variation among the faunal patterns presented, even within the relatively restricted geographic area under consideration here. Cattle register particularly high values (>30%) at the sites of São Pedro, Hornachuelos, Castelo da Lousa, and Santarém, but reach their highest frequencies (c. 50% and above) at the site of Conimbriga. The small sample size at São Pedro inhibits drawing firm conclusions for this assemblage. Most likely these data are skewed in favor of larger bones and teeth (such as those of cattle) that preserve better, and indeed such taphonomic conditions were noted for this site (Davis, 2005b). The Hornachuelos assemblage may also be biased, but in this case the sample derives from late Iron Age/Early Roman times, a period when cattle tend to be more abundant in faunal assemblages across Iberia (King, 1999). The high value of cattle in the Santarém sample, however, may relate to greater pasturing of cattle in this area during Roman times. The low-lying and well-watered landscape around Santarém is more conducive for cattle herding, and pasturing/ranching would be economically viable here. The ancient author Strabo (3.3.5) does recognize the region north of the Tagus River, where Santarém is located, as an important cattle-raising zone. Facilitated operations for cattle pasturing might also help explain the marked predominance of cattle in the Conimbriga samples. Although some of this phenomenon might be a potential recovery bias favoring collection of larger bones, the fact that meat-bearing parts dominate the Conimbriga cattle assemblage suggests that carcasses were butchered elsewhere in the city, with only beef cuts imported to the site (Detry et al., 2001, p. 100). Whatever the case, the data suggest a greater importance to cattle in the Conimbriga (and neighboring) diet and economy than among sites further south (be these urban or rural) within Roman Lusitania.

A second trend visible in the data from Table 4.12. is the dominance of sheep/goat in two fairly distinct clusters of sites. The first of these is represented by sites including Hijoviejo, Botija, and San Julián, all of which are located to the east of Torre de Palma. In many cases here, ovicaprids register NISP values in excess of 60% of the entire domestic mammal sample, rising to nearly 80% at San Julián. That sheep and goats become more prevalent in faunal assemblages from sites east of Torre de Palma is expected. The landscape here gives rise to the flat, arid plateau of the Spanish Extremadura, a geographic area particularly suited for pastoralism, and traditionally associated with this activity from at least the Early Iron Age. Several of the main transhumant routes that link northern and southern Spain pass through this section of Iberia. Although Tourega, near Évora, is south of Torre de Palma, and somewhat removed from the Extremadura sites (Badajoz and San Julián), this site may have served as a larger center for wool marketing, or specialized somehow in sheep and goat pastoralism, hence the greater concentration of ovicaprid bones in its assemblage.

A second group of Lusitanian faunal samples with fairly high frequency values for sheep and goats encompasses sites in and around Lisbon (e.g., NARQ.BCP, Casa do Governador, São Miguel de Odrinhas, Almoinhas, Creiro, Troia). Some of this patterning may relate to

SITE	Date (century AD)	Site Type	NISP*	% Cattle	% Sheep/goat	% Pig
Torre de Palma	1-3	villa	337	18.7	41.8	39.5
Torre de Palma	3-4/5	villa	854	16.2	43.0	40.9
São Pedro	3-5	villa	50	38.0	44.0	18.0
Quinta das Longas (Elvas)	4	villa	277	10.1	45.8	44.0
Tourega (Évora)	Roman	villa	c. 300	10.1	70.8	19.1
Botija (Cáceres)	Roman	settlement	790	23.0	59.2	17.1
Hornachuelos (Badajoz)	Roman	settlement	1253	36.2	34.6	29.3
Hijoviejo (Badajoz)	Roman	settlement	93	23.7	73.1	3.2
San Julián	Roman	settlement	74	14.9	77.0	8.1
Castelo da Lousa	1	villa/trading post	375	33.9	35.7	30.4
Conimbriga	Roman	urban settlement	151	58.9	33.1	7.9
Conimbriga	3-4	urban settlement	74	48.6	25.7	25.7
Alcáçova de Santarém	1-4	settlement	222	23.9	57.2	18.9
Mirobriga	Roman	settlement	249	25.3	39.0	35.7
Troia	1-5	settlement	186	4.3	54.8	40.7
Creiro (Setúbal)	1-5	industrial tank	61	16.4	57.4	26.2
Castanheira do Ribatejo	1-2	villa	200	21.0	43.0	36.0
Almoinhas (Loures)	2-4	villa	586	21.1	59.7	19.1
NARQ-BCP (Lisbon)	1-5	settlement	507	5.7	65.1	29.2
Casa do Governador (Lisbon)	1-4	settlement	90	20.0	65.8	14.4
São Miguel de Odrinhas (Sintra)	4-5	villa	451	16.4	73.6	10.0

* NISP values solely for cattle+sheep/goat+pig

Table 4.12 — NISP frequency of principal domesticated mammalian taxa among Roman sites in Lusitania.

an overall shift to sheep/goat pastoral operations across late antique landscapes overall in the Roman world, but the further concentration within these "Lisbon" samples may imply some more specific measure of dietary and economic preference for ovicaprids here in particular. Some of this may relate to a center of wool and textile manufacturing for this area, or at least a larger aggregate population in this zone that might drive that type of industry.

How does Torre de Palma relate to all of the other sites presented in Figure 4.17. and Table 4.12.? On the one hand, the site is similar to a number of other areas in its lack of specialization. It seems that the Torre de Palma occupants followed a “safe route” in terms of animal husbandry, operating a mixed regime of raising sheep and goats for meat, wool, and milk, coupled with a scheme of pig husbandry which stressed the production of quality brood stock, and the keeping of cattle, predominantly as work animals, but with the occasional slaughter of them for beef. No specialization in any one animal taxon existed; instead, self-sufficiency in all animal resources seems key. Broad dietary diversification marks other sites in Lusitania, including both rural (e.g., São Pedro, Quinta das Longas) and more urbanized (e.g. Miróbriga, Conimbriga, Lisbon) places.

Although economic and dietary diversification at Torre de Palma seems assured, the site, alongside the neighboring site of Quinta das Longas, record among the highest values for pig bones among the list of Lusitanian sites presented in Table 4.12. No doubt environmental factors contribute to this pattern, since there are abundant oak woodlands around Torre de Palma (and the region to the south-east, around Quinta das Longas), providing cheap feed for pigs. However, there are also social factors to consider. As the preferred meat of many Romans, an increase in pork consumption, especially in a Roman provincial area where the resource may not have been popular initially, can be linked with "Romanized" diets and patterns of acculturation (King, 1999). Admittedly, this is a complex topic, which cannot be addressed here adequately on the basis of the limited faunal data available for Roman Lusitania; however, the high values of pork at Torre de Palma and Quinta das Longas could signify ties to more entrenched or core (i.e., Italian) "Romanized" dietary standards. Another question that cannot be answered at this stage in the absence of more faunal data from sites in Lusitania is the connection of the villas at Torre de Palma and Quinta das Longas to the large urban center of Augusta Emerita. In what capacity might these sites have provided resources (and especially pork) to this key Roman city? According to the demographic estimates of C. Carreras Monfort (1995-1996), Augusta Emerita would have required a considerable hinterland, upwards of 50km (and presumably more), to supply its economic and dietary needs. Its sway upon the countryside beyond that range, especially as concerns animal husbandry operations, was presumably also heavy. While I have argued above that Torre de Palma was fairly self-sufficient in terms of providing all the necessary foodstuffs and associated animal resources required of its occupants, this does not preclude the fact that the large size and luxurious nature of the villa complex required some measure of wealth to construct and maintain. Some manufacturing of metals, cloths, and other handicrafts probably occurred at the site (in the South Field area, most likely), but current evidence suggests that these activities were not conducted on any significant scale to produce excess trade and manufacturing wealth for the villa. Presumably, the site generated some wealth by exporting agricultural goods, including animal resources. The distance to which these traveled, however, is difficult to reconstruct, in the absence of secure figures for the amount of surplus goods produced at the villa. Nevertheless, Augusta Emerita would represent a strong and steady market for any surplus agricultural or animal commodities produced at Torre de Palma. The villa could be a draw for urban elites seeking a rural, vacation refuge, even travelers and traders conducting business along the route between Augusta Emerita (Mérida) and Olisipo (Lisbon).

5.3. Contributions of Wild Taxa

Domesticates were not the only animals consumed in Roman times; wild animals also contributed to the diet. Table 4.13. lists the frequency of consumable domestic and wild taxa among Roman sites in Lusitania. As red deer tended to predominate most of the wild animal bone samples, their frequency is also indicated in Table 4.13.

Excluding Hornachuelos (which yielded an exceptionally and unreliably high wild animal value – issues of contaminated deposits here), the data from Table 4.13. indicate that Torre de Palma, and its neighboring villas, São Pedro and Quinta das Longas, register among the highest frequencies of wild animal bones for Roman sites in Lusitania, and show a clear predominance of red deer within these samples. Hunting certainly factored more in the diet and economy of Roman Lusitania (and at Torre de Palma, especially) than is the case for Roman Italy, by comparison (Mackinnon, 2004).

Why wild animals appear to contribute more to the Lusitanian diet is difficult to determine, especially given that upon closer inspection the data show no readily discernible pattern in terms of site type or time period. There is no significant percentage of wild

SITE	Date (century AD)	Site Type	NISP*	% Cattle	% Sheep/goat	% Pig
Torre de Palma	1-3	villa	434	77.6	22.4	13.3
Torre de Palma	3-4/5	villa	1101	79.2	20.8	11.9
São Pedro	3-5	villa	63	79.4	20.6	14.3
Quinta das Longas (Elvas)	4	villa	426	65.0	35.0	7.7
Tourega (Évora)	Roman	villa	c. 330	92.7	7.3	7.3
Botija (Cáceres)	Roman	settlement	915	86.3	13.7	8.6
Hornachuelos (Badajoz)	Roman	settlement	2922	42.9	57.1	40.6
Hijoviejo (Badajoz)	Roman	settlement	113	85.8	14.2	8.0
Castelo da Lousa	1	villa/trading post	679	55.2	44.8	39.8
Conimbriga	Roman	urban settlement	184	82.1	17.9	13.6
Conimbriga	3-4	urban settlement	81	91.4	8.6	2.5
Alcáçova de Santarém	1-4	settlement	296	75.0	25.0	9.5
Mirobriga	Roman	settlement	350	80.6	19.4	7.7
Troia	1-5	settlement	224	83.0	17.0	0.9
Creiro (Setúbal)	1-5	industrial tank	84	72.6	27.4	22.6
Castanheira do Ribatejo	1-2	villa	205	97.6	2.4	0.5
Almoinhas (Loures)	2-4	villa	599	97.8	2.2	1.0
NARQ-BCP (Lisbon)	1-5	settlement	561	90.4	9.6	3.0
Casa do Governador (Lisbon)	1-4	settlement	93	96.8	3.2	0.0
São Migue del Odrinhas (Sintra)	4-5	villa	463	97.4	2.6	2.2

* NISP values solely for consumable domesticates + consumable wild

Table 4.13 — NISP frequency of consumable domestic and wild taxa among Roman sites in Lusitania.

mammals at rural sites as opposed to urban or settlement sites. Moreover, the frequency of wild mammals does not appear to increase or decrease, noticeably, over time. Rather, the high frequency of wild mammals seems to be primarily a regional phenomenon, with more hunting occurring in Lusitania as opposed to outlying areas during antiquity. It is possible (and probable) that Lusitania was much more forested in antiquity than at present,[21] and thus, contained more wildlife, which was more readily available for hunting. In this manner, it may have been more economical to hunt and consume wild game than to raise domesticates for meat. Alternatively, Lusitanians may have relished the taste of venison, rabbit, hare, and boar and subsequently sought to retrieve them, no matter what costs involved. This may relate to dietary differences and a reluctance to conform to patterns of "Romanization," where pork consumption held precedence, or it may also point towards maintenance of old established regional dietary regimes where wild game was important. In other instances, the occupants may not have had a choice and could have been forced to hunt to survive and add meat to their diet. However, this seems unlikely the case at wealthy villas, such as Torre de Palma. Surely, at least the privileged occupants at Torre de Palma did not need to hunt to survive, and could have more readily obtained sustenance from domestic animals raised in the area or purchased at markets. Hunting has sometimes been linked with dietary wealth, and this may apply in the case at Torre de Palma. The elite occupants here chose to add wild game to their diet. The villa may have even operated as a country hunting retreat for elite clients and to have capitalized on this activity.

[21] Clarke's (1997) environmental reconstructions for the vicinity of Torre de Palma support such reconstructions.

Wild animals were certainly plentiful in Lusitania during antiquity, if we can believe the comments of Martial (1.49), Strabo (3.4.15), and Polybius (34.8.10) on this matter. Conflicting accounts exist, however, as to whether wild game was particularly prized and consequently a luxury in the diet, or if it was a more common staple. Martial (1.49) writes about hunting in Iberia as an activity typically reserved for the elite, but he is addressing an Italian audience and in essence encouraging them to pursue this as a vacation sport to some degree. He does not comment on the level to which the Iberians themselves hunted, or if this was considered a wealthy or more commonplace event for them. Polybius (34.8.10), in outlining various costs of Lusitanian animals, states that the flesh of wild animals from there is scarcely thought worth pricing but is given away for nothing or exchanged. This comment would suggest that wild game was not the standard dietary luxury in Lusitania as it may have been elsewhere in the Roman world. Instead it may have been a fairly common item of the menu of both poor and wealthier natives and non-natives alike. The situation may have been similar to that during Medieval times in Portugal when, in a country that consisted of game preserves and uncultivated land, hunting was both a luxury pastime of the rich as well as an important means of acquiring meat for the peasant diet (Oliveira Marques, 1971, p. 17).

The connection of Roman elite and wild game in Lusitania may not be as simple as seems to be the case in other Roman provinces such as Italy, where higher frequencies of wild animals tend to imply wealthier diets (Mackinnon, 2004). If the native Iberian diet was marked by a high percentage of game, then Romans, and especially elite Romans, may have wished to distinguish themselves from this "native" pattern by choosing to consume more domesticated or even exotic animals, in other words picking a menu that was opposed to the standard Iberian one. This then would identify them as Romans. The topic of "Romanization" and dietary change in Iberia is complicated, and requires more integrative research, combining zooarchaeological, archaeological, iconographic, and textual analyses, beyond the scope of this particular faunal report for Torre de Palma. It is, nevertheless, an important issue to address overall cultural change (or continuity, as might be the case) in the Roman west.

Reconstructing the role of hunting in Roman Lusitania presents further complications, since accessibility to game animals would certainly be influenced by a multitude of factors, and not just social status or the amount of game available. The ancient laws concerning ownership of wild game are not always clear. Wild animals in a private game preserve (i.e., *vivarium* or *leporarium*) belonged to the owner of that preserve. However, those not contained in a reserve essentially had no owner and effectively became the property of the taker as soon as they were caught, regardless if this occurred on one's own or someone else's property (Just. *Inst.* 2.1.12). A landowner could certainly warn people off his estate, and most civilized hunters probably limited such confrontations by restricting themselves to their own, or invited territories. In any event, hunting big game, such as red deer, required large tracts of land. While technically and theoretically most of the land in Roman Portugal was owned by the wealthy or the state, it follows that the rich and powerful essentially had greater legal access to the game animals contained therein. In practice, however, boundaries were probably not as clearly demarcated or even recognized for that matter, and the degree to which these Roman laws were enforced in Lusitania, generally, or around Torre de Palma, specifically, is difficult to judge. No doubt the state claimed ownership on much uninhabited land, including many forests, but this surely did not prevent people from hunting the wild game living within these regions, be this as a known or unknown act of trespassing and poaching.

Although the data on wild and domestic animals at these Roman Lusitanian sites show a number of interesting trends and prompt a number of equally interesting hypotheses, at present there are simply too few data to test these. Roman sites throughout the Iberian Peninsula register fairly sizable amounts of wild animals, and the national average is over quadruple that for its Italian equivalent. Clearly wild game formed a much greater part of the Roman diet in Iberia than it did in Italy, but the circumstances surrounding this are difficult to determine.

V. Summary

MARY LUCAS POWELL AND STEPHANIE J. MALONEY

The site of Torre de Palma provides us with an unparalleled, very long, view of the evolution of human life in this region of Portugal, from the nomadic hunter-gatherers of the Chalcolithic Age who left only their stone tools to mark their existence, to the Iron Age villagers whose sparse remains nonetheless testify to their metallurgic skills and their extensive trading networks, to the builders of the Roman villa who recognized the immense agricultural potential of the Palma area and established a prosperous estate surrounding their luxurious home, to the early Christians who built one of the earliest, largest, and most distinctive church complexes in Iberia, and finally, to the Medieval noble family who revived the Christian precinct and established an important fortified outpost facing Portugal's eastern border with Spain.

1. From paganism to Christianity at Palma: what changes do we see?

In Chapter I, Maloney outlined the development of the Roman villa and the early Christian church precinct at Palma. She describes the successive construction stages during the 1st-4th centuries AD at the villa as it developed into a large agricultural estate with numerous industrial outbuildings. Palma is the largest Roman villa yet discovered in Portugal, and its abundant *spolia* (including lavish mosaic floors, ceramics, metal ornaments and utensils, and numerous other artifacts as well as the remnants of the buildings themselves) will continue to yield much information on life in the Alto Alentejo in Late Antiquity.

In the religious precinct (Complexes A, B, and D), the foundations of a small pagan temple lie beneath the eastern apse and altar of the first church built early in the 5th century and rebuilt in the 6th, an example of the widespread re-use of "sacred space" common throughout the Late Roman Empire and beyond as Christianity replaced the old beliefs. Small rural churches were not uncommon in the western Empire in Late Antiquity, but the Church at Torre de Palma steadily grew in size and complexity. A second, smaller, basilica was added end-to-end with the earlier church in the 7th century and the existing small 5th-century font was enlarged to create a font deep enough for adult immersion. Torre de Palma is the largest rural church yet discovered in Portugal, and it surpassed in size the early Christian church at Mértola as well as the known double-apsed churches in Spain. The construction of a large house-like building (possibly a *mansio*) adjacent to a separate bath complex suggests a facility to house travelers or religious pilgrims to the site, attracted by word of a miraculous underground watercourse that filled the font each springtime just before Easter. Two of the adults buried at Palma had consumed diets heavy in millet in the years not long before their deaths, yielding quite different isotopic profiles from the typical Palma pattern; perhaps they were pilgrims from regions that lay to the south of the Alentejo, where millet was a dietary staple.

2. From *extra muros* to *ad sanctos*: where do the dead belong?

In Chapter II, Powell and her colleagues outline the successive changes in the mortuary patterns at Palma that accompanied these developments in the religious precinct. Only five sets of human remains represent the pre-Christian occupations, and the great majority of tombs date to the early Christian era. In the two small cemeteries near the western end of the Church (Complexes A and D), the dead now lay in close proximity to the living, a direct reversal of the pagan Roman proscription against burials near the dwelling places of their gods. The dead even invaded the body of the Church (Complex B) itself, striving to lie *ad sanctos* (near the saints) in order to gain protection for their souls in the afterlife and for their still-living descendants. Unfortunately, no inscribed grave markers have been discovered at Palma, so we do not know the identities of the dead buried here, but the successive burial of individuals within selected tombs reflects the persistence of family ties beyond the grave, as evidenced by biological markers.

The original church was abandoned in the late 7th or early 8th century, perhaps as a result of the Muslem invasions. Nevertheless, the sanctity of the site was preserved when a small chapel was created incorporating the third apse of the old church. Burials continued to be placed in the consecrated soil of the religious precinct, as shown by the Medieval coins found in grave fill. Portugal's African excursions from the 15th century onward brought many Black Africans, enslaved or free, to Iberia. One resident at Palma, a woman with some degree of sub-Saharan African ancestry (determined by cranial morphology and aDNA analysis) who died in her mid-thirties was buried in the Church sometime in the late 15th – early 17th century (AD 1469 – 1648, radiocarbon dates calibrated for eastern Portugal). Regardless of her antecedents, she was accorded Christian burial alongside her fellows at Palma, a marker of Portugal's increasing globalization in the Medieval era.

3. The people of Torre de Palma

The human skeletal sample from Torre de Palma, recovered from 139 mortuary features, represents a minimum of 250 individuals: 90 infants, children, juveniles, and adolescents and 160 adults (54 females, 74 males, and 32 adults of undetermined sex). This is the largest sample of human skeletal remains yet recovered from an archaeological site in Portugal. Although many of the individuals are poorly represented due to various taphonomic factors, large bodies of data on key biological dimensions are presented in multiple tables in Chapter III, covering the dimensions of age and sex, cranial and post-cranial metrics and morphology (adult stature, sexual dimorphism, and skeletal markers of daily activities), reconstruction of the Palma diet based on analysis of carbon and nitrogen stable isotopes, faunal remains, and dental pathology, and descriptions of paleopathological cases of infectious disease, traumatic injuries, and metabolic and hemopoetic disorders.

The inhabitants of Palma evidently enjoyed better health than their contemporaries in Late Antiquity's crowded, unsanitary cities. The analysis of dietary isotopes (carbon and nitrogen) indicates a relatively high level of animal protein, a conclusion supported by the zooarchaeological analysis that revealed an unusually large proportion of wild animals taken for food (deer, rabbits, etc.) in addition to abundant domesticates. Men ate somewhat more meat than did women, but the diets of those buried inside the Church (a location typically indicative of higher social status) did not differ substantially from those buried in humbler circumstances. Evidence of poor nutrition (e.g., orbital and cranial vault lesions denoting iron-deficiency anemia) are, not surprisingly, very rare. The few traumatic injuries identified suggest occupational mishaps rather than warfare.

A comparison of metric data from Torre de Palma adults with similar data from medieval sites in Portugal, Spain, and France shows little inter-regional variation in adult body size, but comparison with late 19th- early-20th century Portuguese from the Coimbra Identified Skeletal Collection documents a significant secular decrease in adult stature, body size, and sexual dimorphism in the latter centuries. Skeletal lesions representing non-specific or specific infectious disease are also rare, but osteoarthritis and skeletal markers denoting frequent severe mechanical stress appear in almost all adults aged 30 years or older at death, not an unexpected pattern for a population accustomed to heavy agricultural labor. A number of the older adult males show distinctive osteological alterations of hip and knee joints, identified by other researchers in France, Hungary, and Portugal as *Syndrome du Cavalier* or "Horse-rider syndrome", resulting from strenuous habitual flexion and adduction of the thighs and knees while riding. An elderly adult male who died in the 4th century AD displays the characteristic gross bone deformation with 'mosaic' microstructure diagnostic of Paget's disease, a progressive disorder of unknown etiology found today predominantly in populations of western European origin. This is probably the oldest identified case of this disorder known to date in Portugal.

In sum, the early Christian population at Palma appears generally taller and better fed than their contemporaries in the western Empire and indeed far healthier than their descendants in the industrializing cities of 19th-20th century Portugal. Their relatively tall stature may owe in some degree to the genetic contributions of the Germanic tribes who came to Iberia in Late Antiquity, a question for future analyses of aDNA.

4. Animal husbandry, hides, and hunting at Palma

A detailed zooarchaeological analysis of 15,000 faunal remains recovered from 4th-5th century AD midden areas indicated a mixed agricultural economy, with cattle, ovicaprids (sheep/goats), and pigs as the primary domesticates. Hunting wild game on horseback was a popular activity at rural Roman villas during the Late Empire, well documented by mosaics and frescos. Red deer, wild boar, hare, and rabbit accounted for 30% of the total faunal sample, the highest frequency reported to date from any agricultural site in the western Mediterranean. The prominent role of wild and domesticated animals in the Torre de Palma diet in Late Antiquity is well attested by the high levels of nitrogen isotopes revealed by dietary analysis, relative to contemporary and Medieval Portuguese populations.

The processing of deer and cattle hides for domestic use and possibly also for export was evidently one of the industries that helped sustain the Palma economy.

5. Endnote

In sum, fifty-three years of archaeological explorations at Torre de Palma (1947–2000) have provided important insights into Portuguese lifeways during Late Antiquity and the Medieval era. The abundant documentation and materials from this site, curated at the *Museu Nacional de Arqueologia*, should stimulate many avenues of future research beyond the scope of these investigations.

VI. Sumário

MARY LUCAS POWELL AND STEPHANIE J. MALONEY

O sítio de Torre de Palma oferece-nos uma visão inigualável e muito extensa da evolução da vida nesta região de Portugal, desde os caçadores-recoletores nómadas do Calcolítico, que deixaram apenas os seus instrumentos de pedra como marca da sua existência, até aos habitantes do núcleo da Idade do Ferro cujos escassos vestígios testemunham, porém, as suas capacidades metalúrgicas e a sua extensa rede de comércio e a capacidade de construção da Vila romana. Estes terão reconhecido o imenso potencial agrícola da área de Palma e estabeleceram uma propriedade próspera em torno da sua luxuosa casa, tal como os primeiros cristãos que construíram um dos mais antigos, maiores e mais distintos complexos de igrejas da Península Ibérica. Finalmente, também a família nobre medieval reconheceu a importância de Palma ao revitalizar o recinto cristão e ao estabelecer um importante posto avançado fortificado frente à fronteira oriental de Portugal com a Espanha.

1. Do paganismo ao cristianismo em Palma: que mudanças observamos?

No Capítulo I, Maloney descreve o desenvolvimento da villa romana e do recinto da igreja cristã primitiva em Palma, ou seja, as sucessivas fases de construção durante os séculos I-IV d. C. na Vila à medida que se desenvolve uma grande propriedade agrícola com numerosos edifícios de lavoura anexos. Palma é a maior Vila romana jamais descoberta em Portugal e o seu abundante espólio (incluindo luxuosos pavimentos de mosaico, cerâmica, ornamentos e utensílios de metal e vários outros artefactos, bem como os vestígios dos próprios edifícios) continuarão a fornecer muita informação sobre a vida no Alto Alentejo na Antiguidade tardia.

No recinto religioso (Complexos A, B e D), as fundações de um pequeno templo pagão sob a abside oriental e sob o altar da primeira igreja, construída no início do século V e reconstruída no século VI, são um exemplo da reforma generalizada na utilização do «espaço sagrado», comum em todo o Império Romano tardio e mesmo depois, à medida que o Cristianismo vai substituindo as antigas crenças. As pequenas igrejas rurais não eram infrequentes no final da Antiguidade no Império Ocidental. Neste caso, a igreja de Torre de Palma foi crescendo sempre em dimensão e em complexidade. No século VII uma segunda basílica de menores dimensões foi adicionada de uma ponta à outra da igreja anterior. Da mesma forma, a pequena fonte do século V, foi ampliada para criar uma bacia batismal suficientemente profunda para a imersão de adultos. A basílica de Torre de Palma é a maior igreja rural já descoberta em Portugal e ultrapassa em tamanho a igreja cristã primitiva de Mértola, bem como as conhecidas igrejas de abside dupla em Espanha. A construção de um grande edifício semelhante a uma casa (possivelmente uma mansio) adjacente a um complexo de banhos separado, sugere uma estrutura no local para hospedar viajantes ou peregrinos, atraídos pela reputação de um curso de água subterrâneo milagroso que enchia a fonte, pouco antes da Páscoa, em cada primavera. Dois dos adultos enterrados em Palma consumiram dietas com base em painço nos anos imediatamente anteriores ao falecimento, produzindo perfis isotópicos bastante diferentes do padrão típico de Palma. Pode-se pensar que seriam peregrinos das regiões a sul do Alentejo, onde o painço era um dos alimentos básicos.

2. De extra muros a *ad sanctos*: a que lugar pertencem os mortos?

No Capítulo II, Powell e os seus colegas descrevem as mudanças sucessivas nos padrões mortuários em Palma que acompanham esses desenvolvimentos nos ritos religiosos. Apenas cinco conjuntos de restos mortais representam as ocupações pré-cristãs. A grande maioria dos túmulos data do início da era cristã. Nos dois pequenos cemitérios próximos à extremidade oeste da igreja (Complexos A e D), os mortos jazem próximo dos vivos, uma reversão direta da proibição romana pagã contra enterros perto das moradas dos seus deuses. Os mortos invadem até o próprio corpo da igreja (Complexo B), esforçando-se para serem enterrados *ad sanctos* (perto dos santos) a fim de obter proteção para as suas almas na vida depois da morte e para os seus descendentes ainda vivos. Infelizmente, nenhuma lápide inscrita foi descoberta em Palma. Não podemos, assim, identificar os mortos neste local. No entanto, o enterro sucessivo de indivíduos em túmulos específicos reflete a persistência de laços familiares para além da *sepultura*, como evidenciado pelos marcadores biológicos.

A igreja original foi abandonada no final do século VII ou no início do século VIII, talvez como resultado das invasões muçulmanas. No entanto, a santidade do local foi preservada quando, posteriormente, foi construída uma pequena capela incorporando a terceira abside da antiga igreja. Os sepultamentos continuaram a ser feitos em solo consagrado do recinto religioso, como mostram as moedas medievais encontradas na *sepultura*. As viagens de Portugal a África a partir do século XV, trouxeram muitos africanos negros, escravos ou livres, para a Península Ibérica. Uma residente em Palma, uma mulher com algum grau de ascendência africana subsaariana (determinada pela morfologia craniana e análise de aDNA) que morreu com cerca de 30 anos, foi enterrada na igreja algures entre o final do século XV e início do século XVII (1469-1648 d. C., datas de radiocarbono calibradas para o leste de Portugal). Independentemente dos seus antecedentes, esta mulher recebeu um enterro cristão ao lado dos seus companheiros em Palma, uma prova da crescente globalização de Portugal na era medieval.

3. A população de Torre de Palma

A amostra dos esqueletos humanos de Torre de Palma, recuperados em 139 espaços mortuários, representa um mínimo de 250 indivíduos: 90 nascituros, crianças, jovens e adolescentes e 160 adultos (54 mulheres, 74 homens e 32 adultos de sexo indeterminado).

Esta é a maior amostra de restos de esqueletos humanos já recuperados num núcleo arqueológico em Portugal. Embora muitos dos indivíduos estejam mal representados, devido a vários fatores tafonómicos, um grande conjunto de dados sobre as principais dimensões biológicas são apresentados em várias tabelas no Capítulo 3, cobrindo características como a idade e o sexo, métricas cranianas e pós-cranianas e morfologia (estatura adulta, dimorfismo sexual e marcadores esqueléticos de atividades quotidianas), reconstrução da dieta de Palma com base na análise de isótopos estáveis de carbono e nitrogénio, restos de animais, patologia dentária e descrições de casos paleo-patológicos de doenças infeciosas, lesões traumáticas e metabólicas e doenças hematopoiéticas.

Os habitantes de Palma gozavam, manifestamente, de melhor saúde do que os seus contemporâneos nas cidades insalubres e saturadas da Antiguidade. A análise dos isótopos dietéticos (carbono e nitrogénio) indica um nível relativamente alto de proteína animal, uma conclusão apoiada pela análise zooarqueológica que revelou uma proporção invulgarmente grande de animais de criação e selvagens na alimentação (veados, coelhos, etc.). Os homens comiam um pouco mais carne do que as mulheres. Todavia, a dieta das pessoas enterradas dentro da igreja (uma localização que representa uma clara indicação de um estatuto social mais elevado) não diferia substancialmente dos habitantes enterrados em circunstâncias modestas. Não é surpreendente a quase ausência de indícios de má nutrição, como seriam as lesões orbitais e da abóbada craniana reveladoras de anemia por falta de ferro. Os poucos ferimentos traumáticos identificados sugerem acidentes do quotidiano e não de combate.

Uma comparação dos dados métricos de adultos de Torre de Palma com dados semelhantes de núcleos medievais em Portugal, Espanha e França, mostra reduzida variação inter-regional na estatura do adulto. Contudo, a comparação com o português do final do século XIX e início do seculo XX da Coleção de Coimbra de Esqueletos Identificados, documenta uma diminuição secular significativa na estatura adulta, tamanho do corpo e dimorfismo sexual nos últimos séculos. Lesões esqueléticas representativas de doenças infeciosas específicas ou não, são também raras. No entanto, a osteoartrite e os marcadores esqueléticos, denotando *stress* mecânico grave, aparecem com frequência em quase todos os adultos com 30 anos ou mais no momento da morte. Este padrão não é surpreendente, atendendo que esta era uma população acostumada ao trabalho agrícola pesado. Vários dos homens mais velhos apresentam claras alterações osteológicas nas articulações da anca e dos joelhos, identificadas por alguns investigadores em França, Hungria e Portugal como «Síndrome do Cavalier» ou «Síndrome do Horserider», resultantes de extenuantes flexões e da habitual adução das coxas e joelhos ao andar. Um homem adulto idoso falecido no século IV d. C., exibe uma grande deformação óssea típica diagnosticada como uma microestrutura em «mosaico» da doença de Paget, uma deformação progressiva de etiologia desconhecida, hoje predominante em populações oriundas da Europa Ocidental. Este é provavelmente o caso mais antigo identificado em Portugal desta doença até à data.

Em suma, a população cristã original de Palma parece geralmente ser mais alta e melhor alimentada do que os seus contemporâneos do Império Ocidental. Na realidade, muito mais saudável do que os seus descendentes nos centros urbanos industriais de Portugal dos séculos XIX e XX. Eram relativamente altos, quiçá pelo contributo genético das tribos germânicas que vieram para a Península Ibérica no final da Antiguidade; uma questão a aprofundar com futuras análises de aDNA.

4. Pecuária, peles e caça em Palma

Uma análise zooarqueológica detalhada de 15 000 restos de animais recuperados nas áreas do século V ao VI d. C. indica uma economia agrícola mista, com gado, ovino, caprino e suíno como os animais de criação. A caça de animais selvagens a cavalo era uma atividade popular nas vilas rurais romanas durante o final do Império, bem documentada por mosaicos e frescos. O veado, o javali, a lebre e o coelho representavam 30% da amostra total dos vestígios animais, a maior frequência relatada até hoje em qualquer sítio agrícola no Mediterrâneo Ocidental. O papel proeminente dos animais selvagens e domesticados na dieta de Torre de Palma na Antiguidade tardia é bem atestado pelos elevados níveis de isótopos de azoto revelados pela análise dietética, se compararmos com as populações portuguesas contemporâneas e medievais. Os curtumes de peles de veado e do gado para uso doméstico, e possivelmente também para exportação, terá sido uma das atividades que ajudaram a sustentar a economia de Palma.

5. Nota final

Em suma, cinquenta e três anos de explorações arqueológicas em Torre de Palma (1947-2000) forneceram importantes perspetivas sobre o modo de vida dos portugueses durante a Antiguidade tardia e a era medieval. A abundante documentação e materiais deste sítio, com curadoria do Museu Nacional de Arqueologia, deverão estimular futuras pesquisas e estudos.

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Appendix I

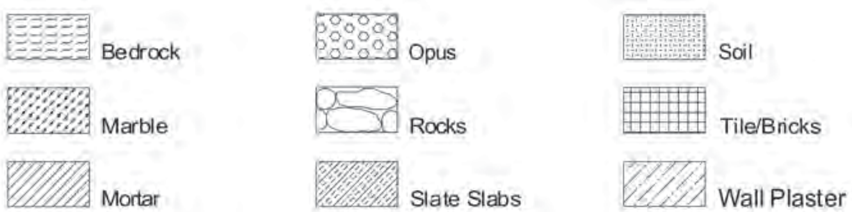
The Mortuary Database

This Appendix contains the individual descriptions of each tomb recorded during the Portuguese and American archaeological excavations (1947 – 2000) at the site of Torre de Palma. The tombs are grouped by time period and location: e.g., the Iron Age tombs, the pagan Roman tombs, the Northwest Cemetery tombs, etc. Each entry opens with a standardized heading with text that provides the following information if available:

(1) the University of Louisville Tomb Number (e.g., NW 6) or inventory number (e.g., TP.113.84);
(2) the associated Langley Complex number (e.g., LC 6) and MNA *Sepultura* number (if present);
(3) the location of the tomb within its named area;
(4) the orientation of the tomb;
(5) the construction/Hale Type of the tomb;
(6) a description of any associated artifacts;
(7) the MNA Skeletal Accession Number of human remains in the tomb (if any); and
(8) the number, the age, and the sex (if known) of the individuals represented by skeletal remains in the tomb.

Most of the tomb descriptions include a drawing of the tomb made by University of Louisville draftspersons. In a few cases, the construction of the tomb was not known because it had been partly or wholly destroyed, so no plan could be drawn. In a few other cases (e.g., the Small and Large Reburials), the tomb consisted only of a deposit of commingled human remains, with no evidence of any sort of formal tomb construction. The individual tomb entries include photographs of all of the tombs excavated by the UL archaeologists that contained human remains, but photographs of tombs that did not contain human remains are not presented here. Field drawings of the tombs were done by Mary T. Walters and Beverly Atkins. Ceramic and artifacts were drawn by Mary T. Walters. The drawings were digitized by S. McNabb and S. J. Maloney.

Key to Fills



1. The Iron Age Tombs at Palma

LC (none assigned)
LOCATION: Southwest Cemetery/*Cemitério da Villa Lusitano-Romano* (Complex D).
ORIENTATION: N/A.
CONSTRUCTION/TOMB TYPE: cremated bones within a ceramic urn.
ASSOCIATED ARTIFACTS: MNA Urn 5152, 2000.405.7
MNA SKELETAL INVENTORY: none.
N: 1; infant 12-24 months.

These human remains were discovered, enclosed in a plastic bag inside the urn, by Langley during her examination of the Iron Age artifacts from Torre de Palma. The remains had presumably been originally buried inside the urn, which was recovered during the 1948 MNAE excavations. The remains consist of 169 bone fragments, of which 24 could be identified: 14 from the cranium, 7 from the spine, and 3 from the lower limbs. The fragments exhibit specific features (mineralized texture, a grey-white color, warping of original contours, and transverse curved fractures) characteristic of fresh bone burned at temperatures higher than 700/800°C (Extebérria, 1994; Walker and Miller, 2005). The remains represent a single individual, an infant; the estimation of age at death as 12-24 months is based on the identification of a deciduous tooth root and one half of the arch of a cervical vertebra.

LC (none); *Sepultura* XVI
LOCATION: Northwest Cemetery/*Cemitério ao pé das Ermidas* (Complex A).
ORIENTATION: N/A.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: MNA 2000.419.1
MNA SKELETAL INVENTORY: none.
N: unknown.

LC (none); *Sepultura* XVII
LOCATION: Northwest Cemetery/*Cemitério ao pé das Ermidas* (Complex A).
ORIENTATION: N/A.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: MNA 2000.420.1; 2000.420.2
MNA SKELETAL INVENTORY: none.
N: unknown.

LC (none); *Sepultura* XVI
LOCATION: Northwest Cemetery/*Cemitério ao pé das Ermidas* (Complex A).
ORIENTATION: N/A.
CONSTRUCTION/TOMB TYPE: Cremated bones within a ceramic urn.
ASSOCIATED ARTIFACTS: 2000.421.18
MNA SKELETAL INVENTORY: none.
N: 1; probably adult, indeterminate age and sex.

One set of cremated human remains had presumably been buried inside this urn, which was recovered during the 1948 MNAE excavations. The remains are less complete than the set from *Urna* 5152; they comprise 21small fragments, too small for identification of specific skeletal elements. Their texture, color, and pattern of warping and transverse fractures are characteristic of fresh bone burned at temperatures higher than 700/800 °C (Extebérria, 1994; Walker and Miller, 2005). The remains appear to represent a single individual, but no estimation of age or sex was possible.

LC (none); *Sepultura* XXX

Location: Northwest Cemetery/*Cemitério ao pé das Ermidas* (Complex A).
Orientation: N/A.
Construction/tomb type: unknown.
Associated Artifacts: 2000.426.01; 2000.426.03; 10 002/5/78; 10 002/6/78; 10 002
MNA Skeletal Inventory: none.
N: unknown.

The artifacts associated at MNA with this *sepultura* are all typical of Iron Age ceramics and metal objects, except for one ceramic lamp (*lucerna*) that is clearly from the Roman epoch.

2. Pagan Roman Tombs

TP.109.92 (fig. 2.1); LC: none

Location: Colonnaded Court (Complex G), Room XIII, sq. S151E162, the Atrium Builder Villa, Level 3, below the subfloor). Late 1st – 2nd century AD.
Orientation: east-west.
Construction/tomb type: none.
Associated Artifacts: TP.44.92, *lucerna* with winged child.
N: 1; neonate.

This neonate infant was represented by portions of the cranial vault, the two halves of the mandible, several ribs, the left ilium, and most of the larger long bones (shafts only). The spine, hands, and feet were not recovered. The age estimate was based upon dental and skeletal evidence: incompletely formed deciduous tooth buds, non-fusion of the two halves of the mandible, and measurements of long bone shafts (l. humerus, 41.5mm; l. femur, 45.5mm; l. tibia, 39.9mm; l. fibula 38mm). No skeletal pathology was noted.

TP.113.93 (fig. 2.2); LC: none

Location: Colonnaded Court (Complex G), Room LC, near sq. S174E157, beneath the floor and lying against the north wall of this room.
Orientation: east-west.
Construction/tomb type: none. The skeleton was discovered beneath a concentration of broken stones and tiles along the north wall of the room.
Associated Artifacts: two iron nails and an iron clasp recovered from the level above.
N: 1; neonate 0-3 months.

The body of this neonate was lying on its back parallel to the north wall of the room, the head to the west and the legs doubled back over the torso, a common position for burials of infants under the age of three months because of the stage of muscular development (Leach, 1988, p. 161, cited in Scott, 1999, p. 112). According to the UL Field Notes for this feature, the body "appears to have been buried during the construction of the north wall of the Atrium Builder villa, as the skeleton lay right at the bottom of the foundation."

The bone preservation is excellent, and all parts of the skeleton are represented: the cranium, the mandible, spine, ribs, the right ilium, most of the bones of the hands and feet, and the larger long bones (shafts only). The age estimate was based upon dental and skeletal evidence: incompletely formed deciduous tooth buds, non-fusion of the two halves of the mandible, and measurements of long bone shafts (l. humerus, 64.0mm; l. radius, 57.0mm; l ulna, 49.0mm; l. femur, 75.0mm). No skeletal pathology was noted.

TP.66.95; LC: none
Location: Northwest Cemetery (Complex A); near NW 6.
Orientation: N/A.
Construction/tomb type: cremated bones within a ceramic urn.
Associated Artifacts: ceramic urn.
N: 1; child (6 years ± 24 months).

During cleaning of tombs in the Northwest Cemetery by the American excavators in 1995, a ceramic vessel was discovered containing the cremated bones of a young child. The age estimate of 6 years (± 24 months) was based on dental development: the complete crowns (without roots) of two premolars, one deciduous canine, and the roots of a deciduous incisor and a molar. The bones were fragmented, but most of the skeleton was represented: the cranial vault and mandible, the shoulder and pelvic girdle, portions of the spine and ribcage, and the larger long patches, while others are uniformly dark blue-grey. Some of the long bone shaft fragments show distinctive warping and parallel curved cracks characteristic of fresh "green" bone burned at temperatures higher than 700/800°C (Extebérria, 1994; Walker and Miller, 2005). No skeletal pathology was noted.

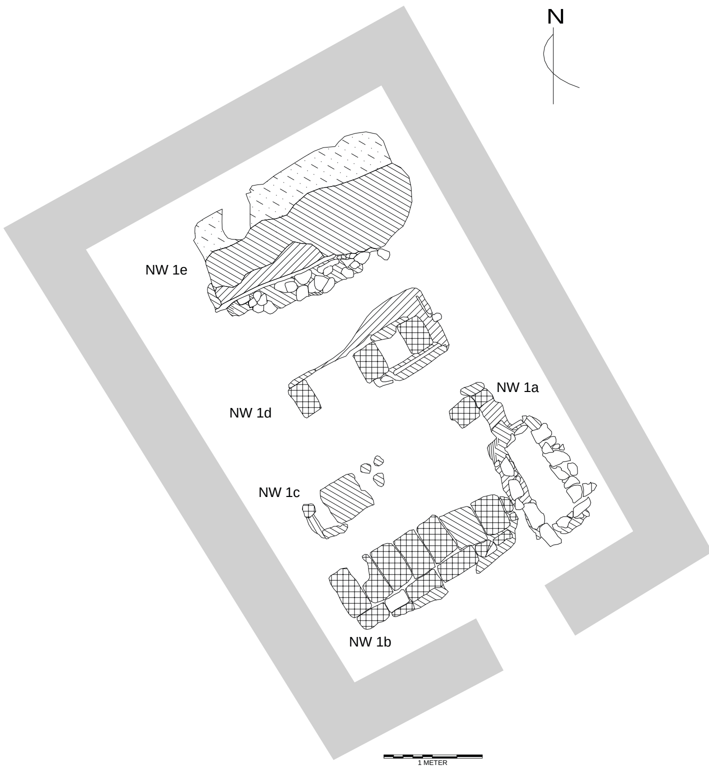
N-1; LC: none
Location: north of the Church.
Orientation: north-south.
Construction/tomb type: Hale Type III.
Associated Artifacts: none.
N: unknown, no bones present.

This is an isolated tomb that lies by itself in the field 35m north of the center of the nave of the Eastern Basilica, and 22m north of the precinct wall, at approximately N065E038. The apparent lack of surrounding archaeological features suggests that it occupied a solitary position in antiquity as well. Beneath a lid of flat stone slabs, one of which still remains in place, this tomb is of mixed stone and brick box construction. The floor is a row of Roman bricks, with the last one at the foot (the south end) now missing. The two side walls differ in construction. On the east, a row of irregular stone blocks is surmounted by two layers of bricks laid flat. On the west, a row of upright bricks and one stone slab is backed along its upper edge by a layer of bricks laid flat. At the head, only two small stones remain, and only one small slab remains at the foot.

3. Northwest Cemetery/*Cemitério ao pé das Ermidas*/Complex A

NW 1a-e; LC1–LC5
Location: The Mausoleum marks the northwest corner of the Northwest Cemetery.
Orientation: NW 1a: North-south. NW 1b – e: East-west.

Construction/tomb type: See individual grave descriptions below.
Associated Artifacts: none.
N: No bones recovered.



NW 1a, 1b, 1c, 1d, 1e

This large mausoleum (Figs 2.3 and 2.4) enclosing five graves lies 2m west of the long row of tombs that form the backbone of the Cemetery proper. The most impressive structure in this cemetery, it is rectangular in plan with a door opening to the south. The threshold of this door, a single stone block with circular socket and groove (possibly reused from the Roman villa), stands higher than any other part of the remains. The stone walls are as massive as those of the Church itself, being 50-60cm thick. Passing out through the door, one would have followed a path past the wall enclosing the Northwest Cemetery and, angling somewhat to the left, would arrive at the western end of the Church, some 25m away to the southeast.

A sample of brownish-yellowish mortar with fine aggregate was taken in one piece (TP. 036.2) from joints between the two upper layers of the interior of the east wall of the Mausoleum by Åsa Ringbom for radiocarbon analysis. The resulting calibrated date was 410-610 AD, placing this structure clearly in the early Christian era. It is unknown whether or not this structure was intended from the first to serve as a mausoleum or was instead constructed as a chapel or even a dwelling. Nor can the possibility be ruled out that when the five tombs were constructed, the house itself was no longer standing and its walls served merely as an enclosure for the tombs. This possibility receives some support from the awkward position of NW 1b, the most carefully constructed of the five, immediately within and athwart the threshold of the original door. On the other hand, it is not unusual for late Roman mausoleums to be entirely filled with tombs (Azkarate Garai-Olaun, 2001). The four larger graves (NW 1b–1e) are parallel and all oriented east-west, but the smallest grave (NW 1a) is oriented north-south. The floors of the four tombs descend like a series of steps from the south end of the building, with the floor of NW 1e lying a full meter below the threshold block.

NW 1e (LC 1): The northernmost of the tombs is separated from the others by a narrow wall of bedrock that forms the north side of NW 1c. Although fragmentary, the remains of NW 1e's southwest corner indicate that once the rectangular hole had been cut in the bedrock, plaster was used to level any rough spots, and then the entire tomb, floor, side walls, head, and foot, was sheathed with thin slabs of white marble (Hale Type VI). This marble is similar to that in the cross-shaped baptismal font. The careful workmanship and plastering seem almost to have aimed at creating another watertight container here in the mausoleum.

NW 1d (LC 2): This tomb is the twin of NW 1b, except that the wedge of brick fragments which expands the latter's east end is missing here. Only the first, third, and sixth bricks have survived *in situ*, the others probably having been removed by diggers who hoped these might be a lid rather than a floor. As with NW 1b, the rough spots in the underlying bedrock have been leveled with plaster. The bedrock outcrop to the north has been cut to form a perpendicular wall or wall support. On the south side at the head is a grooved piece of stone which must originally have held an upright tile or slab.

NW 1c (LC 3): Parallel to NW 1b and less than 40cm to the north is the plaster floor or sub-floor of another tomb. Nothing remains but this plaster flooring, which itself is not complete.

NW 1b (LC 4): Only the brick floor of this tomb survives, stretching across the south front of the mausoleum just inside the door. The east end (head) of the tomb abuts the mass of bedrock which supports NW 1a. Of the seven matched bricks which formed the main part of the floor, the second from the east has been removed, revealing the mass of fine white plaster in which the entire row was set. The customary widening toward the head of the tomb is achieved by the addition of a long narrow triangle of brick fragments added to the south side of the row. Nothing remains of the walls. A neat cut along the surviving mass of bedrock on the south side shows plainly where the upright bricks or stone slabs originally stood.

NW 1a (LC 5): This tomb, the smallest of the five, has a floor consisting of two Roman bricks laid end to end. The walls are built up of three irregular courses of tile and brick fragments set in plaster. A mass of bedrock left standing in the SE corner of the mausoleum serves as a pedestal to support this little tile-box tomb (Hale Type I). This tomb may have been constructed for an infant, although at least one other tomb of similar size (NW 14) yielded the partial skeleton of an adult male.

NW 2; LC 7; *Sepultura* 9

Location: the most northwesterly of the tombs contained within the wall.

Orientation: east-west.

Construction/tomb type: Hale Type II. A brick box tomb, with six bricks for the floor and upright bricks for the walls and east end. The west end is missing, and in one wall a small stone slab does duty for a brick.

Associated Artifacts: iron belt buckle, 1.TP.85; 4 ceramic sherds, TP.40.85.

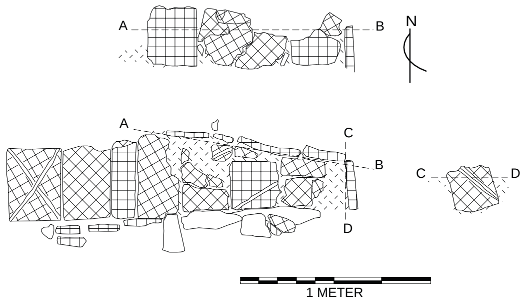
MNA skeletal inventory: none.

N: 4; two adult females (20-30, 30-40), adult male (50-60), infant (birth 0-1).

MNAE excavators in 1948 recovered the commingled incomplete remains from *Sepultura* 9 (MNA 2005.215) of three adults, plus a very young infant represented only by 2 carpals. The American excavators recovered a few more bone fragments from the adults. Two pairs of innominates show the broad sciatic notches, wide subpubic angle, and well-defined broad pre-auricular sulci indicative of female sex; the third pair is more fragmentary but the robusticity and narrow sulci indicate male sex. The male cranium showed complete endocranial obliteration of the coronal, sagittal, and lambdoid sutures, suggesting an age at death of at least 50 years. Age estimates for the two females were based on the appearance of the sacroiliac auricular surfaces.

All three adults were represented by relatively complete crania and mandibles. The assignment of post-cranial remains to the three adults was based on element size, robusticity, and degree of epiphyseal fusion. The older adult female was represented by the left and right scapulae, complete right humerus, pelvis, left femur, and the left and right tibia. The adult male's postcranial remains included a partial pelvis, complete right humerus, and the left and right femur and tibia. The younger female's pelvis, femora, and tibiae were fairly complete, but her other post-cranial bones were not present.

The adult male had suffered a fracture at midshaft of the right tibia; this trauma had evidently occurred a considerable time before his death, because the fracture callus is well remodeled with no evidence of prolonged infection (chronic osteomyelitis). The two halves of the shaft show minimal misalignment, and comparison with the non-pathological left tibia indicates that there was almost no reduction in length of the injured bone. The fibulae are missing.



NW 2

<u>NW 3; LC 12; *Sepultura* 6</u>

Location: south of NW 11, on the west edge of the walled cemetery enclosure.

Orientation: east-west.

Construction/tomb type: Hale Type IV, granite slab. NW 3 shares a common inner wall with NW 4, but is missing most of its floor and the west half of its north wall. What remains of the floor is of flat slabs and bricks set in a generous amount of mortar, and the walls are massive granite slabs (from the villa?). The headstone at the western end was not found, and it is possible that the enclosure wall formed the west end wall of this tomb.

Associated Artifacts: ceramics (MNA 2412.1).

MNA skeletal inventory: 2007.63.

N: 1; adult female (30-40).

The incomplete remains of one adult were recovered by MNAE excavations in 1948. The cranium is missing, but the mandible is partially complete. Postcranial remains include the left clavicle, a partial pelvis, the large long bones of the upper and lower limbs, a few rib fragments, and three hand bones. The gracility of the mandible and the long bones and the distinctive characteristics of the pelvis (broad sciatic notches, wide subpubic angle, and marked preauricular sulci) indicated female sex. The sacroiliac auricular surfaces were scored as phase III or early IV, suggesting an age at death between 30 and 40 years. No additional human remains were recovered by the American excavators, and no skeletal pathology was noted.

<u>NW 4; LC 13; *Sepultura* 5</u>

Location: south of NW 2, on the west edge of the walled cemetery enclosure.

Orientation: east-west.

Construction/tomb type: Hale Type IV, stone block. This tomb shares a common inner wall with NW 3, but it still has its floor intact with concrete sealing the corners. The walls are massive granite slabs (from the villa?), one of which is elaborately shaped with long raised rectangles standing in relief above the flat edges of the three visible sides. The headstone at the western end was not found, and it is possible that the enclosure wall formed the west end wall of this tomb.

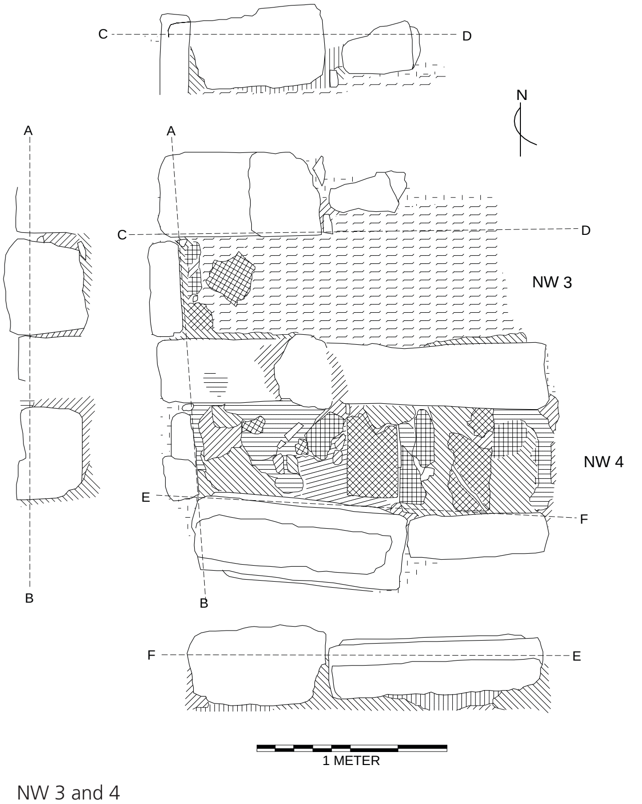
Associated Artifacts: none.

MNA skeletal inventory: 2005.212.

N: 1; adult male, 40-50 years.

The incomplete skeleton of an adult male aged 40-50 years at death was recovered by MNAE excavators in 1948. The cranium was missing, but the mandible is present, along with the major long bones, a few rib fragments and vertebrae, and several hand and foot bones. Because the pelvis was missing, the sex estimate was based on post-cranial metric data (robust long bones, humerus head diameter 48mm, and femur head diameter 48mm). Estimation of age was based on skeletal maturity and moderate vertebral osteophytosis (T12, L1 and 3) and osteoarthritis (lipping of the glenoid fossa).

One right rib fragment bears a small well-healed fracture callus just proximal to the curve of its body. The right and left tibiae and fibulae show marked inflammatory pathology. The entire diaphysis of the right tibia is grossly enlarged in its transverse dimension; the mixture of well-remodeled (sclerotic) and poorly-remodeled bone of the cortex indicates a long-standing inflammatory process still active to some degree around the time of death. A large oval lesion (103mm in length) with clearly-defined roughened margins occupies the center 1/3 of the shaft's anterior aspect, and a broad shallow vascular groove runs across the posterior aspect just superior to the midpoint of the oval lesion on the opposite aspect. The entire shaft of the right fibula shows the same mixture of sclerotic and actively-remodeling cortex, with significant transverse expansion. The left tibia and fibula shafts show less transverse distortion, with actively remodeling cortex most evident along the central third of the lateral aspect of the left tibia, in the same anatomical region as the oval lesion on the right tibia. A break in the left fibula metaphysis reveals the original bone cortex enveloped in a layer of new bone around its complete circumference. No additional human remains were recovered by the American excavators.



NW 3 and 4

<u>NW 5; LC 16; *Sepultura* 3</u>

Location: south of tombs NW 3, NW 4, and NW 33 in the row of tombs with west ends formed by the cemetery enclosure wall.

Orientation: east-west.

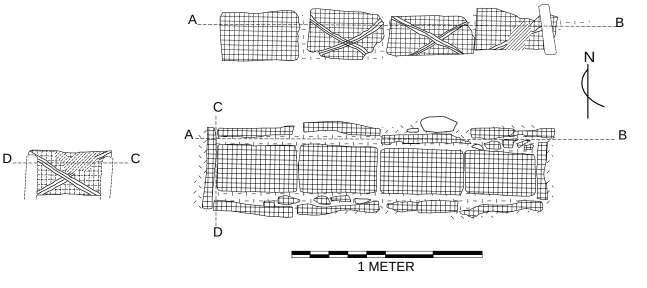
Construction/tomb type: Hale Type II, brick box. A brick-box tomb with four bricks for the floor, four upright bricks for each side wall, and one upright brick at the head and foot. The tomb widens at the east end, and brick chips were inserted to make up for the additional width.

Associated Artifacts: none.

MNA skeletal inventory: 2005.209.

N: 3; adult female (30-40), adult (?), infant (1-2).

The human remains recovered in the earlier excavations represent two individuals: the mostly complete skeleton of a female aged 30-40 years (probably early 30s) and the left humerus and both femurs (shafts only) of an infant 1-2 years old. While cleaning this tomb in 1985, the American excavators recovered fragmentary cremated remains of an adult (fragments of the parietals and occipital, humerus, femur, and other long bones, 1 carpal phalanx, 1 rib); these do not match the remains of the adult recovered in 1948. No skeletal pathology was noted.



NW 5

<u>NW 6; LC 17; *Sepultura* 1</u>

Location: the southernmost tomb in the row lying against the west enclosure wall of the cemetery. It is also the lowest of these tombs, suggesting a ground surface in antiquity which sloped from north to south.

Orientation: east-west.

Construction/tomb type: Hale Type I, brick wall. This is a brick-wall tomb with walls built up of four courses of bricks laid flat, capped by a top course of small flat slabs or additional bricks. The floor, like that of NW 5, consists of four bricks with fragments to fill out the extra width.

Associated Artifacts: none.

MNA skeletal inventory: 2005.205.

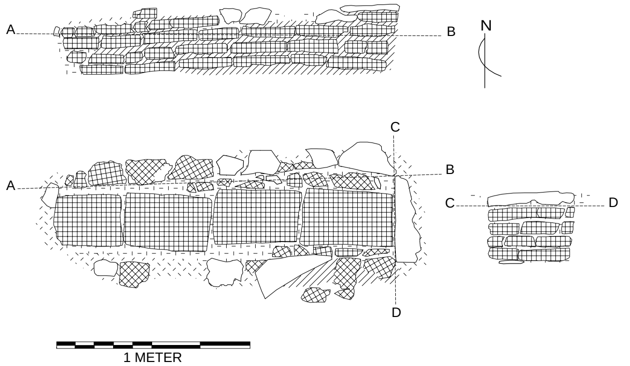
N: 6; 3 adult females (30-40, A, A), 2 adult males, 1 adult (?).

In the drawing of *Sepultura* 1 on MNA Plan 6 its occupants include one extended skeleton of adult size, with a mass of commingled long bones and at least two skulls piled over its lower legs and feet. And indeed, the commingled remains of 6 adults (represented by 6 crania and many postcranial elements) ranging in age from 20-30 to 50-60 are boxed at MNA as coming from this *Sepultura*.

In 1985, American excavators recovered the partial remains of two adults from this tomb, including fragments of cranium, teeth (molars with heavy wear), vertebrae, ribs, humerus, ulna, radius, pelvis, femur, tibia, and hand and foot bones. One adult female (humerus head diameter 38.5mm, femur head diameter 40.0mm), aged probably 30-40 at death (SIA surface phases III-IV), and one male (a large, robust distal right tibia) were represented. These elements complement the inventory of the remains recovered by the MNAE archaeologists and match them for bone color and texture. They suggest these bones belong to the 6 adults noted above. Two calcined fragments of bone from this tomb match the cremated remains in NW 5, and may have originated there.

Cranial pathology was rare: the endocranial surface of the frontal of one female bore 3 large pits with rounded margins, ranging in size from 2.5mm to 9.7mm in diameter; the long axes of the pits all showed a superior-inferior orientation. The other female frontal showed a few small remodeled foramina on the superior-lateral walls of both orbits, but no plaques or obvious expansion in the region.

One almost complete spine (17 vertebrae) showed four small Schmorl's nodes (T7, T8, L1, L2) and initial osteophytosis in the lumbar region. The central 1/3 of the shafts of both tibiae of one female show patches of subperiosteal new bone (well-remodeled, with few striations visible) on the medial and lateral aspects.



NW 6

NW 7; LC 20

Location: the western tomb of a pair (NW 8 is the other) lying south of the row of tombs encompassed by the cemetery enclosing wall.

Orientation: north-south.

Construction/tomb type: Hale Type V, stone kerbs. The walls are made of rows of small, rather irregular stone slabs and the floor is bedrock. The north headstone is lacking.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 2; adult, child 2-3.

No human remains are associated with the original MNAE excavation of this tomb. The American excavators recovered only one deciduous incisor and a fragment from an adult long bone shaft.

NW 8; LC 21

Location: the eastern tomb of a pair (with NW 7).

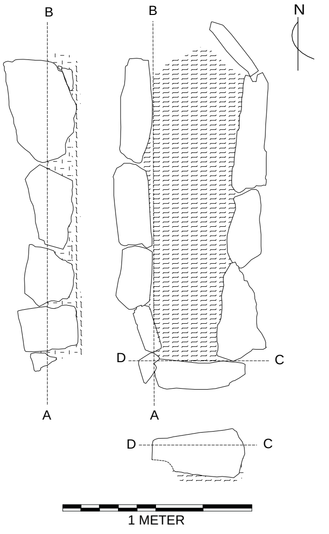
Orientation: north-south.

Construction/tomb type: Hale Type I, brick wall. A flat cut face of bedrock forms the north end of the tomb and an upright brick or tile forms the south end. The east wall consists of three to four courses of bricks laid in mortar. In the west wall the layers of bricks in the northern third give way to crudely cut bedrock.

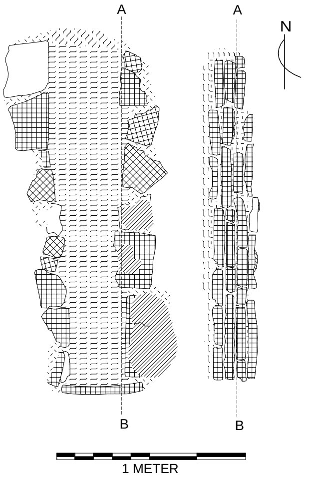
Associated Artifacts: none.

MNA skeletal inventory: none.
N: unknown, no bones recovered.

The original MNAE excavation plan depicts a single extended skeleton in this tomb, but no *Sepultura* number was assigned to it and no human remains at MNA were associated with this tomb. The American excavators recovered only a few small fragments of human bone; their presence was noted in the field but not kept.



NW 7



NW 8

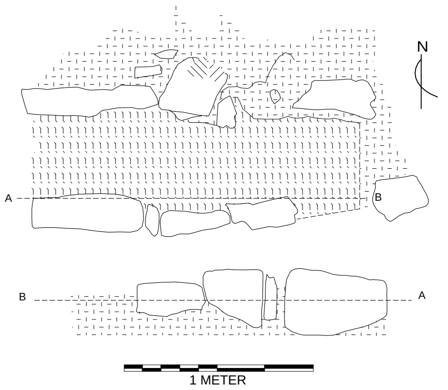
<u>NW 9; LC 19; *Sepultura* 2</u>

Location: the central tomb on the south side of the principal tomb cluster defined by the enclosing wall.

Orientation: east-west.

Construction/tomb type: Hale Type V, stone kerbs. Very little of this tomb has survived. There was no head or foot. The floor was of bedrock, and the walls consisted of two rows of small irregular slabs.

Associated Artifacts: none.



NW 9

MNA skeletal inventory: 2005.208.
N: 3; 2 adult females, 1 adult male (40-50).

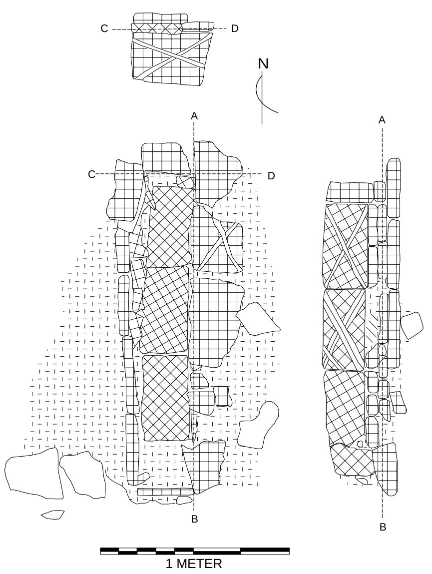
MNAE excavators recovered human remains representing three adults: 1 adult male (skull, pelvis, femora), 1 adult female (pelvis, femora), and a second adult female. The male was aged 40-50 years (based on fusion of skull sutures and pelvic features), and one female was aged in her early 50s (SIA, osteoporotic bones). No additional human remains were recovered by the American excavators. No pathology was observed.

NW 10, TP.5.85; LC 18; *Sepultura* 4

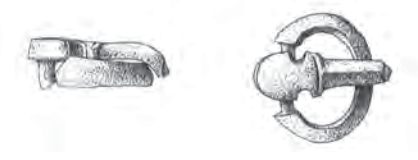
Location: the middle of the south half of the main tomb cluster, north of NW 9.
Orientation: north-south.
Construction/tomb type: Hale Types I/II. This tomb shows a combination of brick-box and brick-wall techniques, with lower walls of upright bricks capped by three courses of bricks laid flat. The floor consists of three large bricks (possibly originally four) with chips added on northern two-thirds of west wall.
Associated Artifacts: Bronze belt buckle, 2.TP.85; 1 ceramic vessel rim, TP.5.85
MNA skeletal inventory: 2005.210.
N: 2; adult female (30+), adult male (40-50).

The remains recovered by MNAE excavators in 1948 represent the mostly complete skeleton of a male aged 40-50 years (based on cranial suture closure) and six long bones from another adult 30+ years, probably female. The cranium shows both male and female morphological features but matches in color and texture the male postcranial skeleton. The left and right ulnae that do not belong to the male are of unequal length, and the longer, left ulna may represent a third adult. Skeletal pathology was minimal: several small Schmorl's nodes on the lower thoracic (T8-T12) and lumbar (L3-5) vertebrae.

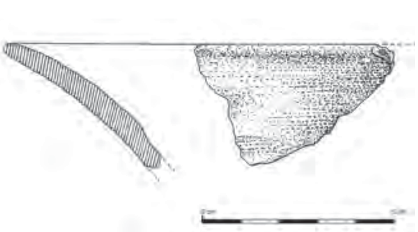
The American excavations recovered additional human remains (a left clavicle, several hand and foot bones, the upper cervical vertebrae, and a few rib fragments). These most likely belong to the male skeleton, as they complement (but do not duplicate) the bones that were assigned to that skeleton during laboratory analysis in 2007.



NW 10



2.TP.85



NW 10 TP.5.85

NW 11; LC 14; *Sepultura* 7

Location: east of tombs NW 3 and NW 4 in the center of the cemetery cluster. NW 11 apparently forms a pair with NW 4 immediately to the north.

Orientation: east-west.

Construction/tomb type: Hale Type III, stone block w/stone cap. This is an elaborate and well-made tomb. The most striking feature was a tremendous lid of stone covering the central portion of the tomb cavity (approx. 1.65m x 1.00m). This irregular slab is the only available example of the original type of capping for the tombs in the Northwest Cemetery. The walls are moderate-sized slabs of dressed stone laid on edge. The central slab in the north wall is an old threshold with door socket, presumably from the villa. The slabs in the north wall did not quite suffice to reach the east end and two upright bricks were inserted sideways to fill the gap. The stone slab walls are capped with one to three courses of small slabs and a few bricks. The floor is of mortar over a slab or bedrock base.

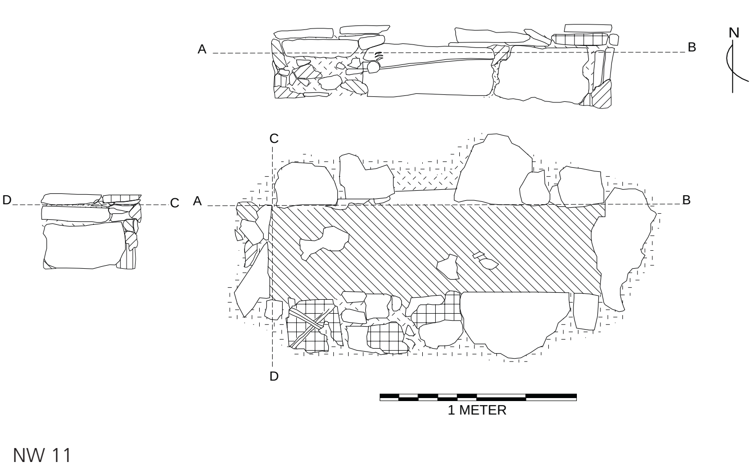
Associated Artifacts: 11 ceramic sherds (including 2 rims, 1 fragment with graffiti), TP.6.85.

MNA skeletal inventory: 2005.213.

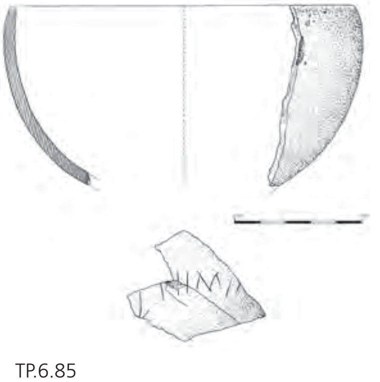
N: 3; two adult females (40-50 and 20-25) and one adult male (40-50).

The remains of three adults were recovered by MNAE excavators: a male aged 40-50 years, a female aged 40-50 years, and a second female aged 20-25 years. The skeletons of the older male and the female are almost complete, but the younger female is represented only by a fragmentary left innominate, several thoracic and lumbar vertebrae with newly-fused rings, and a few hand and foot bones.

The older adults, predictably, showed extensive spinal osteophytosis and initial arthritic involvement of several of the larger limb joints. The fragment of the anterior iliac crest of the younger adult male bears three small contiguous oval lytic lesions on its medial (visceral) aspect, with pitted and remodeled cortex within the depressed lesions. The lateral aspect is not affected, nor is any cortex outside the clearly demarcated lesion margins. The proximal shafts of the older female's left and right tibiae show a marked medial curvature (towards the midline of the body), but the central shafts are not bowed. On the right tibia, the popliteal line is very strongly developed and extends inferiorly to midshaft, and the distal shaft of the left tibia bears several small bony nodules just superior to the fibula distal articular facet; these modifications may reflect a slightly abnormal gait due to the proximal curvature. The iliac crest of the fragmentary left innominate belonging to the younger female bears 3 remodeled lytic lesions, possibly indicative of tuberculosis or brucellosis. The American excavators recovered several long bones and additional fragments.



NW 11



TP.6.85

NW 12; LC 10; *Sepultura* 8

Location: between NW 2 and NW 11 in the north central section of the main cemetery cluster.

Orientation: east-west.

Construction/tomb type: Hale Type III, stone block w/brick cap. This tomb is the twin of NW 11 with regard to wall construction (dressed stone slabs on edge) but with more bricks used in the courses above the stones. The floor is bedrock leveled with brick rubble in the low spots.

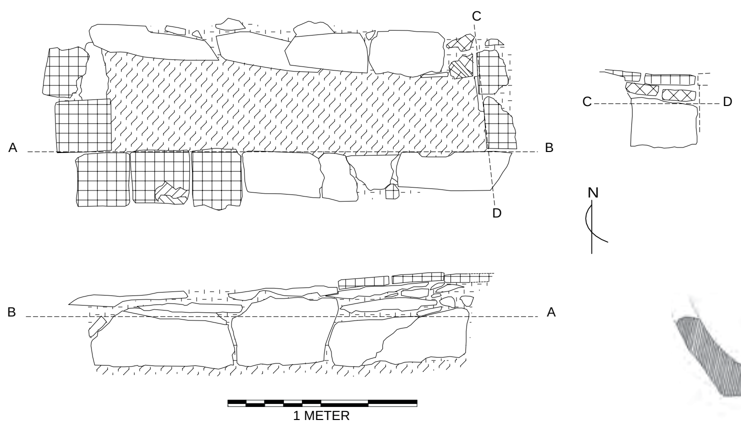
Associated Artifacts: 7 ceramic sherds, TP.41.85.

MNA skeletal inventory: 2005.214.

N: 6; adult female (20-30), adult male (50+), adolescent (17-19), 2 juveniles (6-7, 7-8), 1 child (3-4).

MNAE excavators recovered the remains of 6 individuals: the almost complete skeleton of an adult male aged 50+ years, a small number of long bones that represent a female aged 20-25 years, and four subadults: an adolescent 17-20 years, one juvenile aged 6-7 years, another aged 7-8 years, and a younger child aged 3-4 years at death. The two juveniles are both represented by crania, mandibles, and fairly complete post-cranial elements (except for several missing vertebrae and hand and foot bones), while the young child was identified only by the shafts of the left femur and right tibia, and the adolescent only by a fibula shaft with the epiphyses unfused. The American excavations recovered a small number of incomplete human bones that evidently belong to the older male, the young adult female, and the young child.

The elderly male shows advanced spinal osteophytosis and osteoarthritic involvement of several of the larger limb joints; his pelvis and femora bear the skeletal modifications characteristically associated with "horse-riding syndrome." In the cranium of the younger juvenile, small plaques of remodeled new bone are visible on the medial roofs of both orbits, with scattered small pits.



NW 12

NW 12 TP.41.85

NW 13; LC 8

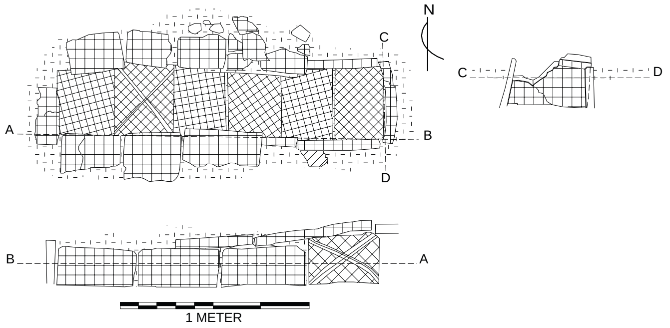
Location: northeastern tomb within the enclosure wall.

Orientation: east-west.

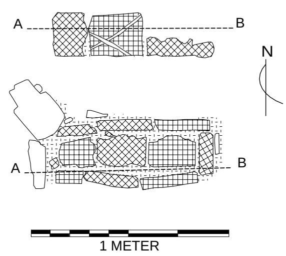
Construction/tomb type: Hale Type II, brick box. The most well-made and well-preserved of the brick-box tombs, with six large bricks forming the floor, four upright bricks in each wall, and one upright brick at head and at foot. The walls and ends are capped with two courses of bricks laid flat.

Associated Artifacts: 6 ceramic sherds, TP.7.85.
MNA skeletal inventory: none.
N: 3; adult female (20-30), adult male (40-50), child (6-7).

No human remains were cataloged by MNAE excavators for this tomb. The American excavators recovered bones representing two adults (a male aged at least 40-50 years and a younger adult, a female aged 20-30) and one young child (6-7 years) with adult mandibular first molars.



NW 13



NW 14

<u>NW 14; LC 11; *Sepultura* 10</u>

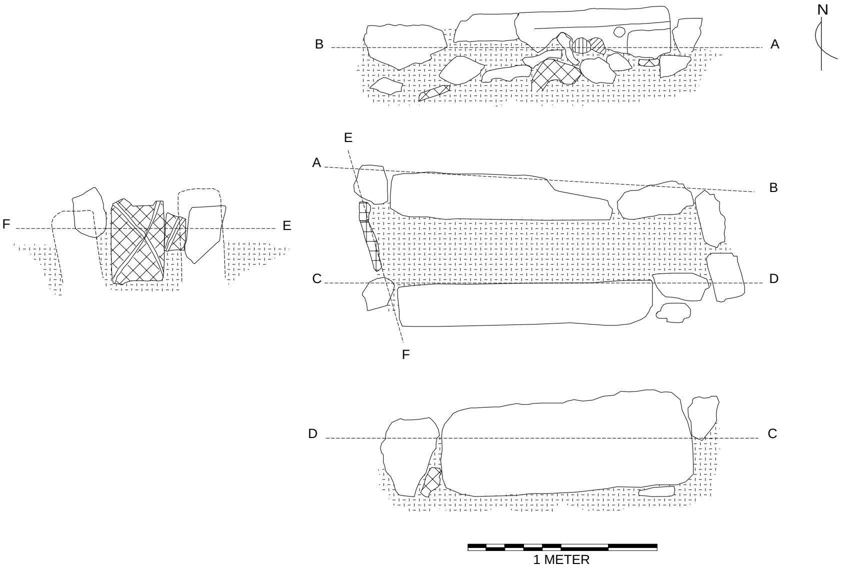
Location: just south of NW 13 on the east edge of the cluster of tombs defined by the cemetery enclosure wall.
Orientation: east-west.
Construction/tomb type: Hale Type II, brick box. The tomb has a floor consisting of three brick fragments and walls of bricks set on edge. A small stone slab forms the west headstone.
Associated Artifacts: none.
MNA skeletal inventory: 2005.216.
N: 1; adult male (50+).

This tomb contained the bones of a male of advanced age (50+ years) represented by a partial cranium and several vertebrae, fragmented ribs, and hand and foot bones. Both thoracic and lumbar vertebrae show extensive osteophytosis and two Schmorl's nodes, and the last lumbar vertebra is fused to the first sacral element. American excavators recovered no additional remains.

<u>NW 15; LC 25</u>

Location: the central tomb in the loosely organized eastern row of the central cluster defined by the cemetery enclosure wall. It lies south of NW 14.
Orientation: east-west.
Construction/tomb type: Hale Type IV, granite slab. This is a crude but monumental stone slab tomb with both north and south walls composed of single large rectangular granite slabs for over half their lengths (presumably reused from the Roman villa). The north wall slab is an old threshold, with the door socket and groove turned outward. Walls are extended with much smaller slabs at the east end. The west head of the grave is one upright brick flanked by small stones. The east foot is closed off with two slabs.
Associated Artifacts: 1 ceramic sherd, TP.8.85.
MNA skeletal inventory: none.
N: 1; adult.

No human remains were cataloged by MNAE excavators for this tomb. The American excavators recovered fragments of one adult skeleton: the distal right femur, left fibula, and three tarsals. No skeletal pathology was evident.



NW 15 TP.8.85

NW 15

NW 16; LC 24

Location: south of NW 15.

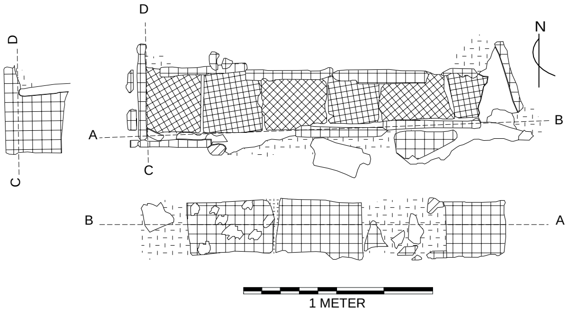
Orientation: east-west.

Construction/tomb type: Hale Type II, brick box. It is a brick-box tomb much like NW 13 but neither so well made nor so well preserved. Six bricks form the floor. Walls consist of four upright bricks on each side, with single bricks at head and foot. There may have originally been a cap of bricks laid flat. A brick in the south wall was impressed with the tracks of a sheep or goat while the clay was still wet.

Associated Artifacts: 1 ceramic sherd, TP.42.85.

MNA skeletal inventory: none.

N: 3; adult male (50-60), adult female (?), infant.



NW 16

No human remains were cataloged by MNAE excavators for this tomb and it does not appear on MNAE Plan 6. The American excavators recovered fragments of one adult male represented by a cranium (with very worn teeth) and mandible, and portions of scapula, humerus, radius, ulna, femur, and a few hand and foot bones. A second, smaller adult (possibly a female) was identified from postcranial fragments that did not belong to the larger adult. One partial fibula shaft from a young infant was also found. No skeletal pathology was evident.

NW 17; LC 22

Location: This tomb lies in the southeast corner of main square cluster of tombs.

Orientation: east-west.

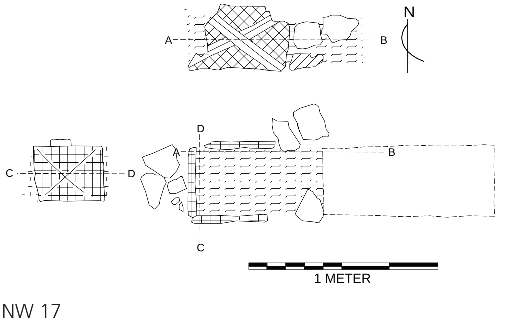
Construction/tomb type: Hale Type II, brick box. A fragmentary tomb represented by head section only, or perhaps originally intended solely as a repository for a skull and a few bones. The tomb presently consists of nothing more than three bricks forming the headstone and the north and south walls. The floor is bedrock.

Associated Artifacts: 10 ceramic sherds (8 from one vessel), TP.9.85; 1 brick fragment.

MNA skeletal inventory: none.

N: 1; adult male (30-40).

This sepulture appears on the MNA plan (fig. 2.3) with bones drawn in; however, no human remains were cataloged by MNAE excavators. The American excavators recovered a partly complete cranium and incomplete, fragmentary post-cranial remains of an adult. The absence of fusion of the major cranial sutures indicates an age younger than 40 years (probably 30-35) at death, and the skeletal robusticity suggests a male. The endocranial surface of the frontal bone displays several clusters of deep pits in the inner table; these resemble Pacchonian pits in appearance but their location on the frontal is unusual. The left parietal endocranial surface shows several pits parallel to the sagittal suture, and the sagittal sulcus turns sharply (90°) to the left, appears unusually narrow, and is truncated. The transverse sulcus on the right side also appears poorly defined and truncated. The nasal bridge is visibly depressed at nasion, and the nasal root projects sharply forward.



NW 17

NW 18; LC 26; *Sepultura* 11

Location: west of the modern dirt road and east of the main cemetery cluster.

Orientation: almost true E-W. It appears markedly skewed relative to the other "E-W" oriented tombs (which imitate the Church in being oriented NE/SW).

Construction/tomb type: Hale Type IV, stone block w/brick cap. This is a rather hybrid tomb, combining features of brick-box, stone-box, and brick wall construction. Its most notable features were a pair of bronze earrings found at the east end and a double floor of two layers of tiles and bricks. The east head and west foot of the tomb are both composed of single upright bricks.

Bricks appear again in the south wall where they are laid in irregular courses along with flat slabs of stone. The north wall, however, is of pure stone construction, with small blocks and slabs, some of them dressed, set in a neat row. The floor visible after initial cleaning consisted of four large tiles with a narrow row of broken tile fragments filling the gap at the base of the north wall. It was audibly apparent that the space under these tiles was hollow. The tiles were lifted in the hope that burial would be found sealed beneath them, but the hollow space was formed by the raised edges of the upper tiles themselves, which had originally formed part of a sloping Roman roof. These raised edges rested on a second lower layer of bricks, thus creating a space c. 3cm in height. Portions of the lower brick floor were lifted to see if yet another cavity was concealed, but this investigation revealed nothing more than bedrock and some mortar, apparently added for leveling.

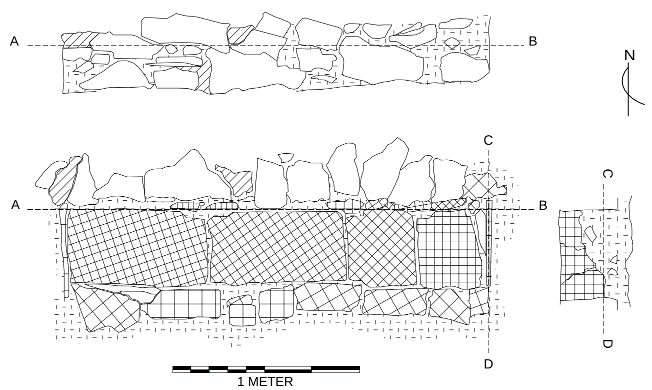
Associated Artifacts: a pair of bronze earrings, 3.TP.85;, 3 ceramic sherds, TP.10.85.

MNA skeletal inventory: 2005.217.

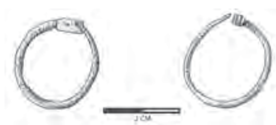
N: 2; adult male (40-50), juvenile (10 years ± 30 months).

MNAE excavators recovered the partial remains of one adult and one juvenile from this *sepultura*. Further excavation by the American excavators discovered additional human remains, belonging to these same two individuals. The robusticity of the adult bones suggests a male, probably aged +40 years at death, indicated by moderate arthritic changes (initial lipping) at both elbow joints. In the adult maxilla, the right canine is rotated 90° medially, lodged at a right angle to its proper line of eruption, with the crown visible lying across the base of the tooth socket. Also notable are the fused sesamoid bones in the adult's first metatarsals.

The juvenile is represented by a nearly complete cranium, right mandible, left and right ilia (unfused to the two other element of the innominates), and the long bones of the upper and lower limbs. In the mandible, the deciduous molars are being displaced by the permanent premolars (10 years ± 30 months).



NW 18



3.TP.85

<u>NW 19; LC 27; *Sepultura* 27</u>

Location: east of NW 18 and west of the modern dirt road and the low wall of backdirt from the MNAE excavations.

Orientation: east-west.

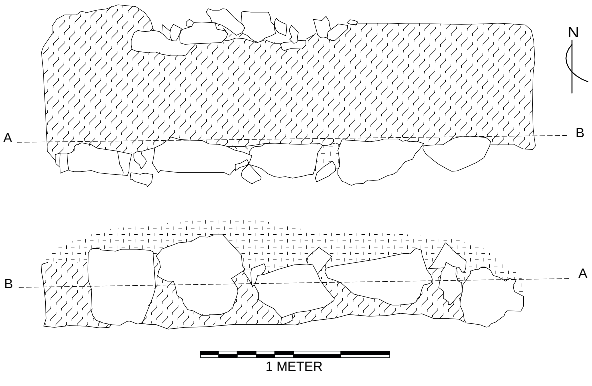
Construction/tomb type: Hale Type V, stone kerbs. A crudely constructed tomb lacking head and foot and with walls of single rows of stone blocks. The floor is of bedrock. The presence of five iron nails in the corners of the tomb suggest that the simple stone walls originally enclosed a wooden coffin.

Associated Artifacts: five iron nails: two in the northeast corner, two in the southeast corner, and one in the southwest corner, 4.TP.85.

MNA skeletal inventory: 2005.424.
N: 1; adult male (40+)

Several ceramic vessels (*pratos*) from this sepulture are curated at MNA but no human remains.

The American excavators recovered one cranial vault fragment and parts of the right humerus and both femora, tibiae, and fibulae from a mature adult (40+), probably a male. The robust development of the humerus and activity-related modifications to the femora suggest "horse-riding syndrome".



NW 19

4.TP.85

NW 20; LC 28

Location: just west of the old backdirt wall and the modern dirt road on the east side of this cemetery.

Orientation: southwest-northeast.

Construction/tomb type: Hale Type VIII, destroyed. This tomb is now represented only by an oblong depression. Hale reported that, according to Elias Peixe, a fieldworker from the 1948 crew, this tomb and others like it were destroyed when over-zealous diggers uprooted the stones and tiles of the tomb along with their contents. In addition, Hale noted that most of the "destroyed" tombs are those lying nearest the modern road where they would have been most accessible to those seeking building materials.

Associated Artifacts: none.

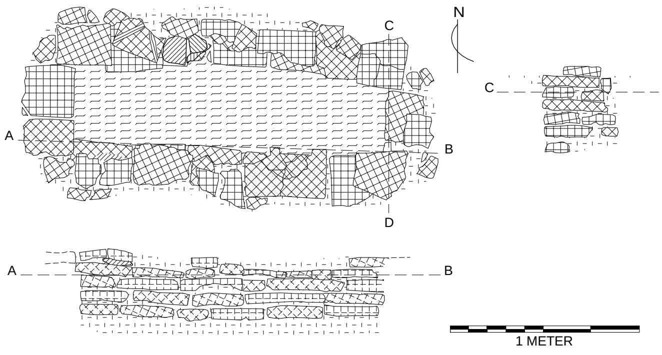
MNA skeletal inventory: none.

N: unknown

No human remains were recovered from this tomb.

NW 21; LC 30

No human remains were cataloged by MNAE excavators for this tomb and it does not appear on any MNA plan. The American excavators recovered the incomplete remains of one robust mature male, including fragments of mandible, vertebrae, scapula, humerus, pelvis, femur, and a few hand and foot bones. This individual was probably aged 60+ years at death, judging from the advanced breakdown of the sacroiliac auricular surfaces, extensive osteophytosis of the vertebrae, bony nodules and lipping on the femur head, extensive antemortem tooth loss in the mandible with resorption of sockets, and heavy wear on the molars. No skeletal pathology was noted other than these age-related changes. An iron nail (5.TP.85) was recovered by UL excavators.



NW 21

5.TP.85

NW 21 TP.13.85

NW 22; LC 32

Location: north NW 21 in the irregular row of tombs formed by (north to south) NW 23, NW 24, NW 25, NW 22, NW 21, and NW 19.

Orientation: east-west.

Construction/tomb type: Hale Type VIII, destroyed. The shallow depression at this spot was pointed out by Elias Peixe as the site of a tomb which was obliterated during the 1948 excavations.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: unknown.

No human remains were recovered from this tomb.

NW 23; LC 37

Location: northeast of the enclosing wall, at the northern edge of the excavated area.

Orientation: east-west.

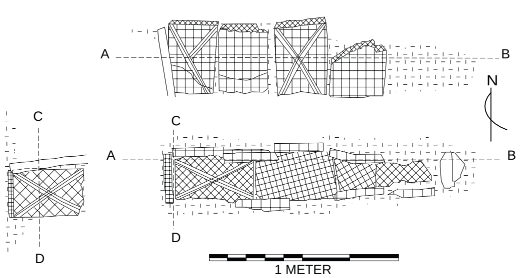
Construction/tomb type: Hale Type II, brick box. It is a brick-box tomb, with a floor consisting of four bricks, and both walls of upright bricks. The east end is closed off with a small stone slab, the west end with another upright brick. Imprinted on the surface of the westernmost floor brick is the footprint of a small child.

Associated Artifacts: TP.14.85, 17 pottery sherds including a small rim and 7 fragments (including a base) of one amphora (perhaps a grave marker?).

MNA skeletal inventory: none.

N: unknown.

No human remains were recovered from this tomb.



NW 23

NW 23 TP.14.85

NW 24 and NW 25; LC 33 and LC 34

LOCATION: These two tombs are badly destroyed and now represented only by depressions in the earth.

ORIENTATION: east-west.

CONSTRUCTION/TOMB TYPE: Hale Type VIII, destroyed. The only surviving trace of NW 25 beyond an oblong east-west cavity was a layer of black carbonized earth 8cm thick resting directly on the bedrock. Although much blacker and more friable than ordinary humus, this soil lacked the greasy consistency and staining power of old charcoal.

ASSOCIATED ARTIFACTS: none.

MNA SKELETAL INVENTORY: none.

N: unknown.

No human remains were recovered from these tombs.

NW 26; LC 38

LOCATION: on the northern edge of excavated area, east of and in line with NW 23.

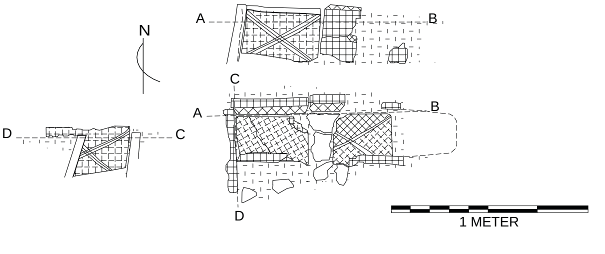
ORIENTATION: east-west.

CONSTRUCTION/TOMB TYPE: Hale Type II, brick box. It is a brick-box tomb, but one which is only half the normal length. It may have originally been the tomb of a child, or it may have lost its eastern end to subsequent builders in need of bricks. Two bricks comprise the floor. The west end and both walls are formed of upright bricks. The east foot is entirely lacking.

ASSOCIATED ARTIFACTS: none.

MNA SKELETAL INVENTORY: none.

N: unknown.



Tomb NW 26

NW 27; LC 35

LOCATION: south of NW 26 in the northeastern sector of the cemetery.

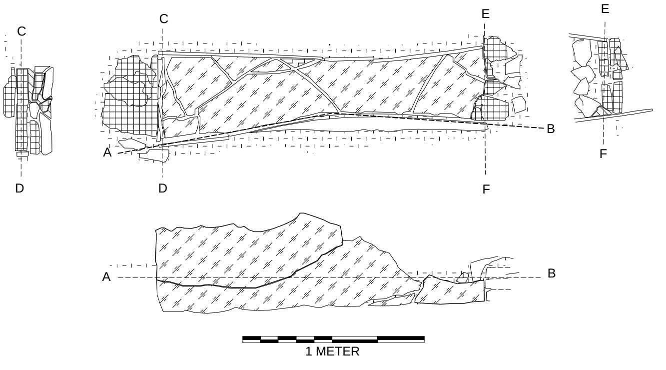
ORIENTATION: east-west.

CONSTRUCTION/TOMB TYPE: Hale Type VI, marble slabs. It is a most elaborate tomb, sharing with the large mausoleum tomb NW 1 the distinction of having its walls sheathed with marble. Before cleaning, the only visible part of NW 35 was a jagged and broken sheet of marble rising out of the ground at what was later found to be the south side of the tomb. The north wall and the floor of the tomb were also single slabs of marble, now fragmentary. Although the marble slabs of tomb NW 1 in the mausoleum were backed with a supporting wall of stone and mortar, the slab walls of this tomb seem to have been laid directly against the earthen sides of the freshly dug grave. The east and west ends are closed off with single rows of small stone blocks, topped by three courses of Roman bricks laid flat.

ASSOCIATED ARTIFACTS: none.

MNA skeletal inventory: none.
N: unknown.

The American excavators recovered only a very small collection of human bone fragments from the east end of the tomb. They were noted in the field but not curated.



NW 27

NW 28; LC 29

Location: a pit east of the main central tomb complex surrounded by (clockwise from the north) tombs NW 29, NW 21, NW 18, and NW 14.

Orientation: east-west.

Construction/tomb type: Hale Type VIII, destroyed. A rubble-filled pit typical of the depressions pointed out by former MNAE excavation team members as having been the sites of tombs destroyed in 1948.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: unknown.

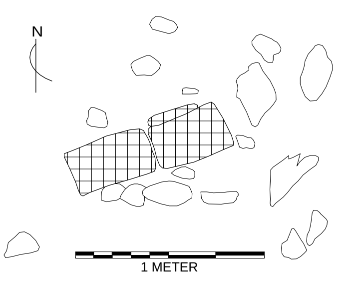
No human remains were recovered from this tomb.

NW 29; LC 31

Location: outside the main central tomb cluster, approximately 3m east of tombs NW 13 and NW 14.

Orientation: east-west.

Construction/tomb type: Hale Type II, brick box. A very small tomb, of which only the two floor bricks survive along with fragments of small stones which either composed part of the walls or served as the foundation for the more customary upright bricks.



NW 29

Associated Artifacts: 5 ceramic sherds, TP.16.85.
MNA skeletal inventory: none.
N: unknown.

No human remains were recovered from this tomb.

NW 30; LC 36

Location: northwest of NW Tomb 23 at the northern extremity of the excavated area.
Orientation: east-west.
Construction/tomb type: Hale Type VIII, destroyed. A shallow depression marks the site of the old tomb.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No human remains were recovered from this tomb.

NW 31; LC 40

Location: southeast of NW 27 and adjacent to the old backdirt wall and the modern dirt road.
Orientation: east-west
Construction/tomb type: Hale Type VIII, destroyed. Only a shallow depression in the ground remains.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No human remains were recovered from this tomb.

NW 32; LC 39

Location: east of NW 27 and adjacent to the old backdirt wall and the modern dirt road.
Orientation: east-west.
Construction/tomb type: Hale Type VIII, destroyed. Only a shallow depression in the ground remains.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No human remains were recovered from this tomb.

NW 33, TP 17/85; LC 15

Location: Between tombs NW 4 and NW 5 in the line of tombs abutting the west boundary wall of the central cemetery cluster.
Orientation: unknown.
Construction/tomb type: Hale Type VIII, destroyed.
Associated Artifacts: In the SW corner, probably from the boundary wall: TP.17.85, 23 pottery fragments (many of them join together), including 5 rims and 1 base.
MNA skeletal inventory: none.
N: unknown, no bones recovered.

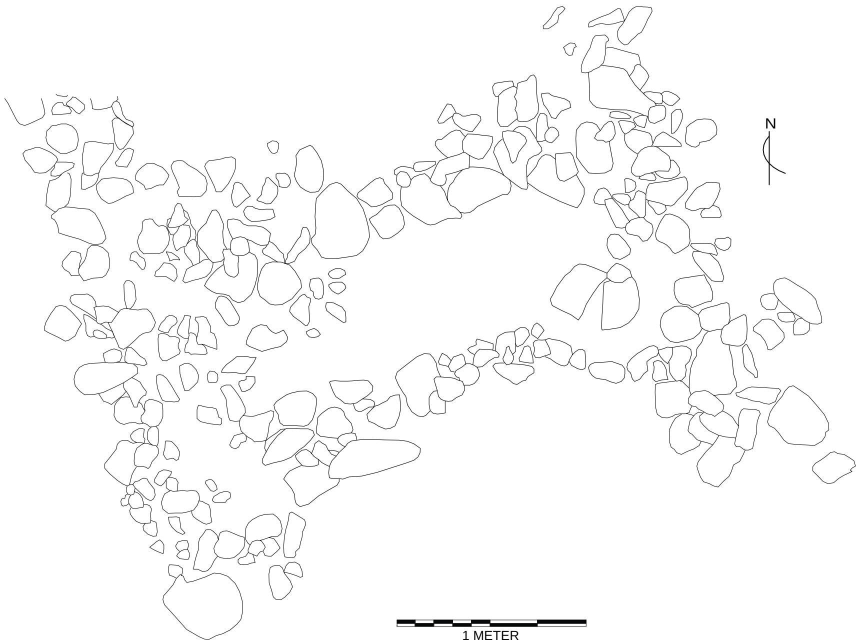
An oblong area of tomb-size dimensions is defined by the following features:

1) on the west, the stones of the cemetery boundary wall;

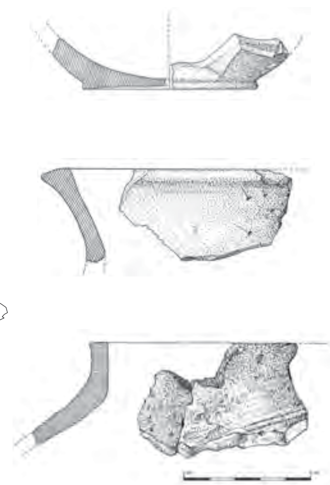
2) on the north, an irregular row of stones, which for at least its eastern two-thirds is clearly the wall of something;

3) on the south, a less well-organized row or extended pile of stones which may or may not be of the same date; and

4) on the east, by a curving row of stones which joins the two long walls and gives the east end of the "tomb" a distinctive horseshoe shape. The floor is bedrock. It would be easier to say whether or not this feature actually was a tomb if the row of stones which begins at its eastern end and continues south beyond NW 5 could be proven to be part of the original cemetery wall rather than a recent accumulation where the 1948 investigators piled stones from other tombs. As it stands, identification of this feature as a tomb is uncertain. Certainly, it is in the right position and has the proper dimensions to be a tomb; however, no human remains were recovered.



NW 33



NW 33 TP.17.85

NW 34; LC 6

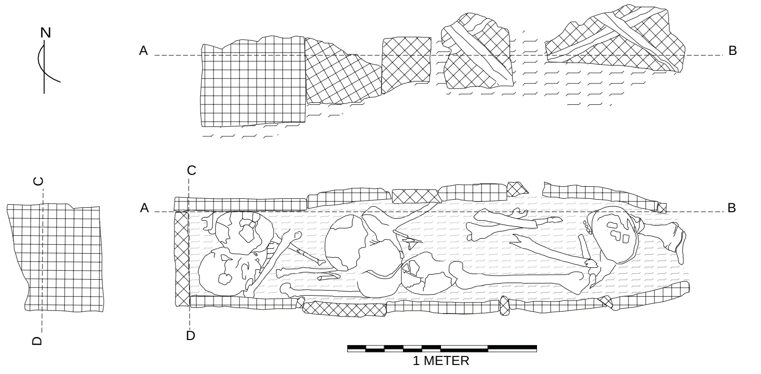
Location: outside and to the southwest of the main cluster of tombs in the Northwest Cemetery (fig. 2.4). Its isolation no doubt accounts for its survival up to the present, disturbed only by plowing and natural forces. It was apparently not discovered by the MNAE archaeologists, but was later recorded and excavated by UL.

Orientation: east-west.

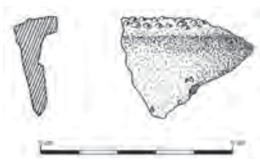
Construction/tomb type: Hale Type II, brick box. This is neatly made with sides bowing outward slightly in the middle and tapering to a narrow foot. The upper edges of the bricks were broken away during years of plowing, but the bones survived more or less intact. A few small chunks and slabs of rock have been used to fill gaps between the wall bricks. The large brick at the west end plainly marks the head of the tomb. The floor was crudely excavated from the natural bedrock; its uneven surface slopes down deeply in the west end, rises to a hump in the middle, and levels off again to the east.

Associated Artifacts: one bronze earring near skull #5, 6.TP.85.

MNA skeletal inventory: none.
N: 6; 2 adult females (40-50, Adult), 2 adult males (30-40; 40-50), a juvenile 7-8, a child 2-3.



6.TP.85



NW 34

NW 34 TP.18.85

The primary burial in NW 34 was an adult (individual A), probably male but not particularly robust, aged 40-50 years at death, laid with his head to the west. His skull and long bones were still *in situ*. His are the most complete remains in the tomb. Some years after the original interment the tomb was reopened and four additional skulls and commingled postcranial bones were deposited on top of the original occupant, whose bones were disturbed in order to make room for the new additions. Individual F, a child (2-3 years old), is represented by humerus shafts and a fragment of the left maxilla.

The four additional skulls represent:

Individual B: a juvenile aged 7-8 years, with a partial cranium, 9 teeth, and long bone shafts.

Individual C: a robust male aged 30-40 years; a partial cranium, most of the larger long bones, tarsals.

Individual D: an adult female (?) whose bones lay near the eastern end of the tomb. The major cranial sutures are barely visible endocranially, suggesting an age at death of 45+ years.

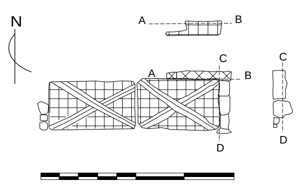
Individual E: an adult female (?) with advanced cranial suture fusion (45+ years at death).

NW 35; LC 23

Location: south of NW 19 on the easternmost edge of the excavated area, adjacent to the old backdirt wall and modern dirt road.

Orientation: east-west.

Construction/tomb type: Hale Type II, brick box. It appears to be the tomb of a child, discovered when the area around a protruding upright brick fragment was cleared of soil. NW 35 is similar to Tombs NW 14, NW 29, and NW 27, with a floor of two Roman bricks laid end to end, surrounded by the lower edges of bricks which originally formed a miniature brick-box tomb.



NW 35

Associated Artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No human remains were recovered from this tomb.

NW 36; LC 9

Location: in the north central area of the 'south mausoleum' which also contained tomb NW 34.

Orientation: uncertain.

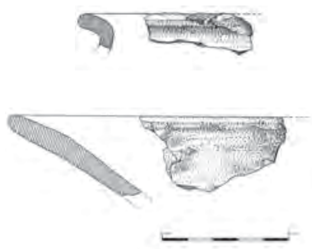
Construction/tomb type: Hale Type VIII, destroyed during the original excavations, probably in 1948. It is now represented only by a large cavity.

Associated Artifacts: iron nail, 7.TP.85.

MNA skeletal inventory: none.

N: 3; adult female, adult male (40+), late adolescent.

Human remains from at least three individuals were recovered by the American excavators from this area: a large robust male aged 40+ years at death represented by fragments of cranial vault, pelvis, ulna, and femur; a smaller adult represented by part of a right femur; and a late adolescent represented by the gracile shafts of one humerus and both femora.



NW 36 TP.19.85a-b

7.TP.85

***Sepultura* 25**

Location: unknown.

Orientation: unknown.

Construction/tomb type: unknown.

Associated Artifacts: unknown.

MNA skeletal inventory: 2005.218.

N: 2; adult female (40-50), adult male (50-60).

These remains could not be associated with any of the *Sepulturas* drawn on F. de Almeida's plan. MNAE archaeologists recovered the mostly complete skeletons of two adults from *Sepultura* 25. The sex assessments were based on both pelvic and cranial criteria. The larger pair of innominates showed narrow sciatic notches and preauricular sulci and an acute subpubic angle (male), while the smaller pair showed broad notches and sulci (female), but the angle was not observable. The larger cranium displayed large, rugged mastoid processes and supraorbital tori and margins, and well-marked mastoid crests and a nuchal prominence (male), but the smaller cranium showed more gracile supraorbital margins, mastoid processes, and nuchal prominence, and a rounded glabella (female). The male's age at death was estimated as 50-60 years, based on advanced endocranial suture fusion, and the female's age estimated as 40-50, based on her left sacroiliac auricular surface, scored at phase V-VI.

Both adults were represented by relatively complete and intact crania, mandibles, clavicles, and upper and lower limb long bones. The scapulae, ribs, spinal columns, pelves, hands, and feet were incomplete. The respective (tentative) assignment of the commingled post-cranial remains to the male and female was based on element size and robusticity.

Minor skeletal pathology was abundant but mainly related to the advanced age of the adults: extensive osteophytosis of the cervical and lumbar vertebrae, complete fusion of L4/L5 in one spine circumferentially and also at the articular facets and spinous processes, several Schmorl's nodes in both spines, and a row of vertical bony "whiskers" extending superiorly from the posterior aspects of one pair of calcanei. Both right (but not left) scapulae show initial lipping around the superior/posterior glenoid fossa margins, with corresponding arthritic involvement (small bony nodules) around the margins of the humerus heads, as do one pair of radii at the radial tuberosities. Both pair of femora, tibiae, and fibulae shafts bear small patches of remodeled cortex, indicative of past episodes of inflammation, but no distinctive evidence of infection. Four rib fragments (from the central portion of the ribcage) show traces of healed fracture callus.

Sepultura 26

Location: unknown.
Orientation: unknown.
Construction/tomb type: unknown.
Associated Artifacts: none at MNA. However, there are indirect indicators that at least two artifacts were placed with this body in the grave. The right humerus shows a green stain on the distal shaft just superior to the metaphyseal region, suggesting a copper or bronze artifact located near the elbow (perhaps an armlet?). And the proximal shaft (lateral aspect) of the right femur has tiny fragments of coarse red clay embedded in the exposed trabeculae where the cortex has been broken away; perhaps a clay vessel was placed in the grave against the right hip.
MNA skeletal inventory: 2005.244.
N: 1; adult male (30-40).

These remains could not be associated with any of the *Sepulturas* drawn on F. de Almeida's plan. The human remains curated at MNA from *Sepultura* 26 consist of the complete mandible and the partially complete post-cranial skeleton of an adult, probably a male (right femur head diameter, 484mm). Age at death was estimated at 30-40 years (probably the latter half of that decade), based on the incomplete left pubic symphyseal face (Todd score: VI, 35-39). The lowest two cervical and all of the thoracic and lumbar vertebrae are present, with initial signs of osteophytosis. This individual may have suffered a spinal injury: T8 and T9 bear Schmorl's nodes on their inferior body surfaces, and the bodies of T11 and T12 are "wedged" (the anterior heights are markedly smaller than the posterior body heights). Both central tibia shafts display coarsely striated cortex on their lateral aspects, but no plaques or other evidence of infection.

Sepultura 28

Location: unknown.
Orientation: unknown.
Construction/tomb type: unknown.
Associated Artifacts: unknown.
MNA skeletal inventory: 2005.220.
N: 2; 2 adult males (20- 30, 40-50).

These remains could not be associated with any of the *Sepulturas* drawn on F. de Almeida's plan.The human remains curated at MNA from *Sepultura* 28 represent two adult male individuals. One was represented by a partial mandible, a partial pelvis, spine, many rib fragments, and most of the larger long bones; most of the hands and feet were missing. His age at death was estimated at 20-30 years (probably 20-25), based on pelvis criteria (sacroiliac auricular surfaces: phases I-II, and pubic symphyses: Todd stages I-II, and incomplete fusion of the iliac crest), and non-fusion of the medial clavicle epiphysis. Remains of the other male include a partial cranium and mandible, the right temporal, a partial pelvis, and most of the larger long bones; vertebrae, ribs, and most of the hands and feet were missing. His age at death estimate was 40-50 years, based on cranial (advanced endocranial suture closure) and pelvic (sacroiliac auricular surfaces: phases III–IV, and pubic symphyses: Todd stage VI).

The skeleton of the younger adult shows signs of trauma to the thorax. T10 through T12 and L2/L3 bear Schmorl's nodes, and three left rib fragments show healed fractures, suggesting trauma to the thorax. Fragments of three consecutive central thoracic right ribs from the younger adult bear patches of periostitis on their pleural aspects and the first thoracic vertebra bears a lytic lesion on the left side of the body, with traces of remodeling, which may be related to the rib pathology. In the older adult, the central shafts of both tibiae and fibulae show extensive cortical remodeling; the left fibula shaft diameter is visibly increased, and the lower portion shows a possible healed fracture.

Human remains whose original tomb association is uncertain

TP.20.85

Orientation: N/A.
Construction/tomb type: There was no evidence of a constructed tomb.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: 2 adults (M, ?F).

Several bones were recovered from the east side of the wall running north-south in this square. They include the right tibia of a large adult (probably a male), showing a partially healed fracture of the upper shaft with much new bone and considerable distortion of the shaft. A right patella and portion of a fibula match this for size and color. A smaller left tibia found in this same location represents a second adult, possibly a female. These bones probably came from one or more of the tombs excavated in this area.

TP.21.85, the "Small Reburial"

Location: Sq. N029W013.
Orientation: N/A.
Construction/tomb type: There was no evidence of a constructed tomb. These bones probably came from one or more of the tombs excavated in this area.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: 9 (M 50+, M, M, 3 F, A, child 5-6, adolescent 14-16).

In a pit undistinguished by any signs of a formal tomb near the southeastern corner of the Mausoleum (NW 1a-e), the American excavators discovered a mass of commingled and fragmentary human bones representing the incomplete remains of at least 9 individuals, 7 adults and 2 subadults. There is no written documentation from the earlier MNAE excavations or any oral tradition among the former MNAE workmen who live today in Vaiamonte about this unusual deposit. In the absence of any associated recognizable mortuary structure, it seems likely that this deposit represents human remains left at the site at the order of M. Heleno, because they were deemed useless for scientific analysis, having no complete crania suitable for metric and morphological analysis.

Among the adults, the largest and oldest individual is a very robust male (50+ years) whose innominates show the unmistakable pathognomonic signs of Paget's disease (this individual is described more fully in section 3.9. on "Paleopathology"). A radiocarbon date obtained from a sample of non-pathological bone from this individual placed his death sometime during the 4th-6th centuries AD (2 Sigma calibration: 385–475 AD, or 485–535 AD.)

Two additional males and three females were identified from cranial and pelvic fragments, plus one adult of indeterminate sex. Two of the female crania show hyperostosis frontalis interna, and one adult parietal bears a small healed depressed fracture. The postcranial remains consist almost entirely of long bones and scapula and pelvic fragments, with ribs, vertebrae, and hand and foot bones missing. The two youngest individuals are poorly represented: the cranium, ilia, and several long bone shafts from a child aged 5-6 years, and portions of the pelvis and femur shafts from an adolescent aged 14-16 years. Neither of these shows skeletal pathology.

The incomplete nature of these remains suggests that they may have been rejected for curation by Heleno because they were considered to have no utility either for exhibition in the Museum or for physical anthropological studies aimed at determining the ethnicity of these early Portuguese. However, given the identification inside the Basilica complex of formal ossuary deposits (e.g., UL Tombs A and B, located against the south wall of the Eastern Basilica, and *Sepultura* F) of disarticulated commingled bones, it is not impossible that TP.21.85 was an ossuary deposit of bones removed in antiquity from tombs in the cemetery to make room for new occupants.

4. The Church & Baptistry/*Capela*/Complex B

4.1. Early Christian Tombs in the Western Basilica of the Church

Tomb 3; LC 111

Location: in Room XIII, Apse 4, in Sq. N019E012 and N019E010.

Orientation: northwest-southeast.

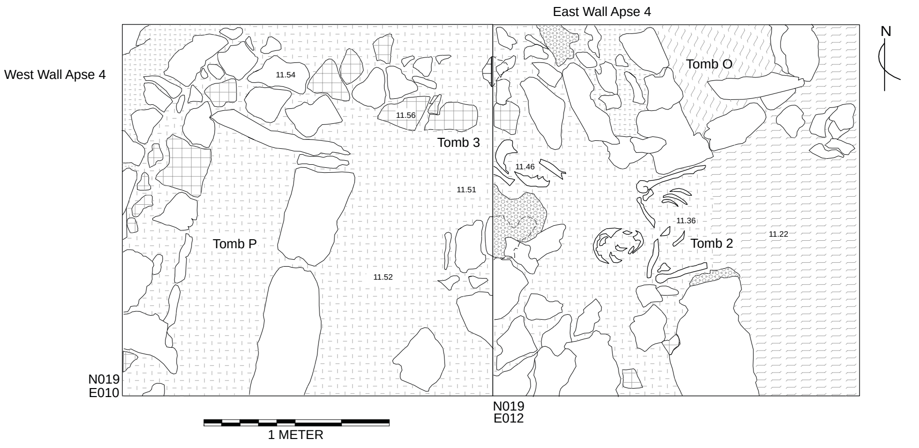
Construction/tomb type: The original walls of this tomb were apparently destroyed by the construction of the large granite slab tomb (Tomb P, LC 46, *Sepultura* F) immediately to the southwest. Portions of one original wall of this tomb remain on one side.

Associated artifacts: none.

N: 6; one female aged 30-35, four males (one 35-35, two 40-50 years and one 45-60 years), and one juvenile (8-12).

In Tomb 3, the commingled, incomplete skeletons of at least six individuals were identified, apparently disturbed when Tomb P was constructed. The disarticulated, incomplete remains of at least six individuals were represented by both cranial and postcranial remains (including assorted vertebrae, rib fragments, hand and foot bones), but no skeleton was more than 50% complete.

Several ribs from the central portion of an adult thorax showed healed fractures. Several vertebrae showed initial osteophytosis and/or 4 lower thoracic vertebrae (possibly from the same person) showed small Schmorl's nodes. A few lower lumbar vertebrae (again, probably



Tombs 2 and 3

from one person) showed advanced osteophytosis. The R innominate of Adult C, a large robust male, showed marked remodeling of the superior/medial acetabular margin, which is extended by a bony rim with small bony lumps just superior to it. A robust, male, left femur that matches this innominate displays marked remodeling of the margin of the head and the superior aspect of the greater trochanter: horse-rider syndrome?

One juvenile (8-12 years) was represented by cranial and post-cranial bones, mostly in fragments. Two teeth (L&R maxillary permanent first molars; TP.56.83) were recovered from sq. N019E012, subfloor. They probably belong to this juvenile.

Tombs J (east) and J (west); LC 51A and LC 51B; *Sepultura* K

Location: These tombs were built against the north wall of the Western Basilica, immediately north of Apse 3.

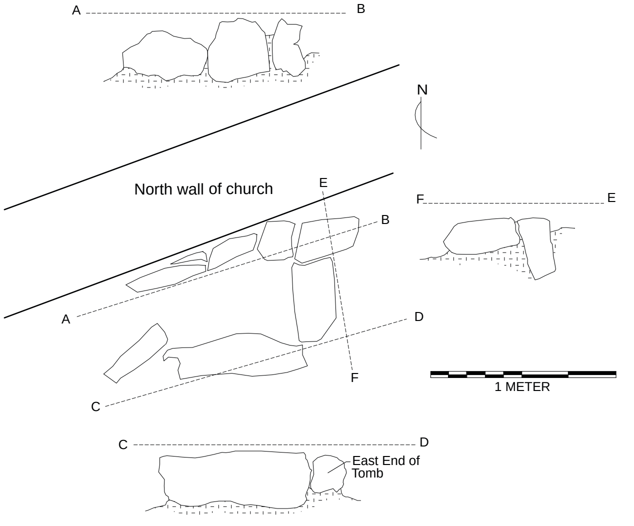
Orientation: east-west.

Construction/tomb type: Hale Type V, stone kerbs.

Associated artifacts: none.

N: unknown, no bones recovered.

The drawing shows Tomb J east; Tomb J west was damaged, and it was not drawn. They may originally have been parts of one tomb.



Tombs J (east) and J (west)

Tomb K; LC 52; *Sepultura* I

Location: this substantial tomb lies immediately north of Apse 3 (Room IX), with the western end lying against the short wall that extends north from the northern end of the curve of Apse 3. It is labeled *Sepultura* I on Fig. 2.6.

Orientation: east-west.

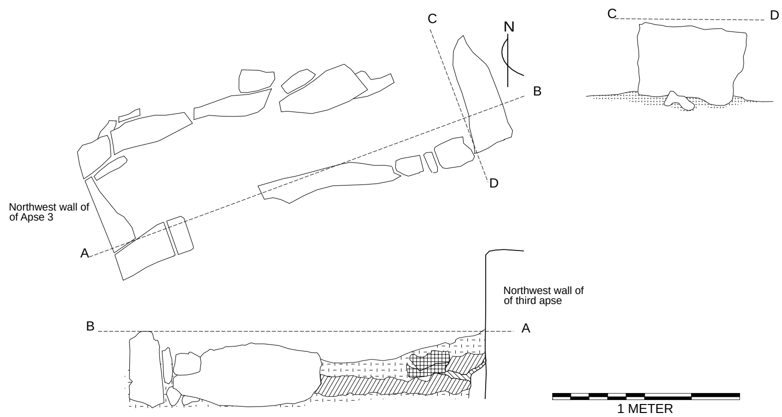
Construction/tomb type: Hale Type V, stone blocks.

Associated artifacts: none.

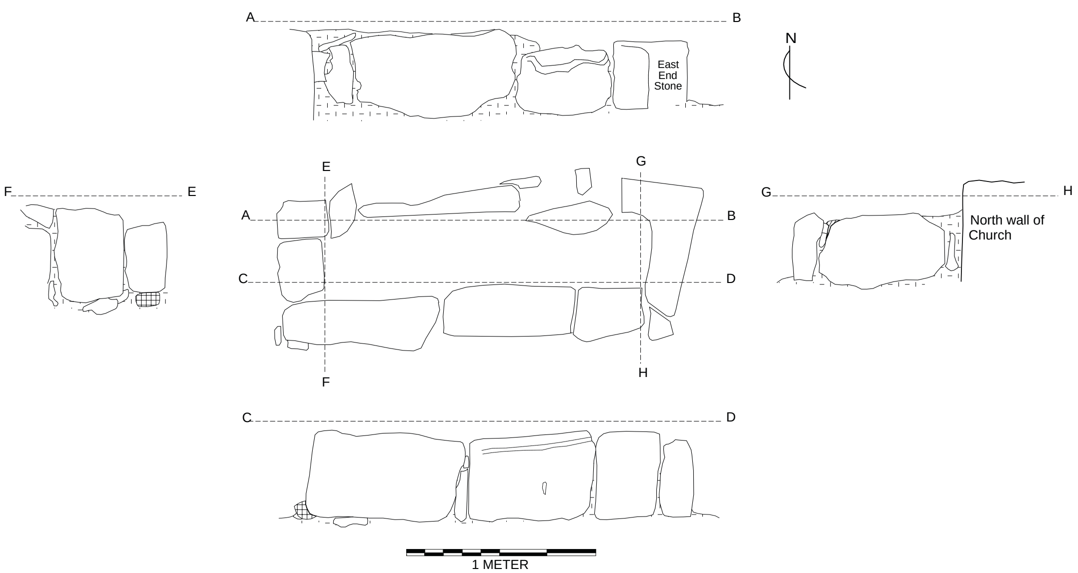
MNA skeletal inventory: (?) *Sepultura* A, 2005.225. No bones at MNA are labeled "*Sepultura* I" but it is possible the handwritten "i"on L. da Silva's plan was misread as "a" and the bones labeled "*Sepultura* A" are from this tomb.

N: 4; 3 adult females, one adult male.

The photograph of this tomb (fig. 2.12) taken during the excavations conducted by MNA in 1955 clearly shows two of the occupants: the complete articulated skeleton of an adult, head oriented to the north, with several disarticulated long bones and the cranium of a second adult lying at the southern end of the tomb. However, the inventory of the human remains possibly associated with this tomb revealed the presence of four adults, three females and one male. The articulated adult in the photograph was an adult female aged c. 30-40 years at death (based on cranial suture closure, tooth wear, and pubic symphysis and sacro-iliac articular surface criteria), another female was aged 40-50 years at death (based on the same criteria), and the age at death of the third female was estimated as +50 years (based on pelvic criteria). The adult male probably died between the ages of 30 and 40. The long bones of these four adults do not display the rugged muscle attachment markers that characterize some of the adult skeletons in *sepulturas* elsewhere in the Church (e.g., *Sepultura* 6-A in the Baptistry complex). Several of the thoracic vertebrae in the spine (T 5 and 6, and T9–T12) of the articulated adult display small Schmorl's nodes on the upper and/or lower vertebral plates, but the lumbar vertebrae from this individual show neither nodes nor osteophytes.



Tomb K



Tomb L

Tomb L; LC 50; *Sepultura* L

Location: against the north wall of the Western Basilica in Room VIII.

Orientation: east-west.

Construction/tomb type: Hale Type IV, granite slab.

Associated artifacts: none.

N: unknown, no bones recovered.

Tomb M; LC 44; *Sepultura* H

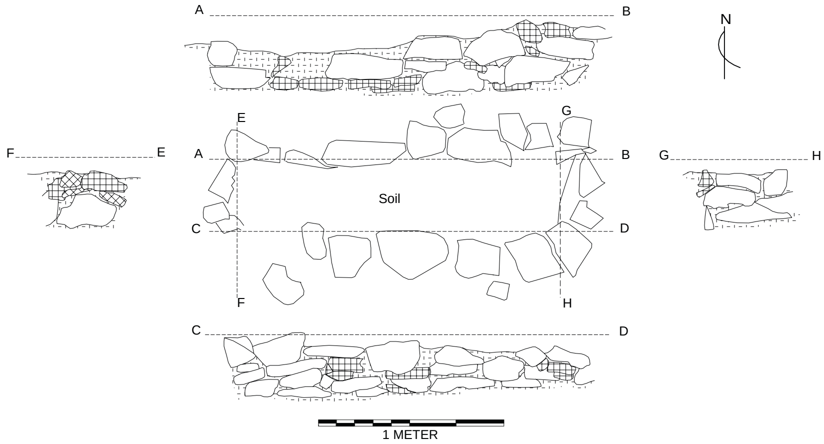
Location: adjacent to the north wall of Room VIII, at the western end of the north aisle of the Western Basilica, just west of Tomb L.

Orientation: east-west.

Construction/tomb type: Hale Type VII, small stones laid flat.

Associated artifacts: none.

MNA skeletal inventory: none.



Tomb M

Tomb N; LC 43; *Sepultura* G

Location: in Room XII (the nave of the Western Basilica), just east of Apse 4, at the western end of the basilica adjacent to the north aisle (fig. 2.6.)

Orientation: east-west.

Construction/tomb type: Hale Type IV, granite slab.

Associated artifacts: none.

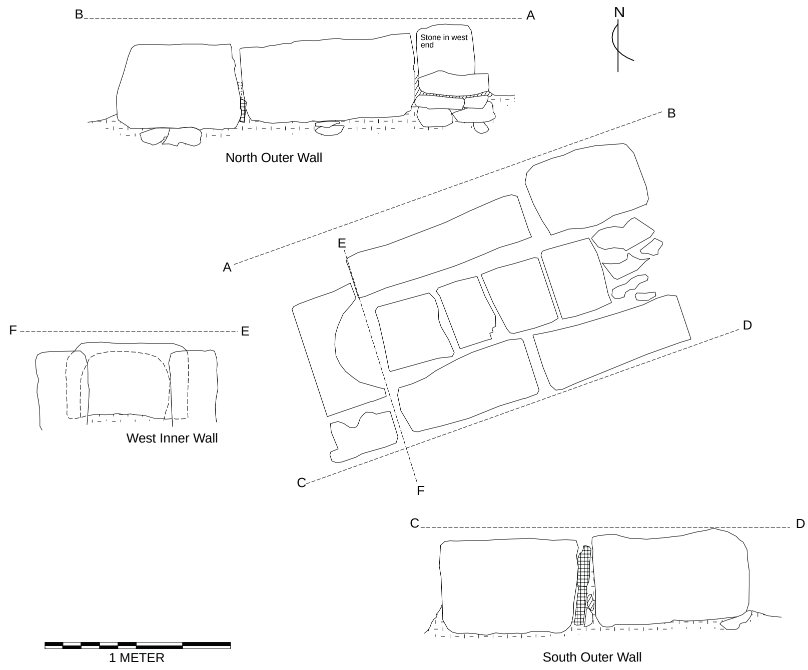
MNA skeletal inventory: It is labeled *Sepultura* G on da Silva's plan, drawn filled with bones. No *Contentores* are labeled for *Sepultura* G at MNA. It is possible that the bones labeled "*Sepultura* P" may have come from this tomb. *Sepultura* P (?), 2005.235.

N: 3; adult female (30-40), adult male, infant (12-18 months).

The drawing of this tomb on MNA Plan 7 shows one articulated skeleton lying supine with its head to the west. MNAE excavation photograph 235 shows a view of this massive *sepultura* taken from the east, but due to the angle it is difficult to see the bones within it. The adult female, the most complete of the three, is represented by a partial cranium, the lower two thirds of the spinal column, parts of the shoulder and pelvic girdles, most of the long bones of the limbs, and a few ribs and bones of the hands and feet; her bones are visible within the tomb in the photograph, taken during the MNAE excavations. Her innominates show broad sciatic notches and wide shallow preauricular sulci. Her estimated age at death is 30-40 years, based on the degree of cranial suture fusion (the major sutures hold firm but are nowhere obliterated) and the appearance of the sacroiliac auricular surfaces (phase III–IV). No osteophytosis is evident in her spinal column.

An adult male is represented by the distal half of a large robust right humerus and several other large long bone fragments, and by several vertebrae from his lower spine. The infant is represented by a partial femur shaft and a partial left ilium; the latter bone measures 63.5mm in length, giving an estimated age at death of c. 12-18 months (Ubelaker, 1978, p. 49, Table 5).

Both right and left femora of the adult female have unusually short necks and flattened heads, not shaped like mushroom caps but with a smaller medial-lateral diameter than expected; in cross section they would appear as ovals, not circles. Both fovea capita are abnormally shallow, just a faint dimple rather than a well-defined fossa.



Tomb N

Tomb N (MNA photo 235)

Tomb L (foreground), M (middle), and N (background) from the east. Tombs have been filled with earth to help with preservation.

Tomb O; LC 45

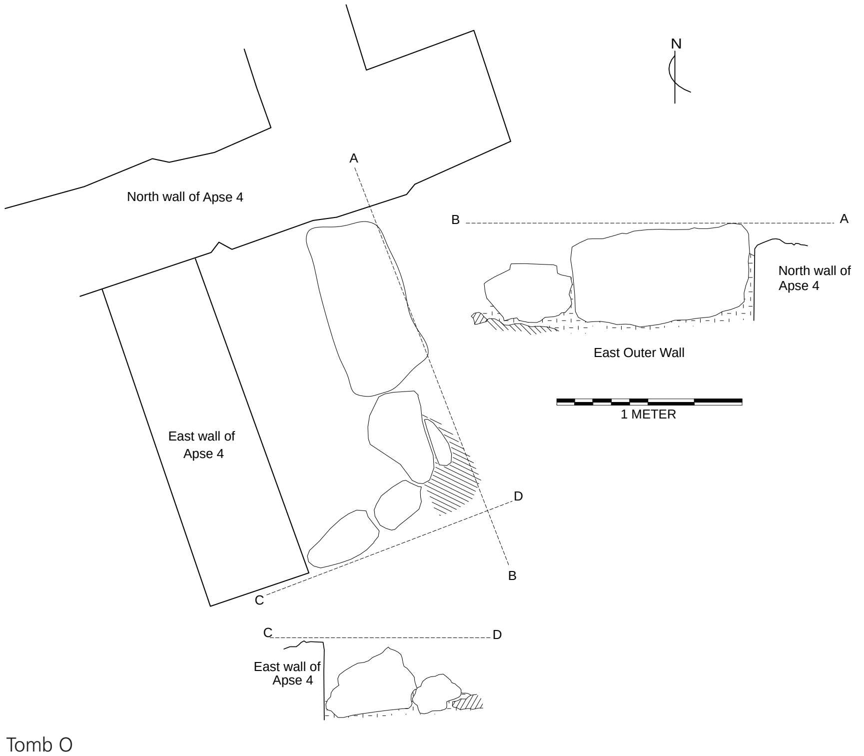
LOCATION: this tomb rests against the north side of the wall that separates Apse 4 from the western end of the Western Basilica.

Orientation: east-west.

CONSTRUCTION/TOMB TYPE: Hale Type IV, granite slab.

ASSOCIATED ARTIFACTS: none.

N: unknown; no bones recovered.



Tomb O

Tomb P; LC 46; *Sepultura* F

LOCATION: in Apse 4 (Room XIII), against the curved western wall of apse just north of center (Figure 2.6.)

ORIENTATION: north-south.

CONSTRUCTION/TOMB TYPE: Hale Type IV, granite slab tomb.

ASSOCIATED ARTIFACTS: none.

MNA SKELETAL INVENTORY: 2005.223

N: 5; 2 adult females, 1 adult male, 1 juvenile, 1 adolescent.

The photograph of this tomb taken during the excavations conducted by MNAE in 1955 clearly shows two of the occupants: the complete articulated skeleton of an adult, head oriented to the north, with several disarticulated long bones and the cranium of a second adult lying at the southern end of the tomb. However, the inventory of the human remains associated with this tomb revealed the presence of four adults, three females and one male. The articulated adult in the photograph was an adult female aged c. 30-40 years at death (based on cranial suture closure, tooth wear, and pubic symphysis and sacroiliac articular surface criteria), another female was aged 40-50 years at death (based on the same criteria), and the age at death of the third female was estimated as 50+ years (based on pelvic criteria). The adult male probably died between the ages of 30 and 40.

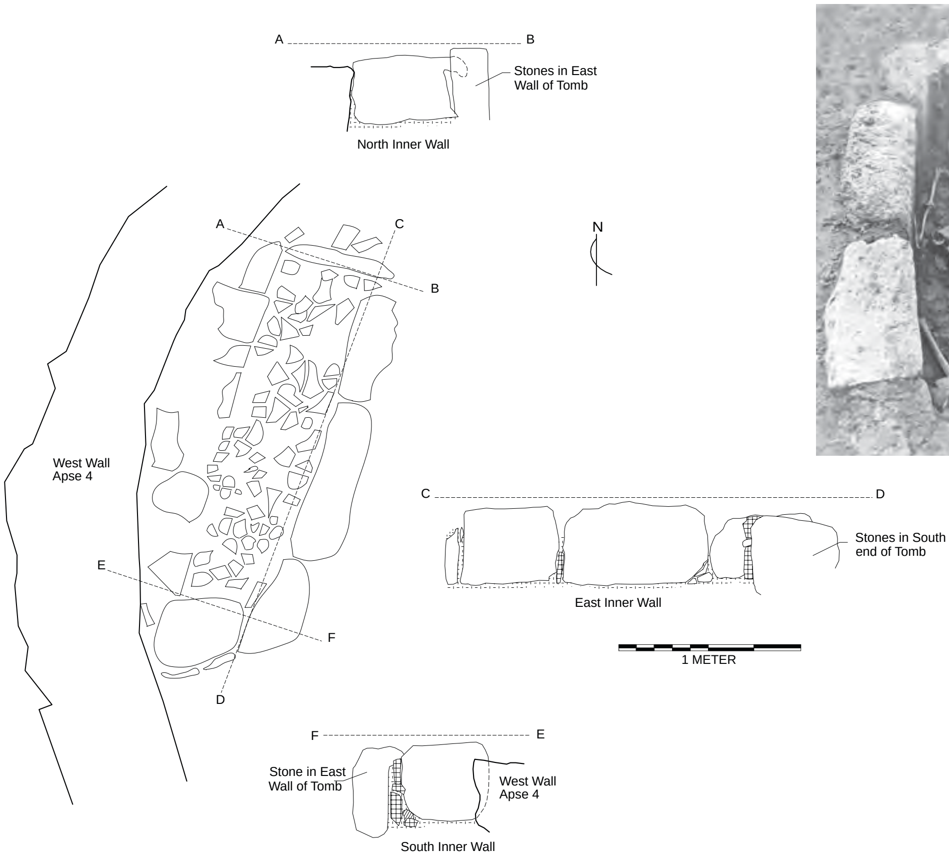
The long bones of these four adults do not display the rugged muscle attachment markers that characterize some of the adult skeletons in *sepulturas* elsewhere in the Church (e.g., *Sepultura* 6-A in the Baptistry complex). Several of the thoracic vertebrae in the spine (T5 and 6, and T9–T12) of the articulated adult display small Schmorl's nodes on the upper and/or lower vertebral plates, but the lumbar vertebrae from this individual show neither nodes nor osteophytes.

Some confusion exists regarding which skeletal individuals were originally discovered in *Sepulturas* D, E, and F. *Sepultura* D on the plan by J. Lino da Silva (fig. 2.6) is drawn as containing no bones at all; yet the bones labeled for that *Sepultura* at MNA contained skeletal remains representing three adults plus single fragments from an adolescent and a child.

Sepultura E as drawn on J. Lino da Silva's plan (fig. 2.6) shows one articulated skeleton; the skeletal inventory made by Hale in 1984 for that tomb identified three additional (though very incomplete) individuals: two more adults and one juvenile, and Powell identified an additional adolescent, for a total of five individuals.

The drawing labeled *Sepultura* F on Figure 2.6 shows one articulated skeleton with a pile of commingled long bones at its foot; however, MNA photograph 197 which apparently shows *Sepultura* F (based on its location in the Western Basilica) shows one reasonably complete cranium and a pile of commingled long bones. And when UL field director John Hale examined the boxed remains labeled for *Sepultura* F at MNA in 1984, he found no cranium and no long bones, only an assortment of fragmentary ribs, vertebrae, and tarsal bones representing three adult individuals.

The two subadult skeletal elements boxed with *Sepultura* D probably belong to the subadults in *Sepulturas* E and F: one fourth metatarsal with fused proximal epiphysis and unfused (missing) distal epiphysis most likely belongs to the adolescent in *Sepultura* E, and the subadult first cervical vertebra likely belongs to either the juvenile in *Sepultura* E or the child in *Sepultura* F.



(MNA photo 202)

Tomb P

Tomb Q; LC 42

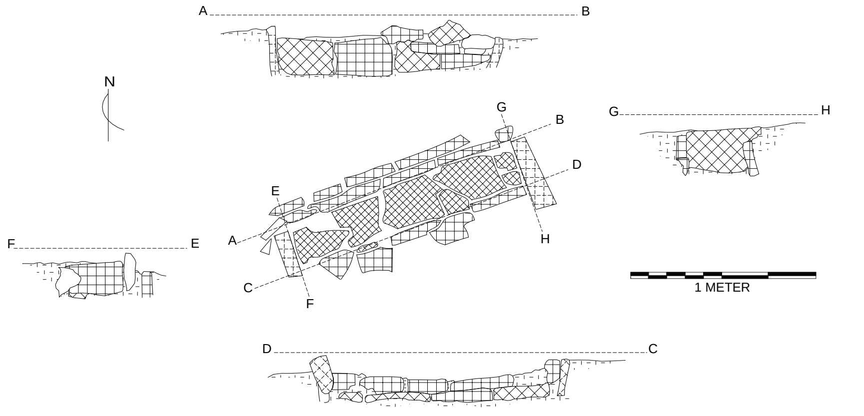
Location: This tomb is immediately south of Tomb R.

Orientation: east-west.

Construction/Tomb Type: Hale Type II, upright clay tiles form the sides.

Associated Artifacts: none.

N: unknown, no bones recovered.



Tomb Q

Tomb R; LC 41

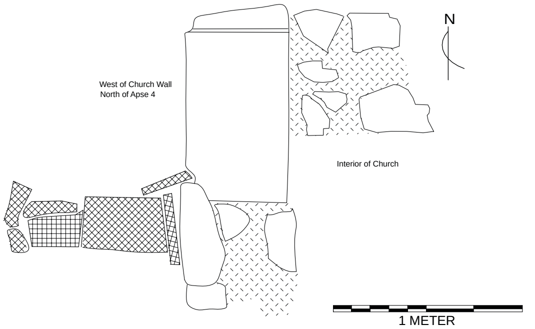
Location: This tomb is located just outside of the west wall of the north aisle in Apse 4.

Orientation: east-west.

Construction/Tomb Type: Hale Type II, upright clay tiles form the sides.

Associated artifacts: none.

N: unknown, no bones recovered.



Tomb R

Tomb S; LC 47; *Sepultura* E

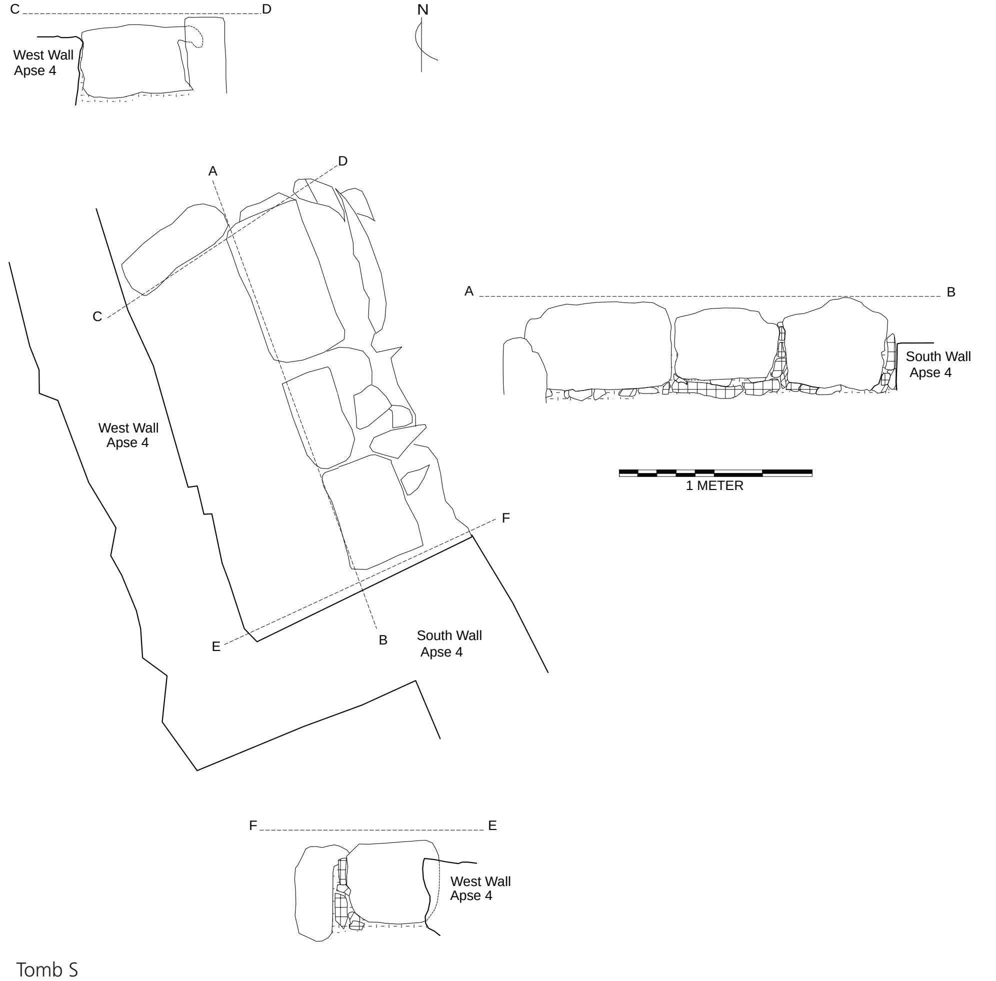
Location: Room XII, with its long side lying directly against the western wall separating Apse 4 (Room XIII) from the nave of the west basilica (Room XII), and the short end of the sepulture lying against the short wall that continues the curve of the apse into Room XII.

Orientation: north-south.

Construction/tomb type: Hale Type IV, granite slab.

Associated artifacts: none.
MNA skeletal inventory: 2005.224.
N: 2; 1 adult male, 1 adult.

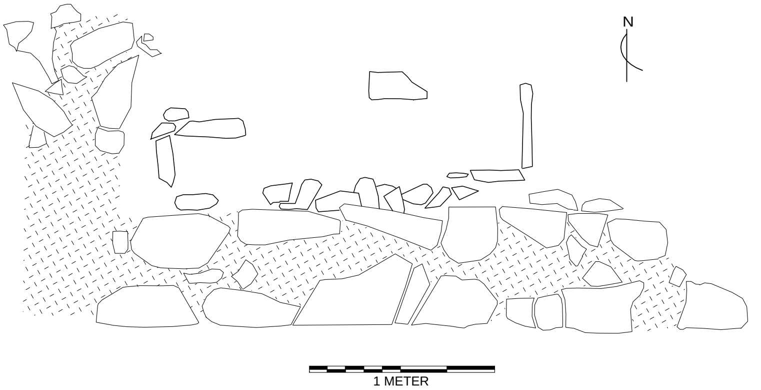
The bones in MNA skeletal series 243 labeled for *Sepultura* E include ribs, vertebrae, a large robust sternum, large robust tarsals and metatarsals, representing two adults. They match in robusticity the long bones show in the MNA field photo, but the two sets of bones are complementary, not identical. However, MNA container 4769, v. 1 (no *Sepultura* is associated with this number) contained one large adult cranium with advanced endocranial and ectocranial suture fusion and a large bipartite Inca bone at lambda. No location is given in the catalog cards for this cranium, but an inscription on its left parietal reads "Torre de Palma".



Tomb S

Tomb T; LC 48; *Sepultura* D

Location: extreme southwest corner of the Western Basilica wall, lying west of Tomb U.
Orientation: east-west.
Construction/tomb type: Hale Type V, stone kerbs.
Associated artifacts: none.
N: unknown. This *Sepultura* was drawn without bones on da Silva's plan, but the bones at MNA labeled *Sepultura* D may have come from this tomb.



Tomb T

Tomb U; LC 49; *Sepultura* B

Location: adjacent to the south wall of the south aisle (Room XI) of the Western Basilica. It is labeled *Sepultura* B on da J. Lino da Silva's plan (fig. 2.6).

Orientation: east-west.

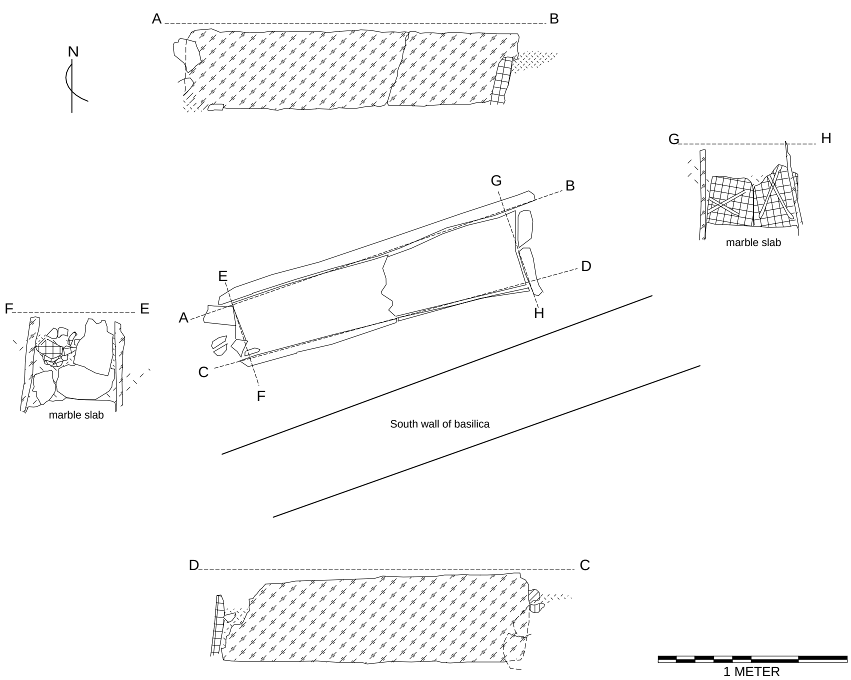
Construction/tomb type: Hale Type VI, marble slabs.

Associated artifacts: none.

MNA skeletal inventory: 2005.221.

N: 1; one adult male.

The human remains associated with this tomb are that of an adult male. The MNA Plan (fig. 2.6) shows a complete articulated skeleton with the skull to the north. However, no cranium is present in container 4775 which contains the mandible, clavicle, tarsals, and large bones of the arms, most of the spine, the pelvic girdle, some fragmentary ribs, and the mostly complete bones of the lower limbs.



(MNA photo 197)

Tomb U

The adult male was aged 30 to 40 years at death, based on complete fusion of the medial clavicle epiphysis, the appearance of the sacroiliac auricular surface (phases 3-4), and light wear (cusp tips rounded, no exposed dentine) on the mandibular third molars. The vertebrae all show completely fused rings but little evidence of osteophytosis; segments 1 and 2 of the sacrum are unfused. Heavily striated cortex, partly remodeled, is visible on the medial and lateral aspects of the lower third of the left and right tibia shafts, but the shafts retain their original shapes. No other skeletal pathology was observed.

Tomb V; LC 72; *Sepultura* 3-A

Location: 1.38m south of the south wall of the Western Basilica.

Orientation: east-west.

Construction/tomb type: Hale Type II, tomb sides built of tiles set upright on edge.

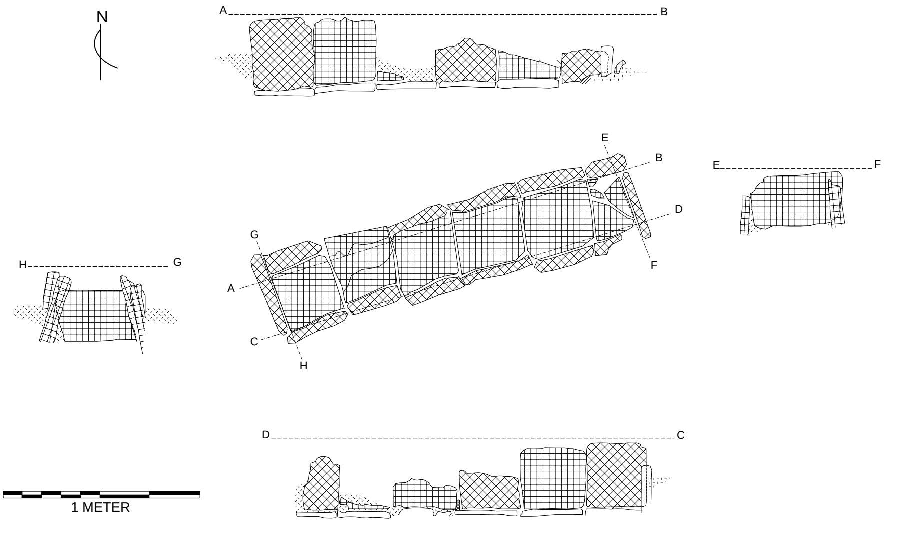
Associated Artifacts: none.

MNA Skeletal Inventory: 2005.226.

N: 7; adult female, 2 adult males, 2 adults (one 40+ years), juvenile (7-9), adolescent (12-13).

This tomb contained the commingled bones of at least 7 individuals: five adults (3 males, one female, and one indeterminate) and two subadults, represented very incompletely, primarily by long bones. Fragments of two maxillae and six mandibles are present, as well as a few fragments of innominates, ribs, vertebrae, and hand and foot bones. At least two adult males and one female could be identified, but the other adult remains were indeterminate for sex. At least one adult was probably older than 40 years at death (based on moderately advanced tooth wear), but no specific age estimates were possible for the other adults. One subadult was estimated to be 8-9 years old and another estimated at 12-13 years, based on tooth development and eruption.

Five individuals (three adults and two subadults) exhibit a discrete skeletal trait of the mandible: bipartite or multiple mental foramen. The mental foramen normally appears as a single patent opening on the lateral (outer) aspect of the anterior body of the mandible, near the chin; it conducts the mental nerve from the interior of the mandibular body. This foramen may also be bipartite – divided internally by a slender bony bar – or may be multiple, i.e., two small adjacent foramina instead of one larger foramen (fig. 3.3). No other human remains at the



Tomb V

site display this trait. The presence of this epigenetic trait, which is very rare in this population sample, in five of the six mandibles present (83%) in this tomb supports the hypothesis that the tombs were used for the successive interment of biologically related individuals, i.e., that they were "family crypts", functionally similar to the family crypts present today in the village cemetery at Vaiamonte.

None of the subadults showed skeletal pathology. Six of the nine thoracic vertebrae apparently belonging to one adult showed small Schmorl's nodes on the inferior plates, and 4 of these also had nodes on the superior plates. Four adult clavicles show rugged muscular attachments at the medial ends. The left and right fibulae of one adult show hyperdevelopment of the interosseous crests along the superior 2/3 of the shafts, so that the shafts appear "canoe-shaped" in cross section; the cortex of these long troughs is somewhat pitted and striated, but well remodeled.

4.2. Early Christian Tombs in the Eastern Basilica of the Church

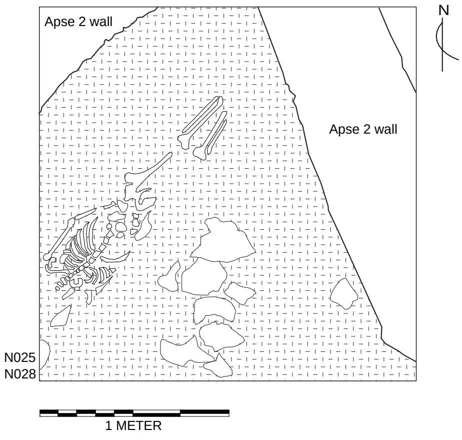
Tomb 1; LC 109

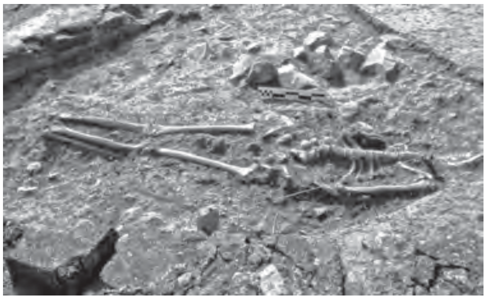
Location: Room VII, Apse 2; sq. N025E028; beneath the plaster floor.
Orientation: southwest-northeast.
Construction/tomb type: There was no tomb container or enclosure, and no visible pit outline.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: 1; late adolescent 17-19 years.

This individual is represented by a mostly complete post-cranial articulated skeleton (TP.28.83), missing the skull, the feet, and the right arm and hand. As with Tomb 2 in Apse 4 of the Western Basilica, the missing parts may have been accidentally destroyed during repeated cleaning and removal of loose debris from the floor of this area. The site guard used an *enxada*—a tool like a short-handled hoe—to scrape off a layer of soil each time he cleaned, and the missing bones may have also been scraped away bit by bit. The absence of any identifiable tomb construction suggests that this tomb may be later than the early Christian tombs of the Basilica, as all of the medieval-era tombs lack formal tomb structures. However, whoever dug this tomb in antiquity seemed to know the original configuration of the apse, so it may in fact have been placed late in that era.

The body was extended supine with the legs pointing to the northeast. The sacroiliac auricular surfaces display the ridge-and-valley topography characteristic of late adolescence or very young adulthood and the crests of the ilia are not completely fused, nor are the vertebral borders of the scapulae, the dorsal margins of the lower lumbar vertebral rims, or the heads of the humeri and the ribs. The key pelvic features observable for determination of sex (sciatic notch and preauricular sulcus) are indeterminate, but the pubic bones are gracile; metric data from the humeri and femora (head diameters) indicate a female. The seventh cervical vertebra lacks transverse foramina, and displays very small facets bilaterally for cervical ribs (not found). No skeletal pathology was observed, but the first two segments of the sacrum were not fused, and S5 displayed spina bifida occulta.

Some of the bones missing from the articulated skeleton (TP.28.83) were recovered from the level excavated directly beneath it (TP.50.83), underneath the plaster floor: several hand and foot bones, one patella, a few fragments of ribs, and the left pubic ramus (with unfused epiphysis). A left maxillary first incisor displays a large interproximal carious lesion and light occlusal wear.





Tomb 1

UL Tomb 8; LC 104

Location: the northeast corner of the north aisle in the Eastern Basilica (sq. N035E045, Room V). Tomb 8 was discovered by the American excavators in 1984 lying directly beneath the fragmentary remains of a larger tomb, Tomb F.

Orientation: northeast-southwest.

Construction/tomb type: Hale Type II, small brick box tomb.

Associated Artifacts: none.

MNA skeletal inventory: none.

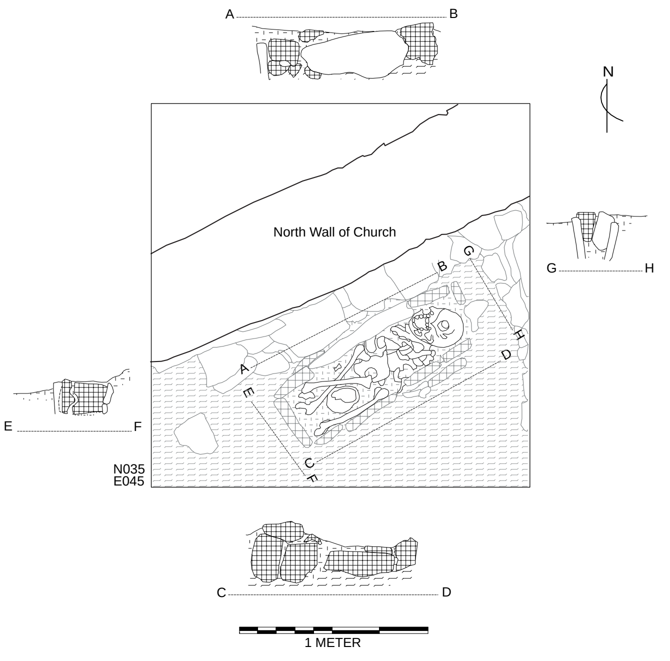
N: 3; female adult (30-40), child (2-3), and neonate.

Tomb 8 contained the disarticulated remains of an adult and the articulated skeleton of a young child (2-3 years old). The small size of the tomb suggests that it may have been originally intended for the child. The cranium of the adult lay upside down at the west end of the tomb, and the child's cranium lay upside down at the eastern end. A large adult vertebra and one of the child's clavicles were found lying inside the child's cranium. The western end of the tomb contained the adult remains (shoulder and pelvic girdles, spine, long bones, 5 foot bones) lying on top of the child's articulated skeleton. A neonate was represented by a single bone, a left tibia shaft.

The adult remains display characteristically feminine features: a gracile supraorbital torus and supraorbital margins, small mastoid processes, a small but well-defined nuchal region, and gracile temporal lines, a gracile mandible with a rounded chin, wide sciatic notches in the innominates, and gracile, lightly defined linea aspera on the femora. An age at death of 30-40 years (probably 35-40) is suggested by several features: the major sutures of the cranial vault hold firm but are clearly visible both ecto- and endocranially, the third molars have erupted and show flattened cusp tips, the medial epiphysis of the left clavicle is solidly fused, the sacroiliac auricular surfaces show smooth faces and minimal marginal rims (phases III – IV), and no vertebral osteophytosis is evident.

The young child's age estimate of 2 to 3 years at death is based upon skeletal and dental development: the two halves of the mandible and of the frontal bone, respectively, are fused (>1 year) but the three segments of the occipital are unfused (<3 years), while the deciduous first molar is completely erupted, the second deciduous molar partly so, and one premolar crown is no more than halfway formed. No skeletal pathology was evident.

When Powell made her initial examination of these remains in 1996, she determined that they represented three individuals. When she re-examined the remains labeled for Tomb 8 in 1999, an extra adult femur (complete, probably female, and not labeled with a TP number) had been added to the box at some undetermined point. Because the provenience of this femur is unknown, Powell did not count this additional individual in her MNI.



Tomb 8

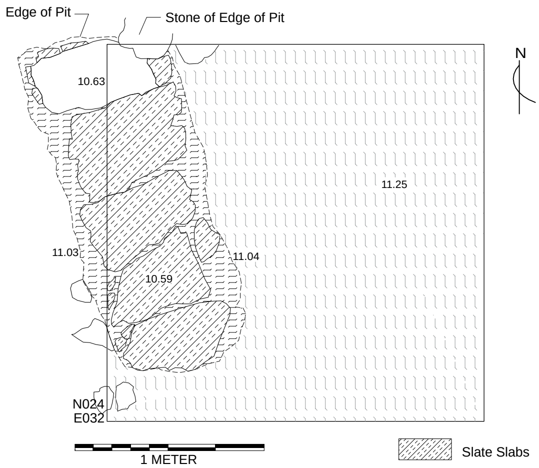
<u>Tomb 11; LC 112</u>

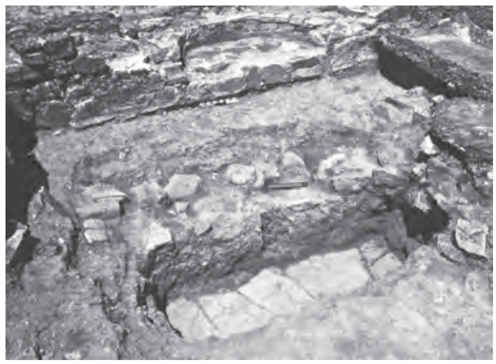
Location: Room IV, immediately east of Apse 2, in sqs. N024E030 and N024E032.
Orientation: north-south.
Construction/tomb type: Hale Type VII, unique.
Associated Artifacts: an iron lock mechanism (55.TP.84).
MNA skeletal inventory: none.
N: 1; adult male (40+ years); TP.96.84.

This large tomb (measuring c. 2m north-south) was dug below the level of the floor of the nave of the Eastern Basilica just east of the raised floor of Apse 2. It was covered with a slate slab and the walls were formed by the natural bedrock. The bottom of the tomb was formed of slate slabs laid over a drainage channel (25cm wide throughout, laid down the center of the grave pit and running approximately north-south) cut into the bedrock, running parallel to the east wall of Apse 2. The channel was most likely dug to drain away water that might accumulate in this tomb during the annual Springtime rise in the subsoil water table, the same annual phenomenon that "miraculously" filled the font in the Baptistry around the time of Easter. Many fragments of tiles were found in the fill.

The human remains recovered from this tomb consisted of 4 hand bones (left metacarpals 1, 2, and 4 and one phalanx) and four foot bones (left talus, left and right calcaneus, left first metatarsal). This individual was promptly dubbed "St. Achilles" by the American excavators. The epiphyses are completely fused, indicating an adult, and their large size suggests a male individual. Arthritic lipping of the proximal and distal epiphyses of the first metacarpal suggests an adult male of advanced age (40+ years).

A radiocarbon date obtained from a bone sample from this individual places his death sometime between 620 and 670 AD (2 sigma calibration). Maloney (2002, p. 42) describes this unusual tomb: "At some time in antiquity the tomb was carefully emptied of its contents. Since the location of this tomb immediately in front of the western apse is potentially one of honor, it is possible that the person originally buried in it was venerated locally and that the remains were intentionally translated to some other burial place. The ... remaining bones may have been left intentionally to maintain the dedication of the spot." The 7th century AD radiocarbon date places the death of this individual well after the initial construction stages of the Eastern Basilica (5th-6th centuries AD), so even if this tomb was revered during the later centuries of the basilica's use as the resting place of a Christian martyr (a *martyrium*) it could not have served as the initial motivation for the construction of the Eastern Basilica. Early Christians regularly incorporated a holy relic from an early martyr or other significant religious personage into the main altar structure of a newly consecrated church, and indeed, a small reliquary deposit was discovered underneath the place (marked by marble slabs) where the altar stood in Apse 1 at the eastern end of the Eastern Basilica; this deposit did not contain human remains, so it likely contained a relic of a more readily perishable material such as cloth or hair.





Tomb 11

Tombs A and B; LC 59 and 60

Location: adjacent to the inner side of the south wall of the Eastern Basilica. As drawn on da J. Lino da Silva's Plan (fig. 2.6), they were both filled with commingled disarticulated bones. Some of the bones are visible in the photo below.

Orientation: east/west.

Construction/tomb type: Hale Type IV, granite slabs.

Associated artifacts: none.

N: unknown.

Although bones are evident in the museum photograph it was impossible to connect those bones with any in the museum collections.

Tomb D; LC 61; unnamed on MNA Plan (fig. 2.6)

Location: South Sacristy (Room III), sq. N028E050.

Orientation: north-south.

Construction/tomb type: Hale Type II, brick box.

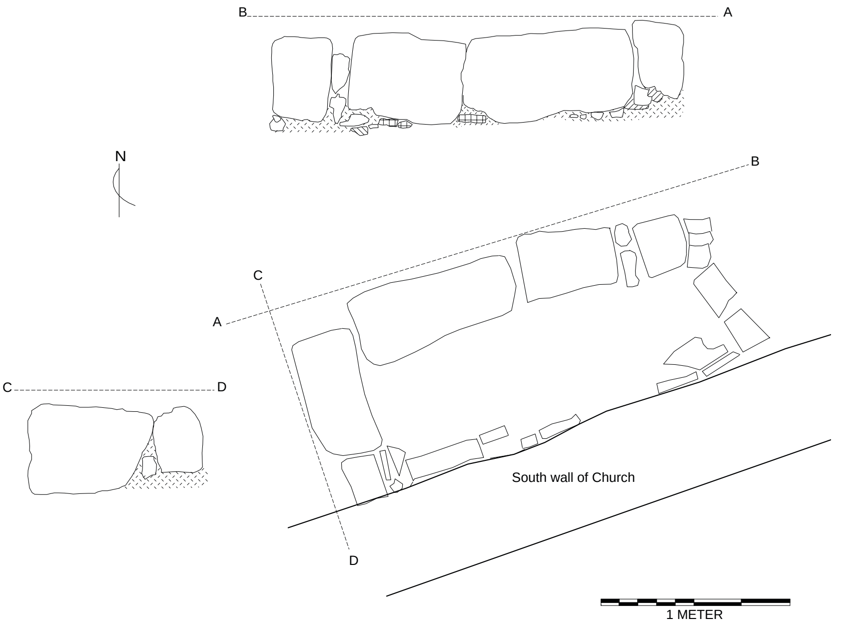
Associated Artifacts: none.

N: unknown, no bones recovered.

Tomb E; LC 62; unnamed on MNA Plan (fig. 2.6)

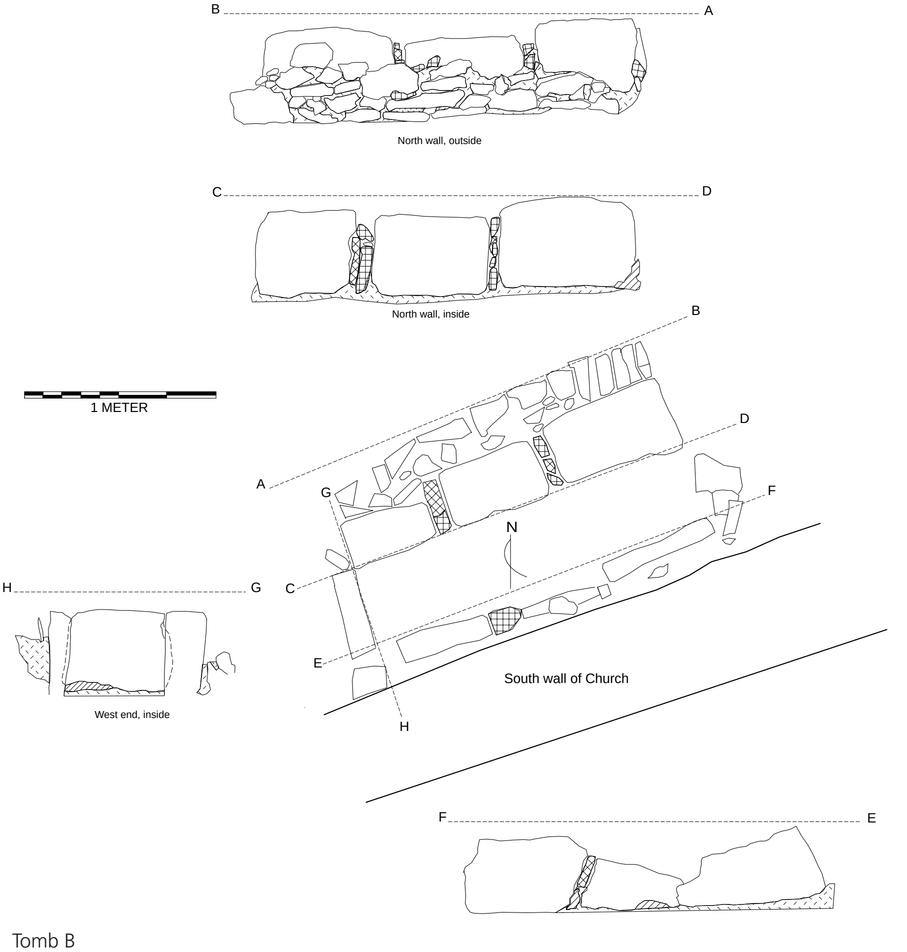
Location: South Sacristy (Room III), sq. N028E050.

Orientation: north-south.



(MNA photo 203)

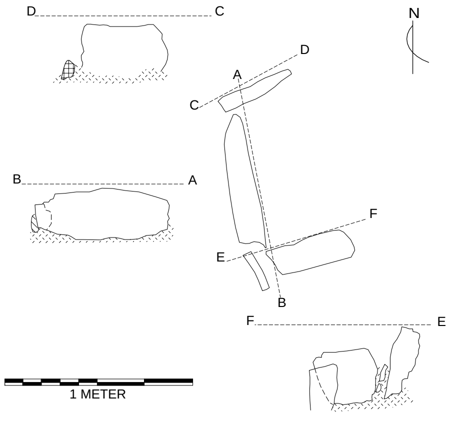
Tomb A



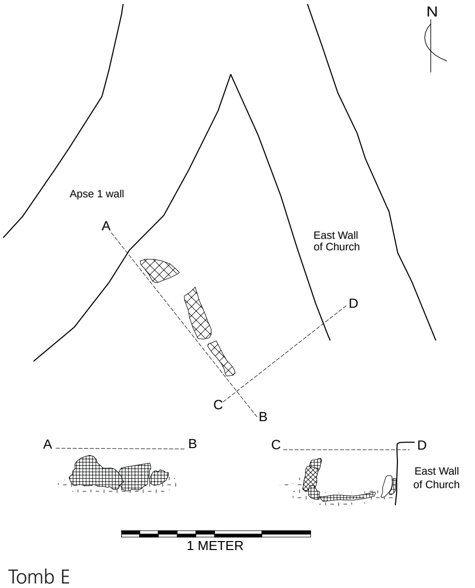
Tomb B

Construction/tomb type: Hale Type II, brick box.
Associated Artifacts: none.
N: 1; infant.

During cleaning of the eastern end of the Eastern Basilica by the American excavators in 1998, several bones of an infant (TP.51.98; distal portions of a femur and tibia, a proximal tibia epiphysis, and a talus) were recovered in the northeast corner of the south sacristy in the vicinity of two small tombs (D and E) that had been originally excavated by MNA. No human remains curated at MNA are associated with either of those tombs.



Tomb D



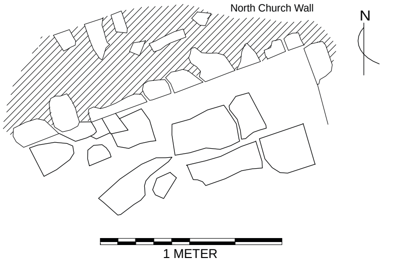
Tomb E

Tomb F; LC (none)

Location: the eastern end of Room V, the north aisle of the Eastern Basilica, directly above Tomb 8 (LC 104). It appears on de F. de Almeida's plan of the eastern end of the Eastern Basilica (fig. 2.16).

Orientation: east-west.

Construction/tomb type: Hale Type V, stone slab or kerb. The north wall is formed by the outer wall of the basilica and the eastern end is adjacent to the wall between the northeast sacristy and the north aisle. The other three walls of this tomb consisted of reused blocks of stone (Hale Type V, stone slabs) and its floor was brick. The western end of Tomb F was badly damaged. A displaced granite sarcophagus lid lay to the south and slightly to the west of this tomb, resting



Tomb F

on a partly preserved brick floor, but the body of the sarcophagus was missing. This tomb had been originally excavated by the MNAE archaeologists; no bones were recovered.

Associated artifacts: none.

MNA skeletal inventory: none.

N: unknown, no bones recovered.

Tomb G; LC 56; unnamed on MNA Plan (fig. 2.6)

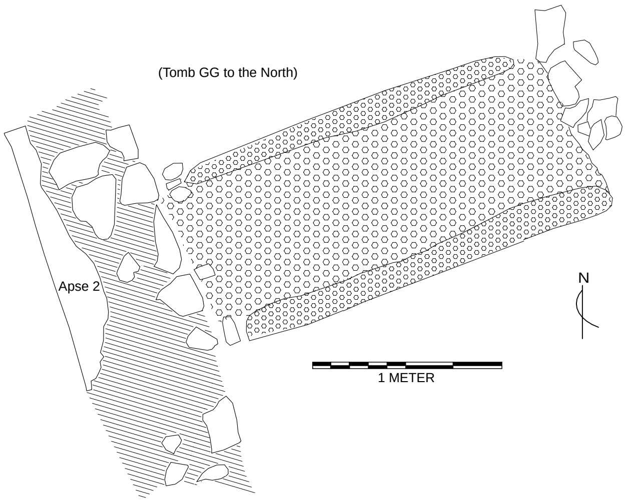
Location: the west end of Room IV, just south of Tomb GG.

Orientation: east-west.

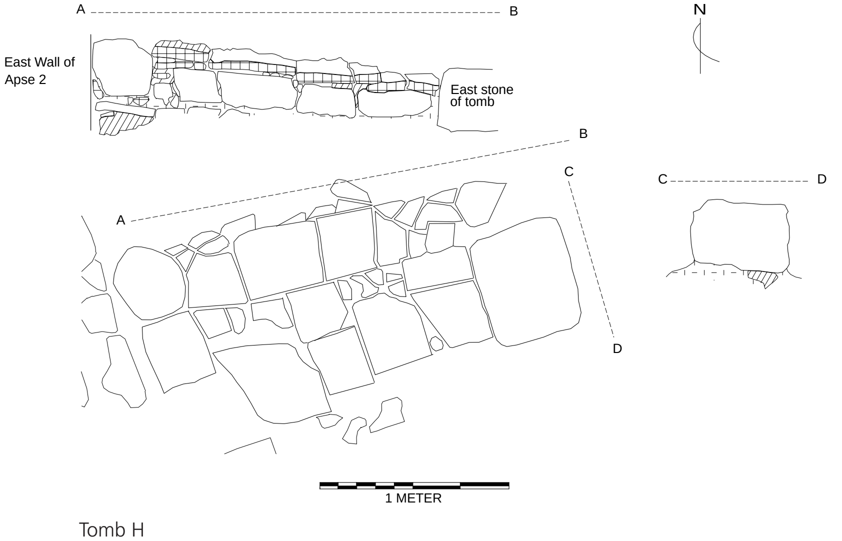
Construction/tomb type: Hale Type VII, a fine *opus signinum* slab at the head (west end) but poor construction at the foot end (east).

Associated artifacts: none.

N: unknown, no bones recovered.



Tomb G



Tomb H

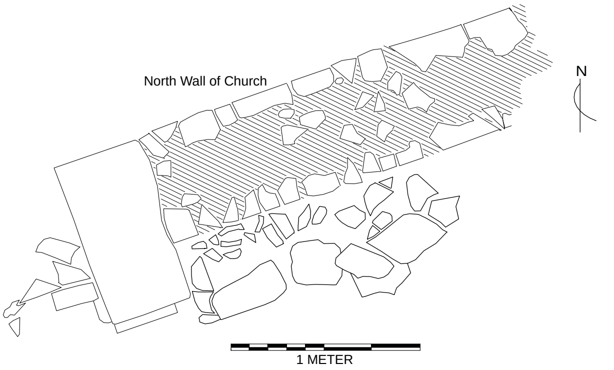
Tomb H; LC 5; unnamed on MNA Plan

Location: eastward from the southern end of Apse 2.
Orientation: east-west.
Construction/tomb type: Hale Type III, stone blocks with a brick cap.
Associated artifacts: none.
N: unknown, no bones recovered.

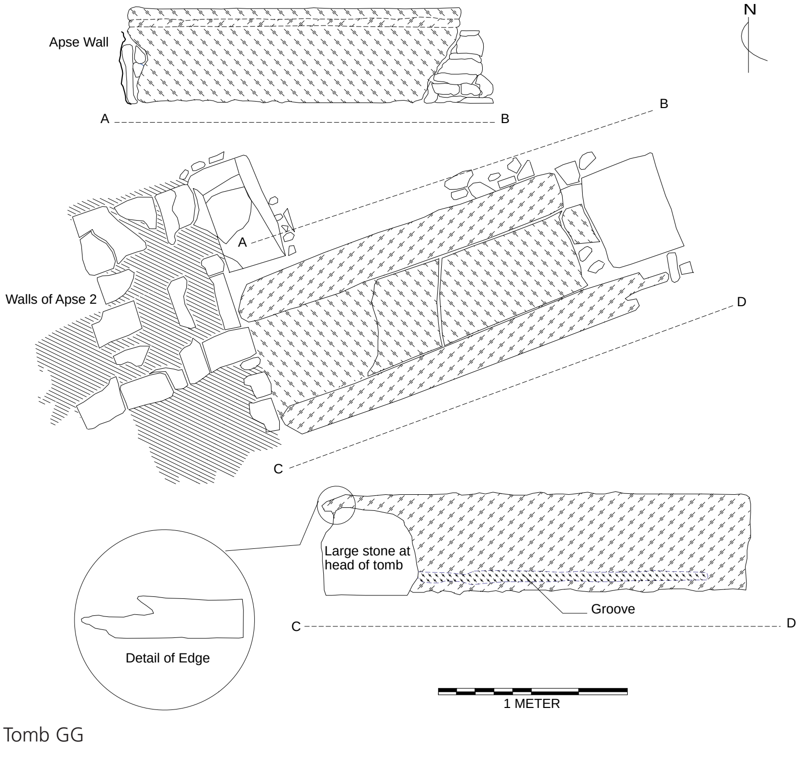
Tomb I; LC 54

Location: against the inner side of the north wall of the Eastern Basilica. It does not appear on any MNAE Plan.

Orientation: east-west.
Construction/tomb type: Hale Type V, stone blocks.
Associated artifacts: none.



Tomb I



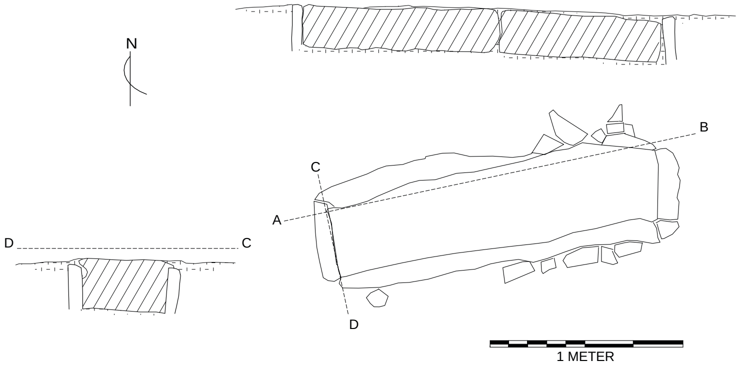
Tomb GG

Tomb GG; LC 55; *Sepultura* L
Location: eastward from the northern end of Apse 2, at the west end of Room IV.
Orientation: northeast-southwest.
Construction/tomb type: Hale Type IV, granite architectural elements.
Associated artifacts: none.
N: unknown, no bones recovered.

4.3. Early Christian Tombs in & around the Baptistry (Complex B)

Tomb C; LC 63; *Sepultura* 7-A
Location: 2.18m south of the southeast corner of the Eastern Basilica.
Orientation: east-west.
Construction/tomb type: Hale Type VII, concrete slabs below ground level.
Associated Artifacts: none.
MNA skeletal inventory: 2005.231.
N: 2; one late adolescent, one neonate.

Tomb C contained the nearly complete skeleton (c. 90%) of a late adolescent female, and a few bone fragments of an infant aged birth –1 year. The adolescent's bones were well preserved, and include the complete cranium and mandible and most of the spinal column, ribs, and shoulder girdle, the long bones of the upper and lower limbs, and the pelvis. The hands and feet are represented only by a few of the metacarpals, metatarsals, and phalanges, and several of the larger tarsals. The adolescent's age estimate is based on dental criteria (light wear on all of the teeth; only one M3 has erupted, the others being visible in their bony crypts), the degree and pattern of osseous fusion (e.g., open basilar suture, fusion of the elements of the innominates, but non-fusion of the humerus head, the distal epiphyses of the metacarpals and metatarsals, and distal epiphyses of the femur and tibia), and the immature appearance of the pubic symphyseal surfaces (distinct transverse ridges, with complete absence of defined rim or plateau). The sex estimate is based upon key features of the cranium (gracile supra-orbital torus and margins, small mastoids, absence of pronounced muscular attachments) and the pelvis (wide sciatic notch and subpubic angle, marked preauricular sulcus). Skeletal pathology included two symmetrical areas of moderately striated cortex along the medial aspects of the central femur shafts and one thoracic vertebra whose spinous process was sharply deviated to the right, perhaps as the result of an old fracture.



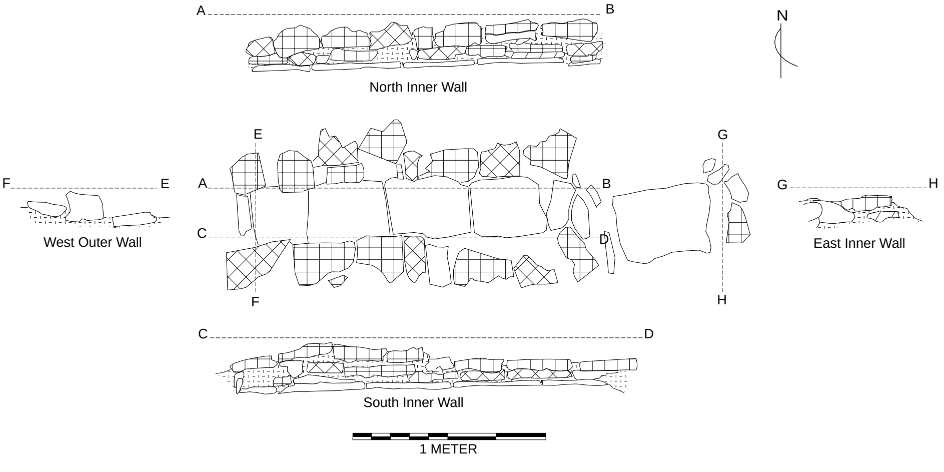
Tomb C

Tomb W; LC 73; *Sepultura* 2-A

Location: 2m south of the south wall of the Western Basilica.
Orientation: east-west.
Construction/tomb type: Hale Type I. Brick wall construction.
Associated Artifacts: none.
MNA Skeletal Inventory: 2005.78.
N: 4: adult female (20-25), adult male, adult, juvenile (7-9).

The human remains associated with *Sepultura* 2-A include the commingled incomplete remains of at least 4 individuals: three adults and a juvenile (8-9 years). One adult is represented by a partial cranial vault (2005.78. 2-19) with unfused coronal and sagittal sutures; the occipital is very loosely joined to the parietals at the lambdoid suture. The third molars in the partially complete mandible (2005.78.20-21) that match this cranium are just erupting, with very light wear on the exposed cusp tips, suggesting an age of 20-25 years. This adult is probably a female, judging from the gracile supraorbital margins and torus and the smooth nuchal region.

A second adult is represented by the large long bones from the upper and lower limbs, but the shoulder girdle, ribs, pelvis, and hands are missing, the spine is represented only by a few vertebrae, and the feet are represented only by the largest tarsal bones. The third adult is represented only by a few long bones. Metric data from the long bones and tarsals suggest one adult male, one adult female, and one indeterminate adult following the methods of Wasterlain (2000) and Silva (1995) for determination of sex. One juvenile aged 7-9 years is represented by a few incomplete post-cranial bones.



Tomb W

Tomb X; LC 74; *Sepultura* 1-A

Location: 3m south of the south wall of the Western Basilica.
Orientation: northwest-southeast.
Construction/tomb type: Hale Type IV.
Associated Artifacts: one ceramic pitcher with handle, visible in MNA photo 46 at the foot end of the tomb; *terra sigilata hispanica*, Mezquirez type, 2nd century AD.
MNA skeletal inventory: 2005.204.
N: 4; adult female (50-60 years), two adult males (one 50+ years), adolescent (13-14).

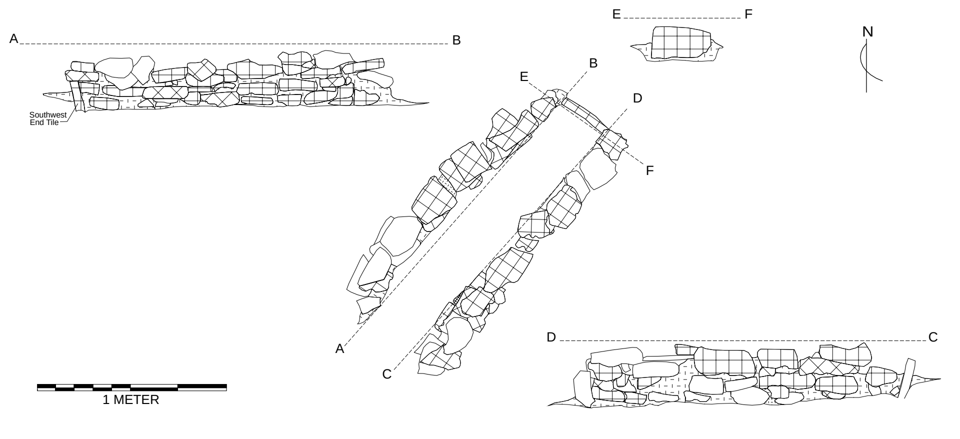
The commingled incomplete human remains recovered from Tomb X indicate at least four individuals: two adult males, one adult female, and an adolescent. One adult skeleton, lying supine, is clearly visible in the MNA photograph included here, with some disturbance of the bones from its originally articulated state; a second complete cranium is lying between its femur shafts. The postcranial remains for these two individuals include the large long bones and incomplete shoulder girdles, pelves, ribcages, and spines; the hands and feet are very incomplete.

The cranium of the adult female (2005.204.3) exhibits advanced ectocranial fusion of the major sutures, with the lines almost obliterated. Advanced biparietal thinning without fenestration is evident, as well as a broad shallow depression centered on the sagittal suture just anterior to the parietal foramina (fig. 3.3). Based on the degree of cranial suture fusion, the sacroiliac surface morphology (coarse macroporosity with initial breakdown of rim at apex), and age-related changes in the vertebrae (Masset, 1989), her age at death is estimated at 50-60 years.

The major sutures of the complete adult male cranium (2005.204.4) are obliterated endocranially and almost so ectocranially. The morphology of the incomplete right pubic symphysis suggests a Todd score of VII or VIII; the two features together suggest an age at death in excess of 50 years. A well-remodeled small oval depressed fracture (24.8 × 11.7mm) is visible on the right frontal, 30mm anterior to the coronal suture (fig. 3.6). The base of the depression shows mild pitting, and the depression is not visible endocranially.

Two adult cervical vertebrae (C2/C3) are fused through the lateral margins of the bodies and the arches, but the disk space is not obliterated. The lumbar vertebrae from one adult show large osteophytes and several Schmorl's nodes. Several quite robust carpal phalanges show strongly developed marginal ridges on the palmar aspects, and one right first metacarpal shows bony osteophytes around the margin of the distal end, palmar aspect.

One additional male adult is represented by a very large robust right humerus. One incomplete right tibia shaft of near-adult size but with the (missing) distal epiphysis unfused indicates an adolescent aged c.13-14 years at death. Given the observed occasional examples of mixing of remains from two different *sepulturas* (whether in the field or during the initial curation at the Museu), it is possible that the very large humerus belongs to the robust adult male in *Sepultura* 2 and that the adolescent tibia shaft belongs to an older subadult in one of the other *sepulturas*.



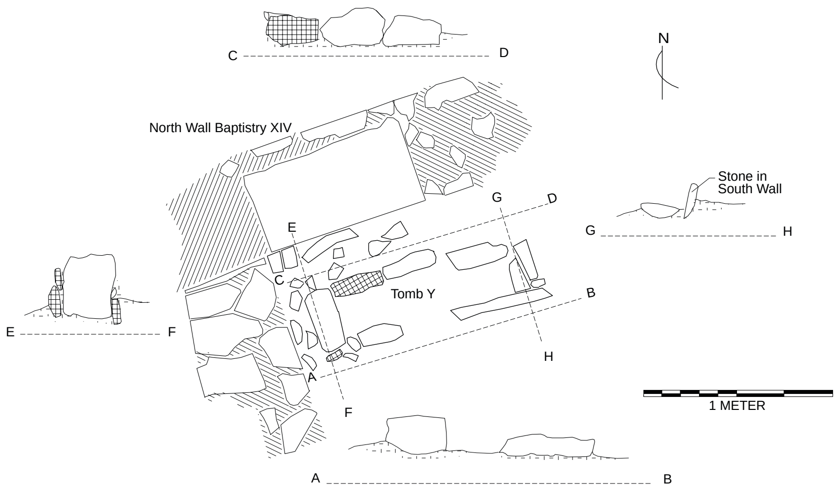
Tomb X (MNA photo 46)

(MNA 2005.204.1_1)

Tomb Y; LC 65; *Sepultura* 8-A

Location: inside the northwest corner of Room XIV of the Baptistry.
Orientation: east-west.
Construction/tomb type: Hale Type V, upright stone slabs.
Associated Artifacts: none.
MNA skeletal inventory: 2005.232.
N: one child aged 3.5-4.5 years.

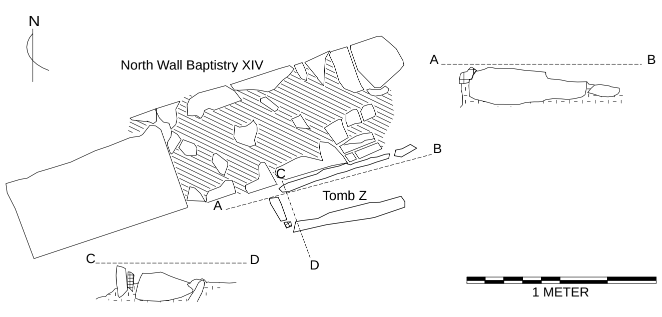
MNA excavation photograph 33 shows the complete articulated skeleton of a single subadult individual. The skeleton occupies only about one-half of the grave pit, which seems to have been dug for an adult. The skeletal remains from this sepulture evidently were mixed with the remains from *Sepultura* 9-A, which was located c. 2m to the south inside Room XIV, at some point after excavation. The commingled subadult bones represent: one child aged 3.5-4.5 years, represented here only by a right femur shaft; and one juvenile (10-11 years) represented by a mostly complete cranial and postcranial skeleton.



Tomb Y

Tomb Z; LC 66

Location: northwest corner of Room XIV in the Baptistry.
Orientation: east-west.
Construction/tomb type: Hale Type V, stone kerbs.
Associated artifacts: none.
N: unknown, no bones recovered.

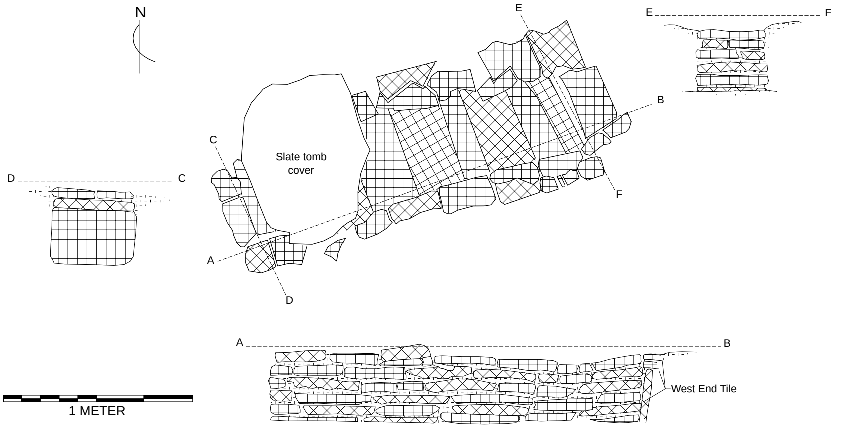


Tomb Z

Tomb AA; LC 67; *Sepultura* 9-A

Location: southwest corner of Room XIV in the Baptistry.
Orientation: east-west.
Construction/tomb type: Hale Type I, layers of tiles laid flat.
Associated Artifacts: none.
MNA skeletal inventory: 2005.233.
N: 1; juvenile 11-12 years (±30 months).

The skeletal remains from this sepulture appear to have undergone mixing with the remains from *Sepultura* 8-A, which was located c. 2m to the north inside Room XIV. The majority of the bones labeled as coming from *Sepultura* 9-A are from a juvenile aged between 10 and 12 years (±30 months, Buikstra and Ubelaker, 1994), based on the full eruption of the left and right mandibular second permanent molars. The cusp tips of the first permanent mandibular molars are slightly flattened, but the cusp tips of the second molars are only very slightly worn. The components of the innominates are present but have not yet fused, indicating a pre-pubertal subadult. This juvenile is represented postcranially by the right and left humerus, radius, ulna, and femur, right scapula, left tibia, and a few fragments of ribs and vertebrae. This skeletal assemblage matches the visual evidence of MNA photograph 33, which shows *Sepultura* 9-A opened and cleaned for bone removal.



Tomb AA

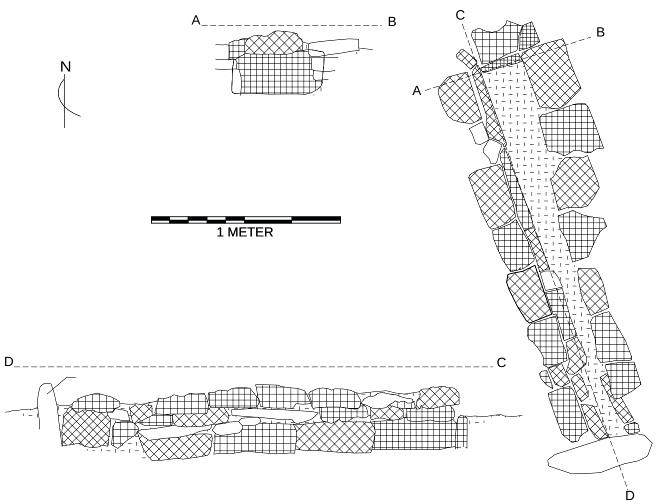
Tomb BB; LC 68; *Sepultura* 4-A

Location: about 1m west of the southern portion of the western wall of the baptistry complex, outside Room XVII.
Orientation: north-south.
Construction/tomb type: Hale Type I, brick wall.
Associated Artifacts: none.
MNA Skeletal Inventory: 2005.227.
N: 3, one adult female (30-40), one adult male, one indeterminate adult.

The MNA photograph 36 below shows the skeleton of an adult, head to the north, with considerable disturbance from its originally articulated state. The commingled and incomplete remains represent three adults. One adult female, aged c. 30-40 years at death based on medial clavicle fusion and dental wear, was represented by a partial cranium), a gracile mandible containing 9 teeth, the lower spine, a few rib fragments, several bones of the hands and feet, and the large long bones and shoulder girdle. The coronal suture is obliterated endocranially, suggesting an age at death of over 35 years, and an unfused metopic suture is clearly visible on the frontal.

One left rib shows a possible healed fracture just distal to the angle at the anterior curve. The left humerus shows slight lipping (discontinuous) around the margin of the head. The left distal ulna has a well-healed fracture with a slight offset between the two united segments of the shaft; the alignment is generally good, with no appreciable loss of shaft length.

The other two adults are represented only by very incomplete and fragmented postcranial remains: a few lumbar vertebrae, a right radius, and a left ulna that do not belong to the adult female. One incomplete robust mandible (2005.227.25) includes the anterior half of the left body, the chin, and 4 teeth, and a second, less robust incomplete mandible (2005.227.26) consists only of the left side of the body and 2 teeth.



(MNA photo 36)

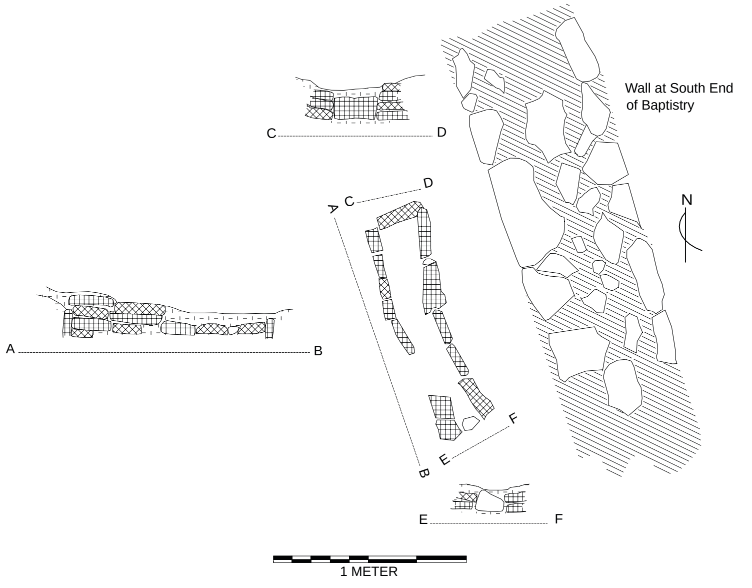
Tomb BB

<u>Tomb CC; LC 69; *Sepultura* 10-A</u>

Location: outside the southwest corner of Room XVII, outside the Baptistry complex wall.
Orientation: north-south.
Construction/tomb type: Hale Type II, brick box.
Associated Artifacts: none.
MNA skeletal inventory: 2005.234
N: 4; adult, infant (0.5-1 year), child 3-4, juvenile 6-7.

The human remains recovered from this sepulture represent the commingled and incomplete skeletons of one infant and two young children, plus an adult first cervical vertebra, rib, and metatarsal. All three of the subadults are represented by both cranial and postcranial fragments, and the age estimates are based primarily upon dental development and eruption (Ubelaker, 1989). The maxilla of the oldest child (aged 6-7 years, ±24 months) contains left and right permanent first molars that are just beginning to erupt, with the deciduous first and second molars still in place. In the mandible of a slightly younger child (aged 5-6 years, ±16 months), the fully formed crowns of both first permanent molars are visible within their crypts, as are the partially formed permanent second molar crowns, with all four deciduous molars still in place. The two halves of the youngest child's mandible have recently fused, with the line of fusion still clearly visible; this feature, considered along with the fully erupted first deciduous maxillary and mandibular molars, give an age estimate of 16 months-2 years, ±8 months).

In the cranium of the oldest child, both orbits show moderate pitting in the medial aspect of the superior surfaces, as well as a small patch of remodeled cortex on the internal occipital protruberance. The next oldest child also shows cranial skeletal pathology: small patches of new woven bone on the medial aspects of both orbits, and several patches of remodeled cortex on the endocranial aspect of the superior half of the occipital squama, the superior squama of the frontal, and the parietals. The external aspect of both greater wings of the sphenoid show finely pitted cortex, strongly suggestive of scurvy (Ortner, 2003). No postcranial pathology was evident.



Tomb CC

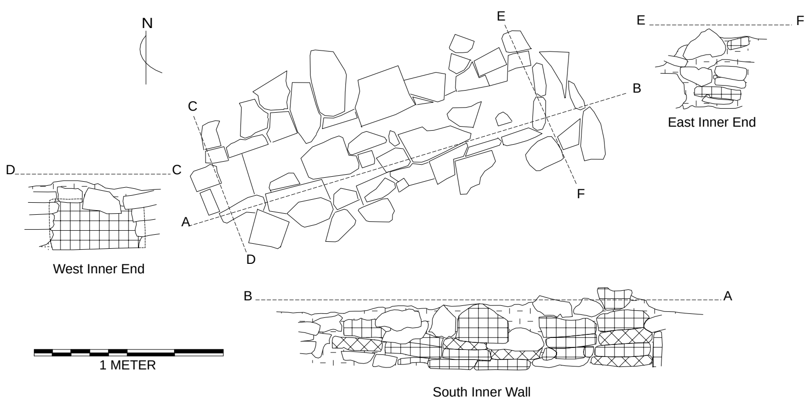
Tomb DD; LC 70; *Sepultura* 6-A

Location: outside the southeast corner of Room XIX, immediately south of Tomb EE.
Orientation: east-west.
Construction/tomb type: Hale Type I, brick and stone fragments.
Associated Artifacts: none.
MNA skeletal inventory: 2005.229.
N: 5; 1 adult female, two adult males (one 40-50 years), juvenile (11-12), adolescent (14-16).

This tomb yielded the commingled remains of five individuals. The three adults and the juvenile are unusually well represented by both cranial and postcranial bones, but the presence of a fifth individual, an adolescent younger than 16 years at death, is signaled only by the presence of a fibula shaft with unfused (missing) epiphyses.

No skeletal pathology is evident in the juvenile's skeleton, but the mandible displays anomalous deep broad grooves across the center of both left and right mandibular heads, oriented transversely (i.e., at 90° to the long axis of the heads). The right anterior body of one adult male mandible displays an unusual bony "shelf" 9mm wide, just anterior to the mental foramen but on the same level in the superior-inferior plane. Immediately below this shelf is an oval depression just superior to the robust inferior margin of the chin. The left side of the mandible shows a similar oval depression but no bony shelf. Two right rib fragments from one of the adults (probably the female) bear small patches of partly remodeled new bone covering a 55mm-long area on the pleural aspect near the lateral curve. Another fragment (probably from the same adult) shows a smaller patch of new bone (14mm long) in the same region. This type of pathology suggests pulmonary inflammation or infection of relatively chronic duration, probably still active at the time of this individual's death. One adult male left rib bears a bony spur 15.8mm long extending vertically, immediately proximal to its anterior costal cartilage articulation.

The postcranial bones of the three adults are robust with rugged muscle attachments, evincing lives of strenuous physical activity. All three sets of lumbar vertebrae show moderate to advanced osteophytosis; one set shows a large Schmorl's node in the superior body surface of L1 and L3/L4 fused by abundant osteophytes. The sacrum of the larger adult male has six segments instead of the normal five, and a markedly anterior curve; anomalous bilateral facets are visible on the posterior aspect of the sacrum at the level of the S1/S2 joint, some 13mm inferior to the lower margin of the normal articular facets. These anomalous facets are flat in appearance; the right facet measures 13mm tall and 13.2mm wide, while the left facet measures 15mm tall and 11mm wide. These match clearly defined accessory articular facets of the posterior left and right innominates belonging to this individual, located posterior to the lower margins of the SIA surfaces. The right SIA surface is heavily remodeled with a bony rim around the superior half and bony nodules evident around the entire rim and on the surface. The left SIA joint also shows some marginal remodeling, but less advanced, suggesting an age of 40+ years at death. The heads and necks of both femurs of this individual show a distinctive pattern of remodeling associated with habitual horseback riding (see section 3.8.1).



Tomb DD

<u>Tomb EE; LC 71; *Sepultura* 5-A</u>

Location: 1m immediately south of the southeast corner of Room XIX of the Baptistry complex.

Orientation: east-west.

Construction/tomb type: Hale Type I, stone slabs and brick lining.

Associated Artifacts: none.

MNA skeletal inventory: 2001.79.

N: 5; 1 adult female, 2 adult males (30-40 years and 40-50 years), 1 adult, one juvenile 9-11 years.

The human skeletal material recovered from this tomb consists of the commingled and incomplete remains of at least four adults and one juvenile. One partial cranium (2001.79.2-.6) exhibits moderately robust mastoid processes and supraorbital margins and torus; it probably represents a male. The coronal suture is obliterated endocranially, and the sagittal and lambdoid sutures partially obliterated, suggesting an age at death between 40 and 50 years. The sacroiliac joint surface of an incomplete male right innominate shows moderate marginal lipping and a grainy surface, which matches this age estimate. A second adult, probably male, is represented by an almost complete frontal and an incomplete right innominate; the lack of coronal suture fusion and the appearance of the SIA surface (initial marginal lipping, a smooth face) suggest an age at death between 30 and 40 years. One adult female was identified by metric data from a complete right calcaneus (Silva, 1995). The adults are incompletely represented by long bones and the larger tarsals (talus and calcaneus); other adult remains include three right innominate fragments, several vertebrae, a partial sacrum, and a few metacarpals. The juvenile is represented only by cranial remains and teeth; the mixed dentition suggests an age at death between 9 and 11 years.

Skeletal pathology is minimal: two vertebrae (T11 and l 5) show osteophytic lipping on the body margins, and there are two small patches of partly remodeled new bone evident on the lateral aspect of the left ascending ramus of the most complete mandible.

Tomb FF; LC 64

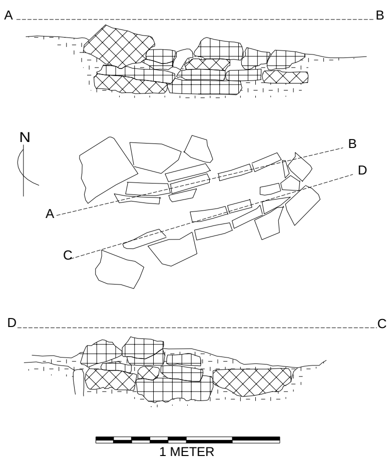
Location: southeast corner of Room XIV in the Baptistry. It is unnamed on MNA Plan (fig. 2.7).

Orientation: north-south.

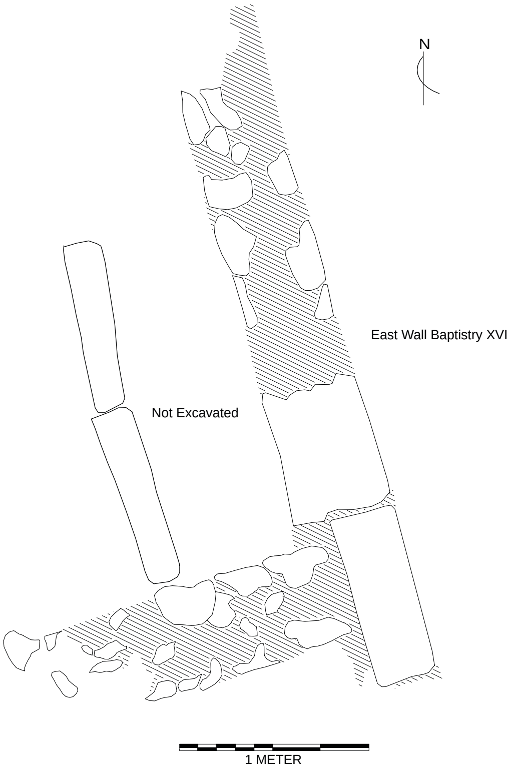
Construction/tomb type: Hale Type VII, a hybrid between Types IV and VI.

Associated artifacts: none.

N: unknown, no bones recovered.



Tomb EE



Tomb FF

Tomb from the Basilica House

TP.1.86; LC 102

Location: probably Room XXII in the Basilica House.

Orientation: east-west.

Construction/tomb type: unknown.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 1; late adolescent (17-19).

These human remains were given to Maloney in 1986 by one of the guards at the site, who discovered the primary extended burial during cleaning of the Basilica precinct. The exact location is not known, but it most likely came from Room XXII in the Sacristy of the Eastern Basilica in the Church.

Almost all of the cranial and postcranial skeleton was represented, although most of the bones were broken. The pelvic morphology (a relatively narrow sciatic notch and the absence of a preauricular sulcus) indicated a sex estimate of "male", and key postcranial metric data (the maximum diameters of the humerus and femur heads) fell within the male range for this population sample. However, the cranium was gracile with small mastoid processes, thin supraorbital margins and small supraorbital torus, small squared chin, and a rounded nuchal prominence, and the muscle attachment markers on the long bones (e.g., the deltoid tuberosity and linea aspera) were not well developed, compared with the rugose attachments observed in many adults in this population, suggesting that this individual did not habitually perform strenuous physical activities.

None of the major cranial sutures (coronal, sagittal, and lambdoid) were fused, and the basilar suture was also open, indicating an age at death younger than 25 years. Other features of skeletal maturity suggested a slightly younger age (17-19 years): many of the long bone epiphyses were unfused, as were the iliac crest, ischial tuberosity, and proximal epiphyses of the metatarsals, or only partly fused, as were the annular rings of the cervical vertebrae. However, all four permanent third molars had erupted, and showed very light wear on the cusp tips, suggesting an age at death of at least 20 years. It is possible that this "offset" between dental and skeletal age might reflect one or more periods of severe physiological stress during childhood or early adolescence which delayed skeletal maturity relative to dental development. However, none of the permanent teeth display linear enamel hypoplasia, a marker of developmental stress seen on the teeth of many other individuals from this population.

This individual shows a very unusual dental feature: each of the four maxillary incisors displays a crescent-shaped linear lesion with sharply defined margins, wedge-shaped in cross section and c. 1mm in depth, on the lingual aspect at the cemento-enamel junction. No similar lesions are visible on the labial aspects of these or any other teeth. This pattern of lingual CEJ erosion is associated with bulimia (i.e., frequent vomiting) in modern clinical literature, as the result of repeated exposure of enamel to stomach acids (Ogden, 2008).

LC 75

This tomb is drawn but not named on MNA plan (fig. 2.7) with no bones shown. There was no trace of this tomb remaining when UL excavations began in 1983.

Location: south of the southwestern end of the Western Basilica, west of UL Tombs X, Y, and Z.

Orientation: unknown.

Construction/tomb type: unknown.

Associated artifacts: none.

N: unknown, no bones recovered.

Human remains not associated with identified tombs

The Large Reburial

LC 53

Location: just south of the adjacent ends of Apse 2 (Eastern Basilica) and Apse 3 (Western Basilica).

Orientation: N/A.

Construction/Tomb Type: no formal tomb, a large pit dug into the ground.

Associated Artifacts: none.

N: 19; 4 females (two 20-30, two 30-40), 7 males (one 20-30, four 30-40, two 50+), 3 adults of unknown sex, 1 infant (12-18 months), 2 children (one 3-4, one 6-7), 1 juvenile (7-8), 1 adolescent (12-13); TP.119.84.

The quality of bone preservation is generally very good. All of the crania are incomplete, and from the perspective of the Portuguese archaeologists of the 1950s, these skeletons were probably judged to be unsuitable for study by physical anthropologists seeking quantitative data for the determination of ethnicity, a major interest of M. Heleno.

Fourteen adults were represented by frontal bones, but none of these crania retained intact facial and/or basicranial regions. Estimations of sex were based on morphology (robusticity or gracility) of key cranial features: supraorbital margins and tori, mastoid process and supra mastoid ridge, and nuchal crest. Four of these adult crania were partially intact, due to advanced fusion of the vault sutures: three females who died in their early 30s (one with the coronal suture still unfused, another with both coronal and lambdoid sutures open, and a third with the lambdoid suture open and no endocranial obliteration of C or S) and one male aged 50+ years (all three major vault sutures obliterated endocranially).

The larger long bones are well represented, shoulder girdle and pelvic elements less so, and vertebrae, ribs, hands, and feet are significantly underrepresented. Because the bones were commingled, it was not possible to reconstruct complete adult individuals; instead, the major elements were seriated from smallest to largest. Counts of individual post-cranial elements supported but did not augment the adult MNI based on the frontal bone: 14 left and right humeri, 13 right innominates, and 12 left femora and tibiae.

Adult skeletal pathology includes two cases of spondylolysis of the fifth lumbar vertebra, one bilateral and one unilateral, resulting from faulty fusion of the arch onto the body of the vertebra. One female frontal shows bilateral mild cribra orbitalia, an indicator of nutritional/parasitic disorders. Two maxillae show apparent healed fractures, and one clavicle has a crushed medial end. Several fibula and tibia shafts display areas of newly deposited (fibrous) or old (sclerotic) bone on the medial and lateral midshaft regions. Several of the larger femora and innominates show bony non-pathological modifications in specific areas of muscular attachments that are characteristic of habitual horse-back riders.

The five subadults include one infant (6-18 months), three children (one aged 3-4 years one aged 6-7 years, and one aged 7-8 years), and one adolescent (12-13 years). They are represented almost exclusively by long bone shafts and unfused components of the innominates; three occipital bones, a few other vault fragments, and one mandible head, and a scattering of vertebrae and ribs. No skeletal pathology was noted in subadult remains; the C2 of a child has a bifid odontoid tip, anomalous but not pathological. This MNI tallies well with Sr. Peixe's memory (35 years after the fact) of "16 adults and 3 children" reburied in this pit. One of the subadults was an adolescent, and the largest of the children may also have been mistaken for a rather small adult.

TP.83.84; LC (none)

Location: sq. N024E048, NE corner of Room XVI (the Well Room) in the Baptistry.

Orientation: N/A.

Construction/Tomb Type: none evident.

Associated artifacts: none.

N: 3; neonate, adult, child (c. 2-3 years); TP.83.84.

Fragmentary human remains representing at least three individuals were recovered from this square. One adult is represented by a partial cranium (a partial occipital with unfused lambdoid suture and fragments of the face and mandible, and 4 teeth) and the second cervical vertebra, and fragments of the right clavicle, several ribs, the left humerus, the pelvis, one patella, fragmentary tibia and fibula shafts, and a few hand and foot bones. The size of the bones suggests a male, aged probably 30-40 years at death (SIA surface = phase III-IV; moderately advanced molar occlusal wear).

A young child is represented by fragmentary and incomplete cranial (including 3 teeth) and postcranial remains. The age estimate of 2-3 years is based upon dental development: in a fragment of the right mandible, the second deciduous molar has erupted and the crown of the first permanent molar is completely formed. A neonate is represented by a few fragments of ribs and vertebrae, the right clavicle, left femur and tibia, and one metatarsal.

TP.84.84; LC (none)

Location: sq. N022E039, NE corner of Room XIV in the Baptistry.
Construction/Tomb Type: no tomb structure identified.
Associated artifacts: none.
N: 1; child (2-3 years); TP.84.84.

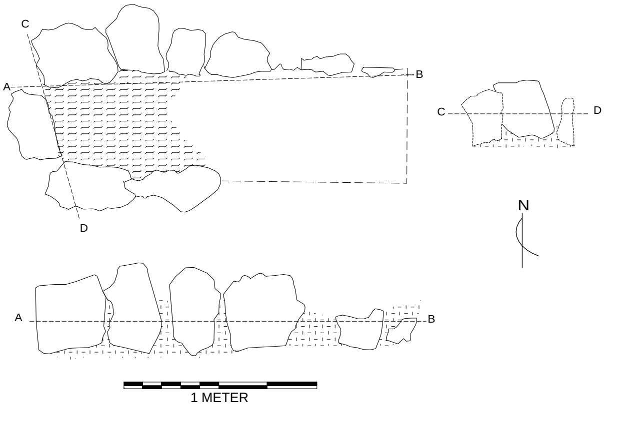
The unfused right half of the arch from a lower cervical vertebra (C6 or C7) of a child aged 2 to 3 years was the only piece of human bone recovered from this square. Numerous pieces of animal bone were found.

5. The Southwest Cemetery/*Cemitério da Villa Lusitano-Romano*/ Complex D

SW 1; LC 77

Location: eastern edge of the SW Cemetery.
Orientation: east-west.
Construction/tomb type: Hale Type V, stone kerbs. The walls, consisting of irregular stone blocks rather widely placed, seem incomplete. At the west end the walls curve in toward the headstone creating a horseshoe shape. The floor is bedrock.
Associated artifacts: none.
MNA skeletal inventory: none.
N: 1; adult female (30-40).

Apparently, the grave was looted at some time in the past by diggers who located the head of the burial and worked their way with hoe or shovel through the area where earrings, fibulae,



SW 1

rings, and buckles might have been found. In the east end of the tomb were the fragmentary remains of a gracile adult (cranium, mandible, spine, ribs, shoulder and pelvic girdle, upper and lower limbs, 3 tarsals). The sagittal suture is fused but not obliterated endocranially, and there is no sign of osteophytosis in the vertebrae, giving an estimated age at death of 30-40 years.

SW 2; LC 76

Location: immediately to the west of SW 1, cutting into the northeast side of room CH II of the Cemetery House.

Orientation: east-west.

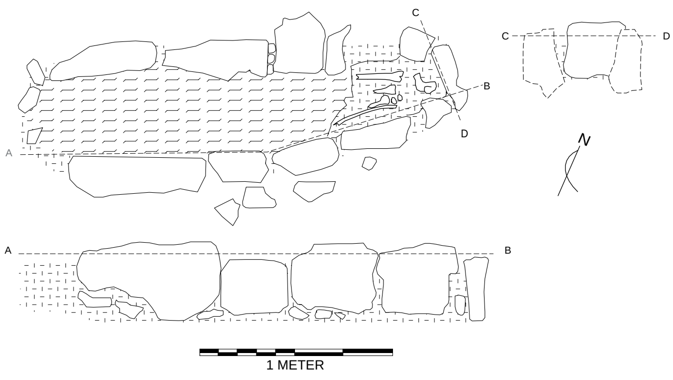
Construction/tomb type: Hale Type V, stone kerbs. This tomb is composed of rough stone blocks with flat surfaces turned inward. The head (west end) is horseshoe shaped, and the floor is bedrock.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 2; adult female, adolescent (14-17).

The incomplete remains of a gracile adult (fragments of humerus, radius, right innominate, left femur, left and right talus, tibia and fibula) were recovered from this grave. The distal end of the tibia of an adolescent (distal epiphysis unfused, 14-17 years) was also present.



SW 2

SW 3 (not a tomb); LC 79

This pit, cut into the wall of room CH 1, was originally believed to be a tomb similar to SW2. It is the most westerly feature in the northern row of tombs. Two large slabs protrude from the ground beside a large carved granite block. It was determined not to be a tomb.

SW 4; LC 78; *Cemitério Sepultura* 7

Location: inside the walls of the Cemetery House, extending from room CH III into room CH I through what was originally the south side of the door.

Orientation: east-west.

Construction/tomb type: Hale Type VII (unique). The south wall of this tomb consists of two large granite slabs down to the midpoint, which match a single large smooth flat slab of bedrock in the north wall. The rest of the walls are finished off on the south side with small irregular blocks and bricks, and on the north side with three medium-size blocks. The cracks between the blocks are filled with brick fragments. The east end (foot) is closed off by an upright brick set in concrete. The matching brick at the west end is missing, but the squared ridge of concrete which supported it is still in position. The floor also shows this change in technique, deteriorating from a complete Roman brick under the head to a closely fitted surface of brick fragments under the torso and pelvis to an uneven mass of coarse rubble and earth under the legs.

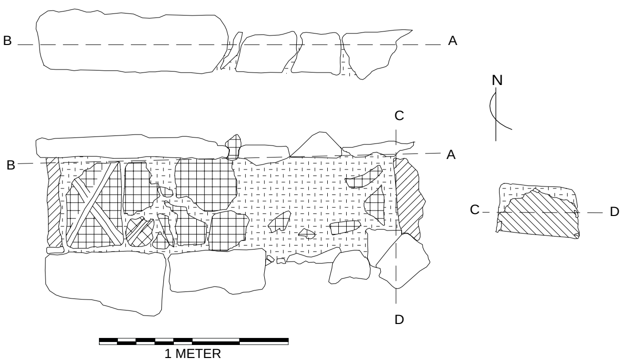
Associated artifacts: 1 ceramic sherd, 25.TP.85.

MNA skeletal inventory: 2005.240.

N: 2; adult male (30-40), juvenile (11-12).

Human remains recovered from this tomb by MNAE excavations in 1952-53 include fragments of an adult's cranial vault (parietals, occipital, and temporals), maxilla, left arm (humerus, radius, ulna), left innominate, and both femora. The left and right femur head vertical diameters measure 44.6mm and 45.2mm, respectively, suggesting a male adult; the linea aspera are bilaterally defined but not particularly robust. No skeletal pathology was evident. The adult's third maxillary molars were recently erupted, with little wear on the cusp tips, suggesting an age of 30-35 years at death. Additional human remains recovered by the American Excavation, cataloged as TP.25.85, consist of one adult tooth (a permanent maxillary lateral incisor) and one fragment of an adult fibula. These probably belonged to the adult represented in 2005.213.

The incomplete cranial remains of a juvenile (fragments of the left and right temporals, the left maxilla, and the occipital) give an age estimate of 11-12 years at death for this individual, based on skeletal development (non-fusion of the basilar suture) and dental development (the left maxillary first permanent molar is fully erupted and the crown of the second permanent molar is completely formed but the roots are incomplete).



SW 4

Tomb SW 5; LC 95

Location: the east corner of the large central room CH III of the house.

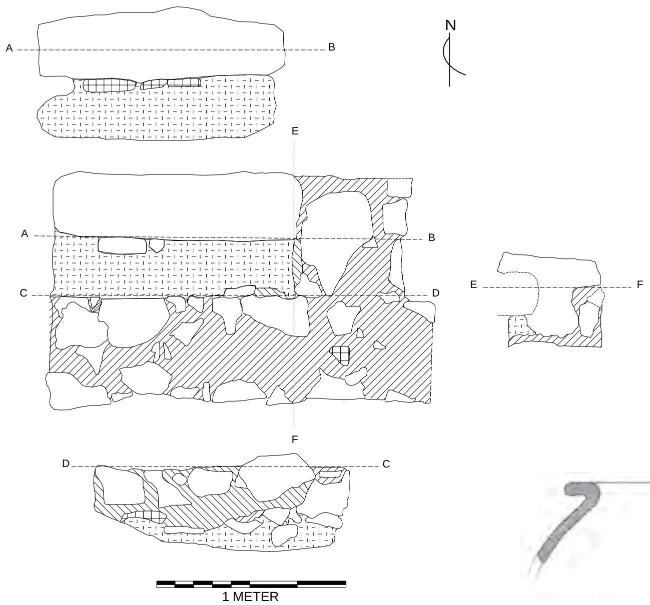
Orientation: northwest/southeast.

Construction/tomb type: Hale Type VII. This unique and apparently makeshift tomb uses the southeast and northeast walls of room CH III for one side and for its head. The northwest wall of the tomb was created by laying a massive stone beam or block directly on the old Roman brick floor 0.30m away from the southeast wall of the room and parallel to it. After the stone beam was laid in place, the bricks of the floor and the fill beneath them were excavated to a depth of 0.30m, reaching bedrock. This subsequent modern excavation has carried away whatever assemblage of stone or tile may have served to close off the foot of the tomb.

Associated artifacts: 2 ceramic sherds, TP.26.85.

N: 1; adult.

One adult was represented by fragments of long bone shafts.



SW 5

SW 5 TP.26.85

SW 6; LC 84

Location: abuting the southeast exterior wall of room CH I of the house, less than 1m southwest of, and slightly skew to SW 7. The head of the tomb is formed by the outer wall of the house against which have been set the three massive stone slabs which form the side walls of the tomb: two on the left and one giant one on the right. Cracks in the corners and joints have been filled with small stone and brick fragments. Nothing is left of the foot or the floor beyond some rubble. The line of the tomb is skewed to the Roman wall rather than perpendicular to it.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type IV, granite slab.

Associated artifacts: 1 ceramic sherd, 27.TP.85.

MNA skeletal inventory: none.

N: unknown.

No human remains were recovered from this tomb.

SW 7; LC 81

Location: northeasternmost of the cluster of tombs constructed along the southeast front of the Roman house.

Orientation: northwest-southeast.

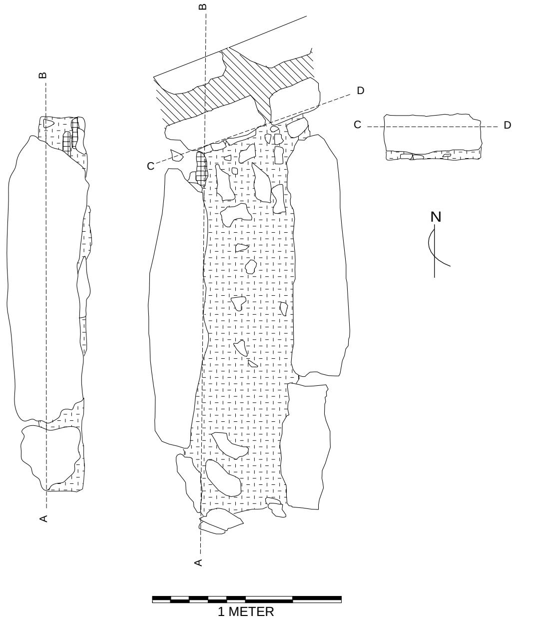
Construction/tomb type: Hale Type V, stone kerbs. Like its neighbor, SW 6, this tomb employs the exterior wall of the house as a headstone. The walls, which were constructed of rows of small stone slabs laid flat, are set at exact right angles to the older Roman wall. The foot is closed off by a similar small slab and the floor is natural bedrock, no brick having been used anywhere in the construction of this tomb.

Associated artifacts: none.

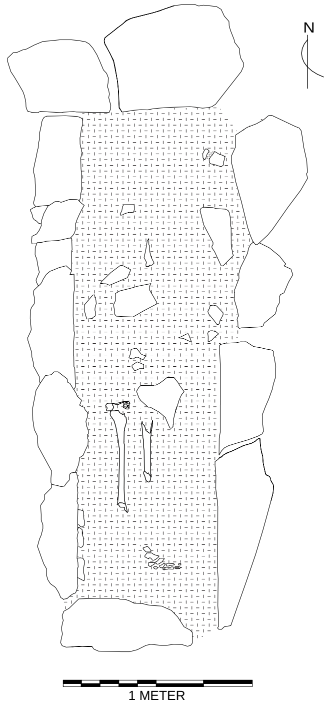
MNA Skeletal Inventory: none.

N: 1; adult female (20-30); TP.28.85.

In the lower (southeastern) half of the tomb were found portions of a pair of tibias lying side by side and apparently *in situ*. Subsequent excavations revealed a few other fragments, including pieces of cranium, clavicle, ankle, metatarsals, and additional long bones. A petite head of a femur suggests that the original occupant was an adult female, aged 25-30 years at death (based on non-fusion of the major cranial vault sutures).



SW 6



SW 7

SW 8; LC 82

Location: easternmost tomb in the Southwest Cemetery as well as the tomb most distant from the remains of the house. It lies 3.5m southeast of the wall of room CH 1, and 2m east of SW 10.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type V, stone kerbs. Stone slabs of small to moderate size form an irregular rectangular kerb around this shallow tomb. The floor is a natural sheet of bedrock which here lies within a few centimeters of the modern surface.

Associated artifacts: 5 ceramic sherds, TP.29.85.

MNA skeletal inventory: none.

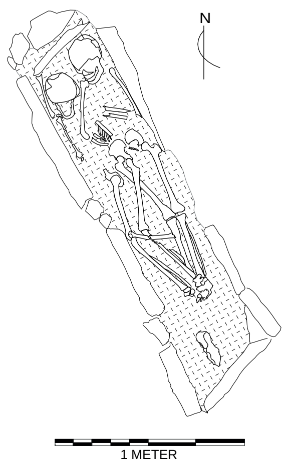
N: 3; adult female (30-40), adult male, adolescent 13-15 years.

The grave was looted at some point, and the uppermost portions of the crania (the frontals and maxillae) destroyed. Two individuals were laid side by side in the narrow grave, with their heads at the north end. The arms of the adult female on the east lie over the torso of the adolescent on the west, while the pelvis of the latter overlies that of the former. A simultaneous double interment must be inferred.

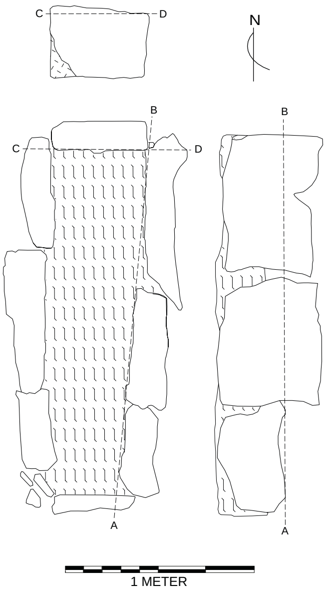
The adult female is represented by an incomplete and fragmented skull, 15 teeth, fragments of the spine, the pelvis, the long bones of the upper and lower limbs, and several foot bones. All visible epiphyses are fused, indicating an adult (>20 years), and the sacroiliac auricular surface of the left innominate displays a youthful appearance (phases II-III, 25-35 years, probably early 30s). The broad sciatic notches indicate a female, and the gracility of the long bones matches this primary skeletal sex indicator. The left first mandibular molar was lost antemortem and the socket resorbed; the occlusal surfaces of the other teeth present show small areas of exposed dentin, suggesting an age of 25-35 years. No skeletal pathology was evident.

The adolescent is represented by 21 loose teeth and incomplete postcranial remains: portions of the left and right humerus and radius, femora, tibiae, and fibulae, and the left and right talus. The skeletal estimate of age at death (13-14) is based on non-fusion of the right ischium with the pubis and the ilium, and non-fusion of several long bone epiphyses: the right humerus proximal and distal epiphyses (missing), both femur heads, and the right tibia proximal epiphysis (missing). The dental age estimate is slightly older (14-15): the second permanent molars are all fully erupted with completely formed roots, and both mandibular third molars have fully formed crowns with incomplete roots.

Additional human remains recovered from this grave suggest the presence of a larger adult (probably male) represented by the distal portion of a left humerus.



SW 8



SW 10

SW 9; (Not a Tomb)

SW 10; LC 83

Location: just southeast of the foot of SW 6.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type IV, granite slabs. It is symmetrically constructed with three large rectangular stone slabs composing each wall. Head and foot are closed off with matching slabs. The head is marked by a larger, higher slab than the foot, and by a slight widening of the walls. The floor is a level expanse of bedrock.

Associated artifacts: 5 ceramic sherds, TP.30.85.

N: 2; adult male, juvenile (12-14).

Human remains recovered include 5 teeth and numerous fragments of the shafts of the left humerus, left and right femora, tibiae and fibulae and one navicular) of a robust adult, probably a male (Individual A), as well as one metacarpal II or III of a juvenile (Individual B) with the proximal epiphysis unfused, indicating an age younger than 14 years.

<u>SW 11; LC 85</u>

Location: 2m south of the outside east corner of room CH III.

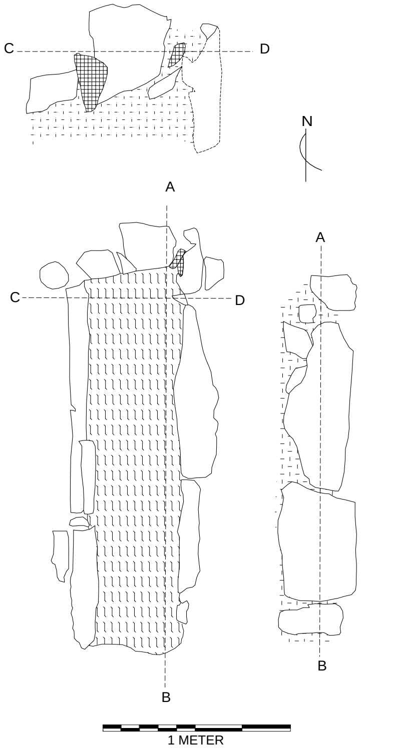
Orientation: northwest-southeast.

Construction/tomb type: Hale Type V, stone kerbs. It is a stone slab tomb with bedrock floor like its neighbor SW 10, but not as well constructed. The slabs are irregular in size and irregularly spaced. The line of the head fails to make a right angle with either wall. Chips are used throughout to plug up cracks. The foot is missing entirely.

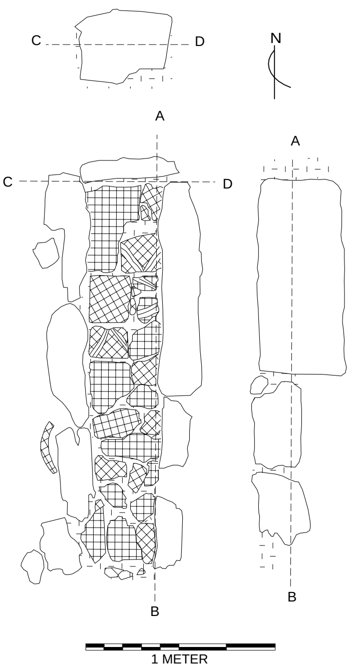
Associated artifacts: 2 ceramic sherds, TP.31.85, 1 nail 8.TP.85.

N: 1; adult male.

The human remains recovered from this tomb include 3 permanent teeth and fragmentary post-cranial remains (scapula, humerus, radius, ulna, femur, tibia, and the left (talus, calcaneus, and metatarsals II and III). The head of the femur measures 44mm in its vertical diameter, suggesting an adult male.



SW 11



SW 12

Nail 8.TP.85

<u>SW 12; LC 86; *Cemitério Sepultura* 3</u>

Location: the third in the row of tombs stretching from SW 10 to SW 17. It lies 1m southeast of the northwest doorpost of the house.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type V, stone kerbs. This tomb shares with SW 16 and SW17 the distinction of having a brick floor, a feature rather rare in the Southwest Cemetery though common in the Northwest Cemetery and in the tombs in the Church. Unlike the latter, which generally use intact rectangular Roman bricks set in a row, the floor of this tomb is composed of broken brick fragments irregularly arranged in a bed of mortar or coarse plaster. Although the north corner block is a smoothly dressed slab (from the Roman house?), the headstone and the remainder of the walls are rough stone blocks. The foot is lacking. The presence of an iron nail suggests the possibility that originally the body was enclosed in a wooden coffin.

Associated artifacts: one iron nail, 8.TP.85.

MNA skeletal inventory: 2005.239.

N: 2; adult male, adult female (?).

MNAE excavations recovered the fragmented, incomplete remains of two adults. A few pieces of long bone shaft cortex are significantly more weathered than the rest of the bones; if this tomb had been looted in antiquity, they may have been exposed on the ground surface. The larger adult is represented by cranial fragments and portions of C1 and C7, one clavicle, the right humerus, left femur, left and right tibia, and the left navicular and cuboid. Bones of the smaller adult include no cranial elements but fragments of one humerus, the left patella, and the left calcaneus, right navicular, and right metatarsals 1, 3, 4, and 5. The American excavators recovered small fragments of adult parietals and occipital, one robust femur shaft, and parts of tibia and fibula shafts. No skeletal pathology was observed.

SW 13; LC 87; *Cemitério Sepultura* 2

Location: fourth in the row of tombs stretching from SW 10 to SW 17. It lies directly outside the door of the Roman house with its head almost blocking the opening.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type VII, unique. The headstone, foot, and southern wall sections are composed of roughly rectangular slabs of native schist, with some brick rubble laid beneath for leveling. At the north end, one slab on the left and two on the right are not stone but rather square blocks of pebbly concrete from an older floor. The smooth (originally upper) surfaces of these blocks have been turned to face outward, strongly suggesting that the walls of this tomb projected above ground level, and that its builders were concerned with its external appearance. As with SW 12, the presence of a nail in this tomb suggests the possibility of a wooden coffin.

Associated artifacts: one iron nail, 9.TP.85;1 ceramic sherd, TP.33.85.

MNA skeletal inventory: 2005.238.

N: 3; adult female (20-25), adult male (40-50), juvenile (12-13 years).

When the American excavators cleaned this tomb, they found that the north half (head) of the tomb had been swept virtually clean by the MNAE excavators, leaving behind only portions of the disarticulated skeleton (several ribs and vertebrae and portions of the pelvis, scapula, right humerus, a few hand bones, femora, tibiae, fibulae, left patella, and several tarsals) from a large, very robust adult male, aged 40-50 years at death. This person was probably the original occupant for whom the tomb was constructed.

In the south half of the tomb lay the virtually intact lower pelvis, legs, and feet of a young adult female (aged 20-25 years at death, based on pelvic features), complete from the hip sockets to the toes were found. Additional bones from this individual include several vertebrae, a portion of the sacrum, and portions of the scapulae, clavicles, humeri, the right radius and ulna, one carpal phalanx, both patellae, the complete broken left and right femora, tibiae, fibulae, the left and right talus, and 9 tarsal phalanges. The tomb is far too large for this individual, whose feet (before the bones collapsed onto the floor) lay a full 0.50m from the foot of the tomb.

A juvenile aged c.12-13 years was represented by the right half of a mandible, with the second permanent molar recently erupted. A green stain, indicating contact with a copper or bronze object, is visible on the inferior lingual aspect of the juvenile mandible.

SW 14; LC 88; *Cemitério Sepultura* 1

Location: 2.5m south of the door of the Roman house, beyond the row of seven tombs from SW 10 to SW 17.

Orientation: northwest-southeast.

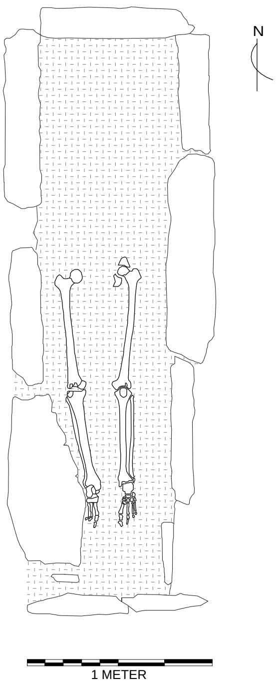
Construction/tomb type: Hale Type V, stone kerbs. The walls are constructed throughout of rough stone slabs, massive at the north end (head) and somewhat smaller to the south. The headstone and foot are similar slabs, and the floor is bedrock.

Associated artifacts: none.

MNA skeletal inventory: 2005.237, 2005. 358.

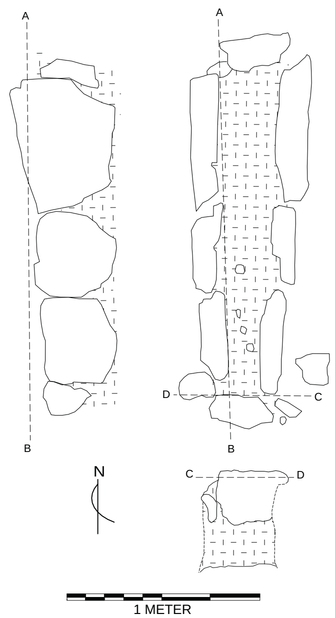
N: 2; adult (30-40), adolescent (15-17).

MNAE excavators recovered the partial remains of one adult (a right tibia) aged 30-40 years at death and an adolescent (fragments of frontal, occipital, parietals, maxilla, and mandible, and portions of the left and right humerus, radius, fibula, the right femur, left and right calcaneus, and one metatarsal) from this tomb. The American excavators collected a few more fragments (2 teeth with very light wear, a left and right clavicle with fused medial epiphyses, and several foot bones (a right first cuneiform, and third and fifth metatarsals). No skeletal pathology was noted.



SW 13

Nail 9.TP.85



SW 14

SW 15; LC 98

Location: fifth in the row of tombs stretching from SW 10 to SW 17. It abuts the outer wall of the Cemetery House 0.75m southwest of the door opening.

Orientation: northwest-southeast.

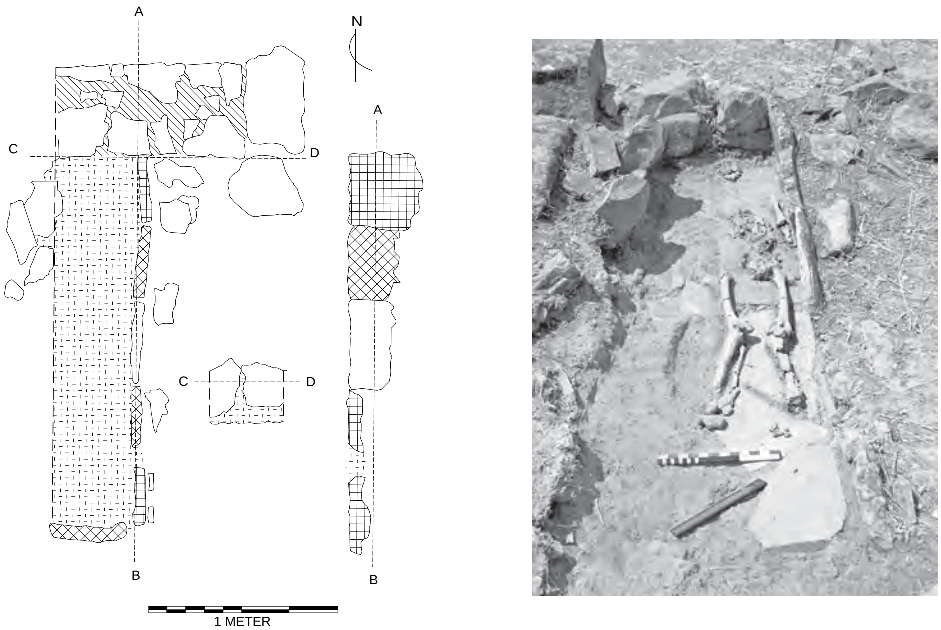
Construction/tomb type: Hale Type II, brick box. It is the only example of a brick-box tomb in the Southwest Cemetery. The foot and the left wall were constructed entirely of Roman bricks set upright, except in the center of the wall where a rectangular marble slab of matching size takes the place of one brick (there are five altogether). No trace of the right wall has survived, but the line of its base is clearly demarcated by the edge of the floor, which consists of white marble slabs neatly fitted together, or one large slab now broken. The head of the tomb is formed by the exterior wall of the house.

Associated artifacts: 3 ceramic sherds, 35.TP.85.

MNA skeletal inventory: none.

N: 1; adult male (30-40).

This tomb contained the partially intact skeleton of an adult (probably male), more or less *in situ*: the posterior cranium, 6 teeth, right humerus, proximal left radius and ulna, a few ribs, most of the vertebrae, a fragment of pelvis, the patellae, and the legs down to the distal ends of the tibia shafts, and several hand and foot bones. The s-curve of the spinal column initially gave the impression of a severely deformed individual, but the position of the right femur higher than the left suggests that the dislocation is due to the right leg having been pushed upward at some point, perhaps when the tomb was robbed in antiquity. The size and degree of epiphyseal fusion indicates an adult, and the robusticity of the long bones (vertical femur diameter: 45mm) suggests a male. No arthritic lipping is evident on the vertebrae or major joint surfaces, The SIA surface of the left innominate was scored at phase III/IV, suggesting an age at death of 30-40 years; this estimate matches the moderate degree of dentin exposure of the occlusal surfaces of the teeth. No pathology was noted.



SW 15

SW 16; LC 89

Location: the head of this tomb cuts completely through the southeast wall of the Roman house at the south corner of room CH III.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type IV, granite slab. Like its neighbor to the south, SW 17, this tomb is a box composed of stone slabs, including some massive ones at the head which may originally have been part of the corner structure of the house. The headstone is a large block, while three slabs form each wall. The foot is missing. The floor was formed of Roman bricks and brick fragments, of which only those in the north end are *in situ*.

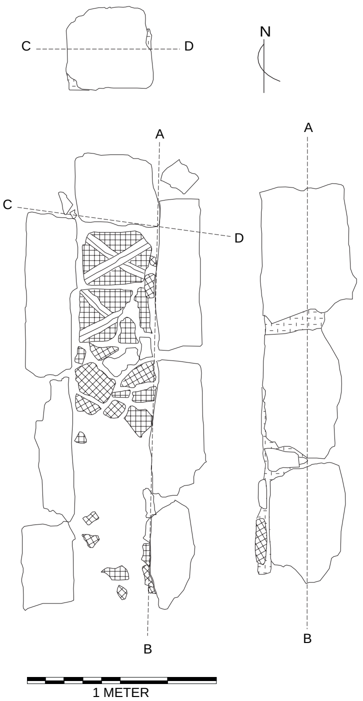
Orientation: northwest-southeast.

Associated artifacts: one ceramic sherd, TP.35.85.

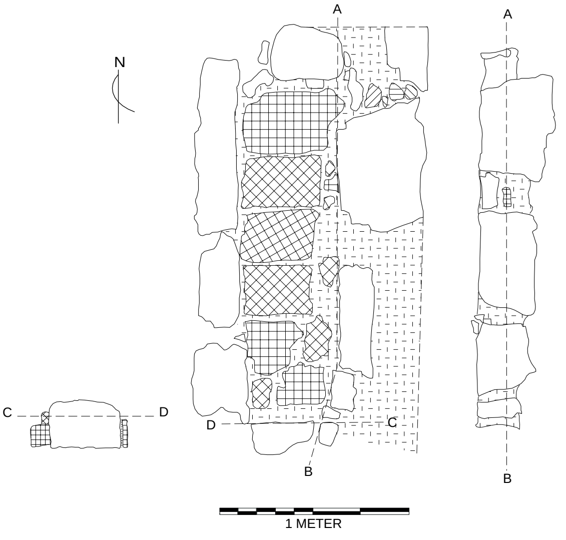
MNA skeletal inventory: none.

N: unknown.

No bones were recovered from this tomb.



SW 16



SW 17

SW 17; LC 91

Location: westernmost tomb in the row of seven which begins with SW 10. The lower half of the tomb cuts through the southeast wall of the Roman house in the east corner of room CH VIII.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type IV, granite slabs. In this tomb roughly worked stone slabs form the headstone and walls (three slabs on each side). An additional slab closes the foot of the tomb. Roman brick fragments have been set vertically to fill the gaps between the slabs. The monumental slab at the east side of the tomb's head actually forms part of the wall between central room CH III and south room CH VIII in the Roman house (this slab being so thick that it spans the entire width of the wall at this point). The floor of the tomb is made of a row of four Roman bricks laid in the northern and central parts of the tomb, with large fragments of bricks covering the foot area. There are additional small brick fragments on the east side.

Associated artifacts: none.

MNA skeletal inventory: none.

N: unknown .

No bones were recovered from this tomb.

SW 18; LC 92

Location: the head of this tomb lies 0.50m southeast of the foot of tomb SW 17, with which it is aligned.

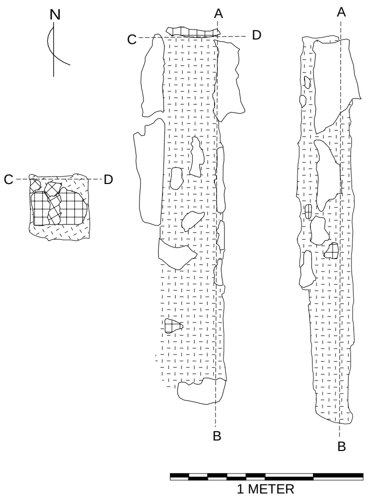
Orientation: northwest-southeast.

Construction/tomb type: Hale Type V, stone kerbs. Little survives of this tomb. Small stone slabs formed the side walls, with the flat surfaces turned inward. The head was closed off with a Roman brick set upright. The foot is missing. A few flat stone fragments and a piece of brick in the center of the tomb suggest a floor of mixed construction.

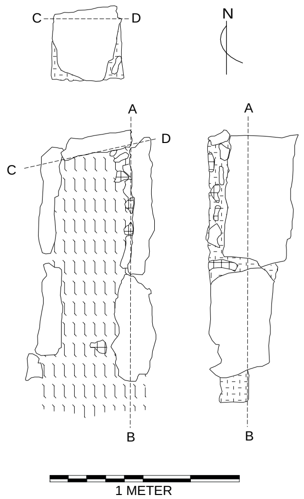
Associated artifacts: 1 ceramic sherd, TP.37.85.

MNA skeletal inventory: none.
N: 1; adult (30-40).

Fragments of the occipital bone and of femur and tibia shafts of an adult were recovered from this tomb. The lambdoid suture is not completely fused, suggesting an age at death younger than 40 years.



SW 18



SW 19

SW 19; LC 93

Location: cutting through the southeast wall of the house near the center of the poorly preserved south room, approximately 0.80m southwest of SW 17.

Orientation: northwest-southeast.

Construction/tomb type: Hale Type IV, granite slabs. It is a stone slab tomb with two neatly worked rectangular slabs surviving on each side. Another serves as a headstone. The foot, as well as the lower end of the tomb is missing. Some fragments of tile and stone protrude from beneath the bottom edge of the first slab in the left wall. In addition to leveling and supporting the slab, these may originally have filled the gap left along the edge of a brick or stone slab floor. As preserved, however, the floor is bedrock.

Associated artifacts: none.

MNA skeletal inventory: none.

N: 1; adult.

Small fragments of adult femur and tibia shafts were recovered from this tomb.

SW 20; LC 94

Location: westernmost of all the tombs in this cemetery, this one was built just within the southeast wall of what had been room CH VIII at the south corner of the Roman house.

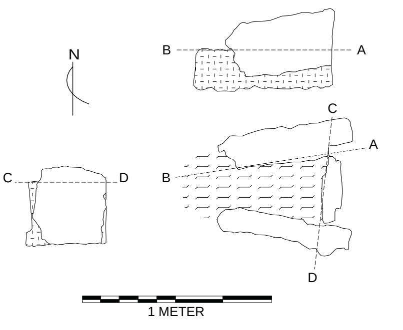
Orientation: east-west.

Construction/tomb type: Hale Type V, stone kerbs. The now fragmentary tomb appears to have been made of stone slabs. The upright slab of the headstone is framed by the first slabs of the side walls which are collapsing inward due to the pressure of the surrounding earth. Nothing remains besides these three slabs. The floor appears to have been of earth.

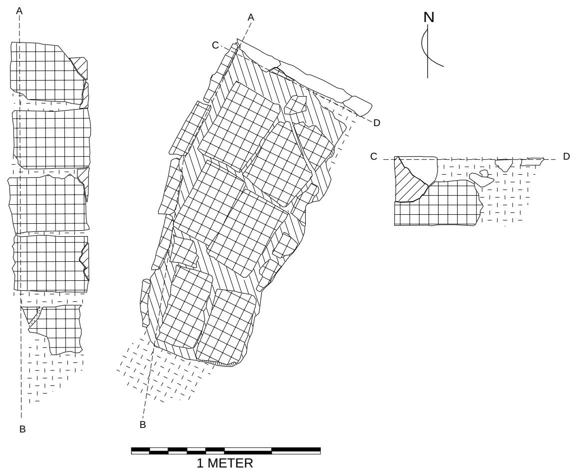
Associated artifacts: none.

MNA skeletal inventory: none.
N: unknown.

No bones were recovered from this tomb. The removal of the western portion of SW 20, as well as the total loss of the western walls of rooms CH VII and CH VIII of the house, which have been cleared away right down to bedrock, suggests that the southwest cemetery was at one time concealed under an erosional build-up of soil (washed down from the north), and that the first sections to come back into view as these soil deposits wore away were these sections on the western side. The exposed stones were probably quarried for building material.



SW 20



SW 21

<u>SW 21; (Not a Tomb); LC 99</u>
Location: north corner of Room CH VIII.
Orientation: N/A.
Construction/tomb type: unknown.
Associated artifacts: 1 complete bowl, TP.39.85; two other ceramic sherds (including one rim); 3 tile fragments.
MNA skeletal inventory: none.
N: unknown.

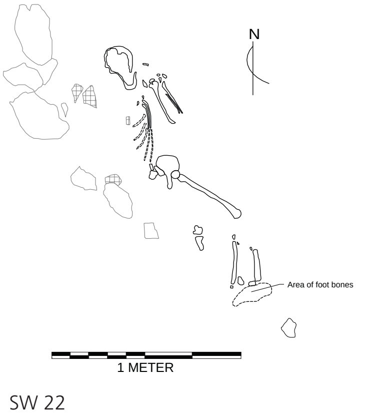
This feature is located at the north corner of room CH VIII of the house, lying just within and partially blocking the door opening into the large central room CH III. The feature consists of a floor of six large Roman bricks neatly laid in mortar. The surviving walls are composed of upright bricks, which form a precise 90-degree angle at the north corner. The second wall brick in the NW wall continues this precise alignment (it lies directly against the NW wall of room CH VIII) but the third, fourth, and fifth bricks in this wall curve away from the original straight line. Since the floor bricks repeat this curve at precisely this point, it is evident that it was not the builder's intention to form a square or rectangle (which could easily have been done using the line of the Roman wall as a guide). Nothing remains of the SW and SE walls. Although the protruding upper edges gave the impression of a brick-box tomb before excavation, this feature was plainly not intended as a tomb and the absence of human bones strongly suggests it was never used as a tomb. Although a charcoal layer was found on the floor of the feature, the bricks themselves show none of the blackening to be expected of an oven or hearth. The feature appears to have been intended as a storage pit for agricultural produce, although it may, in its final stages, have served as a domestic dump.

SW 22; LC 80

Location: east of SW 7, in a line of tombs south of the Cemetery House.
Orientation: NNW/SSE.
Construction/tomb type: no tomb structure evident.
Associated artifacts: none.
MNA skeletal inventory: none.
N: 1; adult female (30-40); TP.80.00.

According to Maloney's preliminary report, "These human remains were discovered in 2000 when American excavators opened sq. S015E010 just east of the southeast corner of Room CH I of the Cemetery House. The articulated skeleton of an adult was oriented NNW/SSE, with the head lying directly against the north side of the square. The legs were slightly flexed to the left with the knees spread apart but with the ankles joined tightly together. The bones of the left hand lay against the side of the head and the left arm was so tightly flexed that the humerus, radius, and ulna were all lying in a close bundle, side by side. Although the head was facing up, the rest of the body was clearly tilted onto its left side. The tight flexing of the ankles and at the wrist and shoulder suggest that the body may have been wrapped tightly in a shroud or bound" (Maloney, 2002, p. 6-7).

The size and degree of skeletal maturation (all observable long bone, vertebral, and pelvic epiphyses are fused) indicates an adult individual; the sagittal suture is obliterated endocranially, but the lambdoid suture is not yet fused solid, suggesting an age at death of 30-40 years. This estimate matches the appearance of the left SIA surface (phases III/IV), and the appearance of mild lipping on the margins of the lumbar vertebra bodies. The cranium and pelvis are too fragmented for reliable estimation of sex, but the moderate size and robusticity of the cranial fragments and the long bones suggest a female. No skeletal pathology was noted, aside from the mild lumbar osteophytosis.



SW 22

MNAE *Cemitério Sepultura* A; LC 116

Location: unknown.
Construction/tomb type: unknown.
Associated artifacts: unknown.
MNA skeletal inventory: 2005.236.
N: 3; adult male (40-50), adult, juvenile (7-8).

The human bones identified include commingled, fragmentary incomplete remains of three individuals, 2 adults and one juvenile. One of the adults was a large male (the adult right femur head vertical diameter measures 54.8mm, the largest such diameter in the entire series). The femur and pelvic fragments from this individual display the distinctive suite of morphological alterations associated with habitual horse-back riding (*Syndrome de Cavalier*). The sex of the other adult is indeterminate, due to the incomplete nature of the remains. One of the adults was probably aged 40-50 years at death, judging from the very advanced wear on a right maxillary first molar which displays very little enamel remaining on the occlusal surface. The juvenile is represented by very incomplete cranial and postcranial remains; complete crowns (without root formation) of a mandibular second premolar and second molar suggest an age at death of at least 7 years. No skeletal pathology was noted.

Cemitério Sepultura B; LC 117

Location: unknown.
Construction/tomb type: unknown.
Associated Artifacts: 1 sherd of coarse-temper thick-walled ceramic ware.
MNA skeletal inventory: none.
N: 2; adult female (30-40), child.

The human bones identified at MNA with this tomb include the fragmented remains of one adult female. An age estimate of 30-40 (probably 30-35) is based upon fusion of the left clavicle medial epiphysis; the sagittal and lambdoid sutures show no fusion. The right and left SIA surfaces were scored at Phase II/early Phase IV, supporting the cranial age estimate. Cranial remains include portions of the cranial vault and the mandible, with 3 mandibular teeth. The postcranial skeleton is represented by portions of the left scapula and the left and right clavicle, humerus, femur, and tibia; the lower spine is present but the thorax (vertebrae and ribs) are extremely fragmentary. One carpal phalanx and two tarsals are present. The second individual is represented only by a fragment of a child's cranial vault (parietal). No skeletal pathology was noted.

Cemitério Sepultura E; LC 118

Location: unknown.
Construction/tomb type: unknown.
Associated artifacts: unknown.
MNA skeletal inventory: 2005.241.
N: 1; adult male (50+).

An incomplete cranium (left and right parietals, occipital, and left temporal) plus one carpal (left hamate) from a large adult comprise the human remains associated with this tomb at MNA. The lambdoid suture is obliterated endocranially (except at the lateral ends) and the sagittal suture obliterated completely, indicating an age of at least 50 years at death. The large robust mastoid process and nuchal region suggest a male individual.

Cemitério Sepultura F; LC 119

Location: unknown.
Construction/tomb type: unknown.
Associated artifacts: 2 sherds, coarse paste.
MNA Skeletal Inventory: none.
N = 1; adult male? (20-25).

One adult cranial vault and fragments of the mandible are associated at MNA with this *Sepultura* from the *Cemitério*. The third molars have recently erupted and show very little occlusal wear, suggesting an age at death of 20-25 years. The robust chin (though incomplete) suggests a male.

Cemitério Sepultura M; LC 120

Location: unknown.
Construction/tomb type: unknown.
Associated artifacts: none, but adult left radius midshaft shows a green stain-bronze bracelet?
MNA skeletal inventory: 2005.243.
N: 3; adult M? (30-35), adult F?, child (3-5).

The bones from boxes labeled "Tomb M" represent at least three individuals, two adults and one young child aged c.3-5 years. Some of the adult bone fragments show extensive weathering (cracking and flaking of the cortex), but most of them do not, nor do the subadult bones. The child is represented by portions of the cranial vault and mandible, 6 deciduous teeth, left ilium, left and right femurs, and left tibia. The first and second mandibular deciduous molars and the maxillary canines are completely formed, but the first permanent molars (missing) had apparently not yet erupted as the distal surfaces of the deciduous molar crowns show no inter proximal contact facets. The estimated age of this child is 3-5 years, based on dental development (Ubelaker, 1978, fig. 62).

The larger of the two adults is represented by an incomplete fragmented cranial vault, most of the spine, and portions of the left and right shoulder girdles, arms, innominates, legs, and the left and right talus and calcaneus. The pelvic sciatic notches and the preauricular sulci are narrow (indicating male sex), the chin is squared but not robust (indeterminate), and the femur heads measure 42.0 and 43.0mm, respectively (also indeterminate), suggesting that this individual is probably male. The cranial vault that probably belongs to this adult shows only initial fusion of the major cranial sutures, suggesting an age at death of 30-35 years; this estimate is supported by the appearance of the left and right SIA surfaces (Phase III, 30-35 years). The large right clavicle shows a recently fused medial epiphysis, further confirming this age estimate.

The smaller adult's femur heads show smaller vertical diameters (40.5mm and 39.0mm, respectively), suggesting a female. No skeletal pathology was noted.

Cemitério "sepultura imp." 4818 v.3-6; LC 121

Location: unknown.
Construction/tomb type: unknown.
Associated artifacts: unknown.
MNA skeletal inventory: none.
N = 2; adult, juvenile (11-12).

The phrase "sep. imperc." (*sepultura imperceptivel*) in the MNA catalog register for this individual suggests that the MNAE excavators could not determine the presence of a formal tomb enclosing this burial; it is also possible that the exact context of this burial was not recorded or that the original field information has been lost. The remains represent at least two individuals, an adult and a pre-pubertal juvenile. The juvenile remains include fragments of the cranial vault, the scapulae, a complete left humerus, portions of the left and right innominates, the complete shafts of the right femur and both tibiae, the right patella, and numerous bones of the hands and feet. All of the long bone shafts show unfused epiphyseal surfaces. The elements of the innominates have not fused, indicating an age below puberty; the measurable long bone lengths confirm this age estimate of 11-12 years at death. The adult is represented only by a few fragments of femur shaft and an incomplete left patella.

The left femur of the juvenile displays several patches of periostitis and a slightly expanded shaft. The tibia shafts of this same individual show small patches of partly remodeled periostitis on their lateral and medial aspects.

Human remains not associated with identified tombs

LC (none)

Location: These remains were recovered from the area within the wall enclosing tombs SW 2, SW 4, SW 14 – SW 18, SW 5, and SW 15.

Construction/tomb type: no tomb structure.

Associated artifacts: none.

MNA skeletal inventory: none.

N: 1; adult male.

The central shaft of a large robust adult left femur and a fragment of a matching right femur probably represent one adult male. They probably belonged originally to one of the tombs excavated by MNAE.

6. The *Capela De São Domingos* in the Church (Complex B)

Tomb 2; LC 110

Location: Apse 4 (Rooms XII/XIII, sq. N019E012).

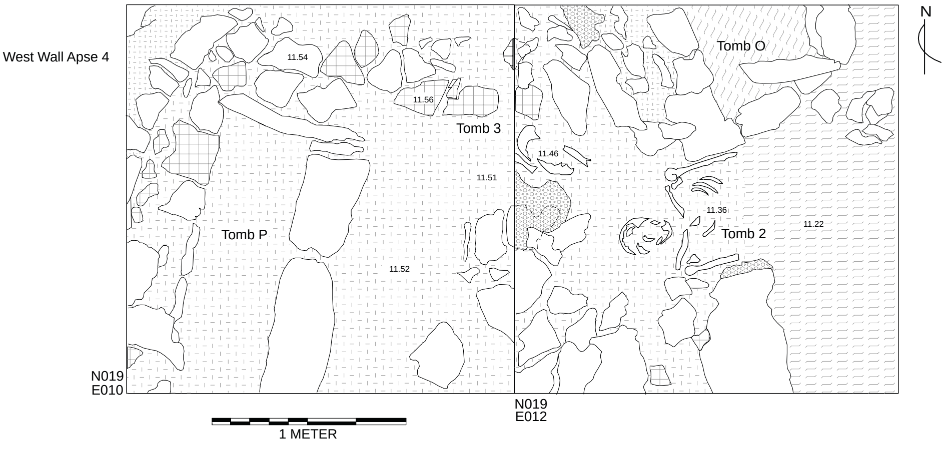
Orientation: east-west.

Construction/tomb type: There was no tomb container or enclosure, and no visible pit outline.

Associated Artifacts: none.

N: 1; adult male.

When the American excavators were cleaning Apse 4 during the 1983 field season, this tomb was found breaking through the retaining wall on the east side of the apse. The location suggests that this tomb post-dates the early Christian tombs in the Western Basilica. It contained the upper half of the articulated skeleton of an adult male, whose head lay in the eastern part of the square between two portions of the wall. UL Project Director Maloney proposed that the lower part of this skeleton had been accidentally destroyed during the cleaning of the basilica by



Tomb 2

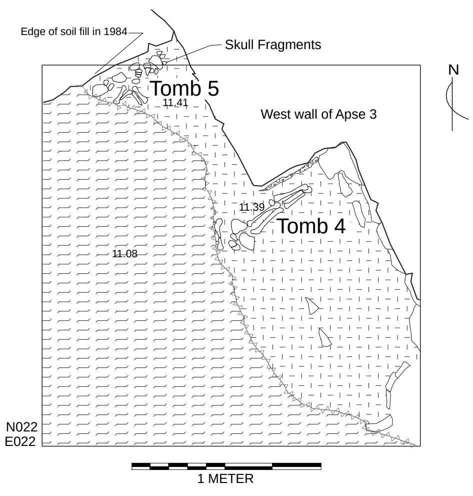
the site guard, who employed an *enxada* (a short-handled hoe) to scrape away loose debris on the floor of the various areas. The skull and upper portion of the skeleton were protected from destruction by the adjacent sections of the wall.

The skull (cranial vault, base, facial fragments, mandible, and 17 teeth), shoulder girdle, humeri, left ulna, the cervical and thoracic vertebrae, and several fragmentary ribs are present, but the lower half of the skeleton (from the pelvis downward) is completely missing. The estimate of male sex is based on cranial supraorbital morphology and the well-developed- post-cranial robusticity. The basilar suture and the medial epiphyses of both clavicles are completely fused, giving a minimum age estimate of 30+ years; minimal fusion of the lambdoid suture suggests an age of 35-40 years at death. Skeletal pathology includes initial osteophytosis in the lower cervical vertebrae; the thoracic vertebrae are unaffected. One right rib from the central portion of the ribcage shows a large well-healed fracture callus. Both eye orbits show small patches of remodeled pitting in the superior-lateral corners. On the superior-posterior portions of both parietals, superior to the temporal lines, the cortex is well-remodeled creating a slightly irregular surface, palpable and visible in oblique light. There is no sign of trauma; this irregularity may represent well-remodeled porotic hyperostosis, or a healed scalp infection.

Tomb 4; LC 115a

LOCATION: Apse 3, sq. N022E022, Level 2B.
ORIENTATION: east-west?
CONSTRUCTION/TOMB TYPE: No container or structure evident.
ASSOCIATED ARTIFACTS: none.
MNA SKELETAL INVENTORY: none.
N: 1; 3 months (±8 weeks).

The semi-articulated partial skeleton of a very young infant was recovered by American excavators from a pit dug through the floor of square N022E022 in the northeast corner of Room XII. The bone preservation was quite good. The unfused left half of the mandible, the left ilium, both femora and tibiae, and the left fibula showed extensive pathology characteristic of infantile cortical hyperostosis (Caffey's disease). (see Chapter III, 9.4.3 for a further discussion of this pathology).

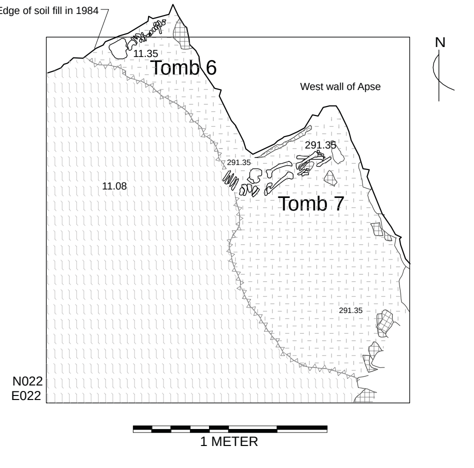


Tombs 4 and 5

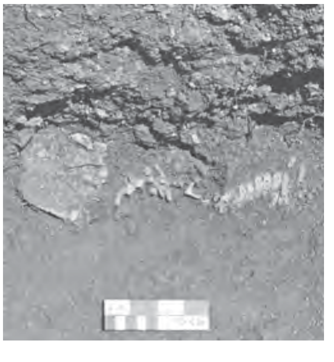
Tomb 5; LC 115b
Location: Apse 3, sq. N022E022, Level 2B.
Orientation: east-west.
Construction/tomb type: no container or structure evident.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: 1; infant, 18-24 months.

The mostly complete skeleton of an infant was recovered by American excavators from a pit dug through the floor near the center of sq. N022E022 in Room XII. No teeth were recovered, and no pathology was noted.

Tomb 6; LC 115c
Location: B5-A. Apse 3, sq. N022E022, Level 3.
Orientation: northeast-southwest.
Construction/tomb type: No container or structure evident.
Associated Artifacts: none.
MNA skeletal inventory: none.
N: 1; neonate.



Tombs 6 and 7


Tomb 6


Tomb 7

A neonate is represented by the partial shafts of a left femur and left tibia recovered by American excavators from a pit dug through the floor of the northeast corner of Room XII, below the level of Tomb 4. These match for age the cranial fragments recovered from this same area, labeled TP.74.84, and may represent the same individual.

Tomb 7; LC 115d

Location: B-5A. Apse 3, sq. N022E022, Level 3.

Orientation: east-west?

Construction/tomb type: no container or structure evident.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 1; infant, 12-18 months.

The partial skeleton of an infant was recovered by American excavators from a pit dug through the floor near the center of sq. N022E022 in Room XII, below the level of Tomb 5.

Tomb 9; LC 114

Location: Room IX, Apse 3, sq. N023E024; Section A, level 2; beneath the brick/plaster floor of the Apse.

Orientation: northwest-southeast.

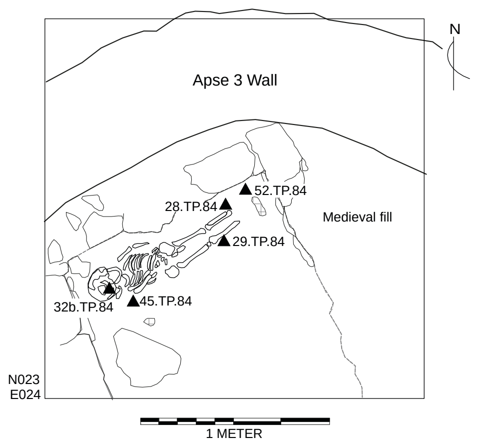
Construction/tomb type: No container or structure evident.

Associated Artifacts: one coin (*ceitis*), dated 1438-1557; iron nails (28.TP.84, 29.TP.84, 32.TP.84, 45.TP.84, 62.TP.84).

MNA skeletal inventory: none.

N: 1; infant (18-24 months).

This tomb, dug down through the floor of the apse, contained the mostly complete, well-preserved articulated skeleton of an infant, lying supine with its head to the northwest. The estimated age at death was 18-24 months, based on skeletal development: the two halves of the mandible and of the frontal bone, respectively, are fused (>1 year), in two of the thoracic vertebrae, the two halves of the arch are joined but not yet fused to their bodies, and the crowns of the first and second mandibular deciduous molars are completely formed but not yet erupted. No skeletal pathology was noted. The left proximal tibia shaft from another infant of similar age was also recovered from the same area and level in the square. It most likely came from one of the other infants buried in this heavily-reused mortuary area.



Tomb 9

The coin was found with the child's body. The five iron nails found in different locations around the skeleton suggest that the body might have been enclosed in a wooden container at burial. None of the other burials in the Medieval chapel show this distribution of nails.

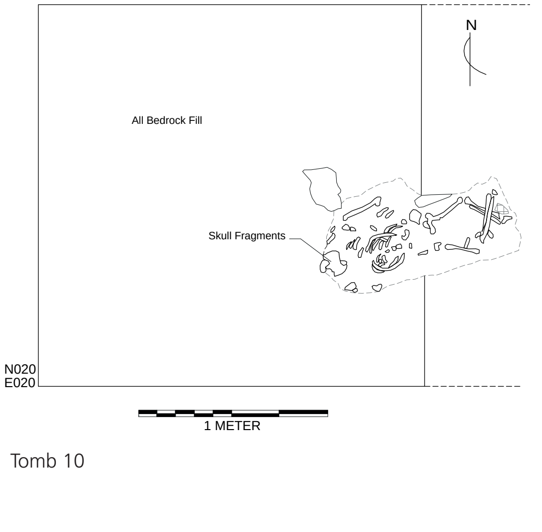
UL Tombs 4, 5, 6, and 7 were all catalogued by Langley under LC 115 because it was very difficult to distinguish the placement of one individual's bones from another's bones. This portion of the subfloor area had been repeatedly dug into for burials during the period of its use as a mortuary chapel.

Tomb 10; LC 113
Location: Room XII, sq. N020E020 and N020E022.
Orientation: east-west.
Construction/tomb type: no container or structure evident.
Associated Artifacts: one coin (*ceitis*), dated 1438–1557.
MNA skeletal inventory: none.
N = 1; child (5-6).

On the north side of square N020E020, underneath the plaster and brick floor of the eastern portion of the Western Basilica, the articulated skeleton of a young child aged 5-6 years at death was discovered, the head lying at the west end of the grave. A coin (*a ceitis*) dated 1438–1557 (Huffstot, 1999-2000) was lying on the upper left side of the ribcage, in the place where the child's right hand would have been placed when its arms had been crossed over its chest. The tomb extended slightly into sq. N020E022, which was opened in order to recover the entire burial. This portion of the Western Basilica was excavated during the 1960's by the MNAE under the direction of Manuel Heleno, and F. de Almeida may have re-excavated here in 1971, but this is not clear from F. de Almeida's journal. However, the excavations had not been taken down to the original bedrock in all places and so this tomb was not discovered.

The remains of this child were fragmentary, consisting of a partial cranial vault, portions of the lower spine, incomplete pelvic elements, femora, and the left scapula, and several small hand bones. One of the carpal phalanges was stained green from the copper in the coin which had been clutched in the right hand. This coin dates this burial no earlier than the mid-15th century. The estimation of age at death of 5-6 years was based on the fusion of the arch of the lowest lumbar vertebra to its body. No skeletal pathology was observed.

Ceitis 1438-1557 (reverse and obverse)



Tomb 10

Human remains not associated with identified tombs

Additional fragmentary and incomplete human remains were recovered in sqs. N020E020, N022E022, and N023E024. They were not associated in the field by the UL archaeologists with Tombs 4, 5, 6, 7, and 9, but some of the remains may belong to those individuals. The most conservative estimate of additional individuals represented by these remains is 4: 1 child aged 3-6 years; 1 adolescent aged 16-18 years, and 2 adults. One possible interpretation is that these individuals had originally been buried in one or more of the large above-ground tombs excavated by MNAE archaeologists (personal communication to John Hale from Sr. Antonio Peixe, one of the workman on the MNAE excavation crew) in this portion of the Western Basilica. The infants' remains may represent additional interments adjacent to Tombs 4, 5, 6, and 7.

TP.6.83; LC 122

Location: These human remains were recovered from the northern half of sq. N023E022 in Apse 3.

Orientation: N/A.

Construction/tomb type: no evident tomb container or enclosure, and no visible pit.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 1, adult.

TP.6.83 includes bones from the left and right foot and left lower leg of an adult. The left ilium of an infant (1-2 years) probably belongs to the infant of this age in TP.9.83, as it matches for preservation, age, and representation.

TP.9.83; LC 123

Location: These human remains were recovered from the northern half of sq. N023E022 in Apse 3.

Orientation: N/A.

Construction/tomb type: no evident tomb container or enclosure, and no visible pit outline.

Associated Artifacts: none.

MNA skeletal inventory: none.

N: 3; infant, child (2-3) years, adult.

TP.9.83 includes two clusters of bones: Group 1 included bones from an infant (and see LC 122, above). Group 2 (encountered 6-10cm below the level of Group 1) included the bones of a slightly older child (2-3 years) and four foot bones from an adult (not the same individual represented in TP.6.83).

TP.113.84, TP.13.98; LC (none)

Location: Level 1 of sq. N020E020 (Room XII) in the Western Basilica.

Orientation: N/A.

Construction/tomb type: no containers or tomb structures were evident.

Associated Artifacts: none, but adult female frontal shows green stain, and 2 adult carpal phalanges also show green stain from bronze coins/ornaments.

MNA skeletal inventory: none.

N: 8; adult female (35-40 years), 1 adult male, 1 adult, two neonates (one slightly older), an infant (12-24 months), a child (5-6), and an adolescent (16-17).

Fragmented and commingled human remains from at least three adults and three subadults: an infant, a child, and an adolescent (TP.113.84) were recovered by the American excavators in 1983 from the north side of this Square, extending eastward into square N020E022.

They do not belong to the child in Tomb 10. The youngest subadults may represent additional subfloor infant/young child burials like those described above in Apse 3. Additional human remains were recovered from this same area in 1998 (TP.13.98), representing three adults. Two adult long bone fragments from TP.113.84 could be fitted to adult fragments from TP.13.98, confirming the hypothesis that these remains originated from the same tomb(s).

An adult female is represented in TP.113.84 by a complete frontal (with fragments of the parietals fused to it) with narrow supraorbital margins and no evident torus; there is a green stain along the lateral half of the superior margin of the right orbit, indicating that a bronze artifact rested there when the body was in its original tomb. The coronal suture is obliterated endocranially, suggesting a minimum age of 35-40 years at death. A gracile left femur shaft with a lightly defined linea aspera, a gracile left clavicle, and a complete left humerus probably also belong to this adult, as well as two carpal phalanges from TP.13.98 also show green staining (perhaps from a bronze ring?).

One adult male is represented in TP.113.84 by part of a left temporal bone (with a robust mastoid process), portions of the left and right humerus, an incomplete left ulna and right femur, and portions of both tibiae and fibulae. Amongst the fragmented bones in TP.13.98, the proximal 2/3 of a right humerus fits neatly with the distal 1/3 of a right humerus from TP.113.84, and the distal half of a right ulna fits the proximal half of a right ulna from TP.113.84.

One additional large adult (probably a male) is represented in TP.113.84 by a left distal humerus fragment that does not match either of the two adults already identified. TP.13.98 contains an "extra" left adult scapula fragment, in addition to two left adult scapula fragments that match the other two adults for size.

In TP.113.84, a neonate is represented by fragmentary left and right femur shafts. Another neonate, slightly older, is represented by fragmentary shafts of the right clavicle, left humerus, left femur, and left tibia. An infant is represented by fragments of the cranial vault, several vertebrae, a few ribs, humerus, radius, and femur shafts, and 7 deciduous mandibular teeth; its age is estimated at 12-18 months, based on dental development (the first molars are erupted, and the crowns of the canines and the second molars are present in their crypts).

A child is represented by fragments of parietal bones, ribs, the left scapula and ulna, left and right humeri and tibiae, one fibula and 2 teeth; its age is estimated at 5-6 years at death, based on dental development (the crowns of the right maxillary canine and the right mandibular molar, both lacking root development).

An adolescent represented by 8 vertebrae with unfused annular epiphyses, portions of the left and right clavicles with unfused medial epiphyses, fragments of the left scapula (with unfused border) and right humerus (the unfused head), and a fragmentary carpal bone was estimated to be aged 16-17 years old at death. The vertical diameter of the unfused humerus head is 43mm, suggesting a male individual.

Observed skeletal pathology was minimal: one adult metatarsal shaft is twisted in a medial-inferior direction, probably the result of an old fracture, and the articular facets of one adult cervical vertebra and one lumbar vertebra (probably from the same individual) show osteoarthritic pitting.

Additional fragmented and very incomplete remains representing c. 14 individuals are listed in Table 3.6 under UL numbers TP.74.84 (neonate, older infant, child, adolescent), TP.82.84 (infant), TP.116.84 (infant), and TP.123.84 (3 infants, 1 adult). These remains were recovered from additional areas within sqs. N020E020, N020E022, N022E022, and N023E024 in Apse 3 of the Western Basilica. Fragments of two additional individuals (an adult and a child aged 4-5 years) were recovered from sq. N023E024, sec B, level 1, but not assigned TP numbers, as were an infant and a child recovered from sq. N023E024, sec A. None of them were assigned to Tombs 4, 5, 6, 7, 9, or 10 but some of these remains may belong to them and/ or to the above-floor medieval tombs mentioned above. The extreme degree of disturbance undoubtedly reflects very intensive re-use of this restricted space over several centuries.

The last two sets of human remains assigned to this portion of the Western Basilica were recovered by MNAE archaeologists from unrecorded locations in the *Capela* during the final stage of the MNAE excavations in the early 1970s.

LC (none); MNA Cont. 4767, v.2
LOCATION: unknown, probably *Capela*.
ORIENTATION: unknown.
ASSOCIATED ARTIFACTS: none.
N: 1; juvenile 6-8 years.

This juvenile is represented only by incomplete and fragmentary cranial remains, including 4 teeth: an erupted first right maxillary molar, a partly formed second maxillary molar crown, a maxillary deciduous second molar, and the partly formed crown of a maxillary premolar. The age estimate is based on dental development and eruption. No skeletal pathology was observed.

LC (none); MNA Cont. 4769; v.2
LOCATION: unknown, labeled "*Capela*" on the cranium.
ORIENTATION: unknown.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: none.
MNA SKELETAL INVENTORY: none.
N: 1; adult female, 30-40 years.

This adult female is represented by a complete cranium and mandible; the discovery of cervical vertebrae 1 and 2 and two small carpal phalanges in the dirt surrounding the base of the cranium suggests that the skull was recovered from an articulated burial, most likely during the final stage of the MNAE excavations in the late 1960s or early 1970s. A ^{14}C date obtained from a tooth (1469-1648 AD, 2-sigma range) placed her burial sometime during the 15th-17th centuries, and aDNA analysis confirmed the visual impression (based on her cranial morphology) by Hale, of her ancestry as sub-Saharan, probably West African. A detailed analysis of this unusual individual is presented in the "Osteobiography" section of Chapter III.10.

7. The Pombal Cemetery/*Cemitério do Pombal*

The *Sepulturas* are numbered below according to J. Lino da Silva's Plan. However, the number of individuals listed for each *Sepultura* is based upon the skeletal inventory of the human remains associated with each numbered *Sepultura* in the accessioned collection at MNA.

Pombal *Sepultura* 1
ORIENTATION: east-west.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: Visigothic ceramic vessel (jug) with broken handles placed at head.
MNA SKELETAL INVENTORY: none.
N: 2: female 30-40, adult male (MNA *Contentor* 4770).

J. Lino da Silva's plan shows two individuals: one articulated skeleton with cranium, and one isolated cranium. The primary burial appears to have been pushed to the top and bottom of the grave in order to make room for the secondary burial. The second, articulated individual is laid out on its back with the wrists crossed over the pelvis. At MNA, the majority of the bones in *Contentor* 4770 are from one adult female (30-40, A), who is well-represented by post-cranial remains. Five postcranial bones represent an adult male (B). Skeletal fragments of two other individuals are present in this *Contentor*: a small portion of a tibia shaft from a gracile young adult and three femur shaft fragments, very weathered, from a robust adult male. These remains probably represent other individuals in this series, and are not included in the count for this *Sepultura*.

This grave yielded the only non-prehistoric artifact that without doubt came from the *Cemitério do Pombal*. It is a 15.4cm tall one-handled jug-type vessel of very pale fabric, clearly shown on J. Lino da Silva's map in *Sepultura* 1, resting next to the left shoulder of the grave's final occupant. The bottom is convex so that the edges along the base do not touch the surface upon which the vessel rests. The vessel body is not perfectly round; one side of the vessel is slightly flat, and perhaps it was intentionally or unintentionally laid on its side prior to firing. A semi-circular piece is missing from the lip of the vase, just off-center from the diametric line created by the handle. This piece appears to have been broken off of the vase prior to its burial. The fabric and shape of this vessel are similar to an example from the *Museo Nacional de Arte Romana*, Merida, dated to the Visigothic period. This leads us to the conclusion that *Cemitério do Pombal's* small jar provides a *terminus post quem* of the early 6th century AD for this particular tomb, and perhaps the whole cemetery. This vessel is Baetican in origin and was meant to hold some sort of liquid.

Pombal *Sepultura* 2

Orientation: east-west.

Construction/tomb type: unknown.

Associated artifacts: a Chalcolithic stone tool, possibly an arrowhead or spear point.

MNA skeletal inventory: none.

N: 6; 5 adults (female, male, and 3 adults of unknown sex) and 1 juvenile (9-10 years); (MNA *Contentores* 4769, v. 3-5 and 4771, v.1).

J. Lino da Silva's plan shows four crania in this grave, two at the western end of the pit, one lying in the middle of the north side, and the last one lying at the eastern end. Between and around them are various disarticulated long bones, schematically depicted. The crania on the eastern end and on the northern edge of the grave were probably the primary and secondary burials. The two crania at the western end of the grave are probably the most recent and may have been buried together, given the symmetry of their appearance. A Chalcolithic stone point is drawn in near the western end of the grave, an intrusion from the much earlier occupation (Boaventura 2001).

The skeletal inventory by Powell of the skeletal remains in *Contentores* 4769 and 4771 revealed cranial remains representing five adults. One of them, a female aged 40-50 years, is also well represented by post-cranial remains. It is possible that one of the missing crania from *Sepultura* 1 was inadvertently included here. A juvenile 9-10 years of age, represented by cranial and post-cranial fragments, was identified in *Contentores* 4771 and 4773.

Pombal *Sepultura* 3

Orientation: east-west.

Construction/tomb type: unknown.

Associated artifacts: none.

MNA Skeletal Inventory: 2007.66 and 2007.67.

N: 1, adult male (MNA *Contentores* 4771, v.3 and 4772, v.1 & 2).

On J. Lino da Silva's plan, the cranium of this articulated skeleton lies at the west end of the grave. The individual is drawn lying on the back with arms along the sides. There are no artifacts drawn in the grave. One adult male, aged 40-50, is well represented by cranial elements, thoracic and lumbar vertebrae, scapulae, clavicles, long bones, pelvis, carpals' and tarsals. The bones show some evidence of trauma, in a rib (2007.66.16) and the distal half of the left ulna

(2007.66.13/2007.67.5). The majority of vertebrae had low grade laminar spines, while some of the lumbar vertebrae exhibit compression. Arthritis is minimal, and not severe when present. Some of the bone fragments mend with adult bone fragments from Pombal *Sepultura* 4 (*Contentor* 4773, volumes 1 & 4), and match the adult male for age, sex, and size.

Pombal *Sepultura* 4

ORIENTATION: east-west.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: none.
MNA skeletal inventory: 2007.67.1; 2007.65.186, 2007.65.190, 2007.65.191.
N: 2, adult male, adolescent 15-16 years; (MNA *Contentor* 4773, v. 1 & 4).

On J. Lino da Silva's plan, this grave is shown as containing one long bones, and pelvis. The individual lies extended on the back, with the head toward the west. The hands are crossed over the pelvis, rather than stretched along the sides. There are no artifacts represented in the drawing of this grave.

The two boxes in *Contentor* 4773 contained remains from one adult male, aged 30+ years. The male is represented by all of the major long bones, one rib, and one clavicle. Fragments of the adult's humeri, ulnae, tibiae and fibulae mend with fragments from *Sepultura* 3. An adolescent aged 12-16, of indeterminate sex, is also represented in this *Contentor* by long bones; the age estimate is based on degree of epiphyseal fusion of the humerus, ulna, radius, femur, and tibia. The adolescent's radius and fibulae from *Sepultura* 4 mend with bones from *Contentor* vols. labeled "*sem indício*" (without indication).

Pombal *Sepultura* 5

ORIENTATION: east-west.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: none.
MNA SKELETAL INVENTORY: none.
N: unknown.

J. Lino da Silva's plan shows one skull, pelvis, and long bones in this tomb. A mostly intact individual lies extended on the back with the head toward the west. The arrangement of the skeleton is unique in this cemetery because there are two long bones placed perpendicular to the body, lying over the tibiae and pelvis. It is unknown whether these bones are human or animal, but it seems likely that they would be human given the evidence of multiple burials in single graves. Perhaps an original burial was disturbed in order to create this particular arrangement. There are no artifacts shown in this grave. At MNA, *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 6

ORIENTATION: east-west.
CONSTRUCTION/TOMB TYPE: unknown.
ASSOCIATED ARTIFACTS: possibly a torque and an arrow or spearhead.
MNA SKELETAL INVENTORY: none.
N: unknown.

No MNA *Contentores* were labeled with this *Sepultura* number. The bones in this burial may have been too fragile to recover. There are several artifacts drawn in the grave, which appear to be a torque and an arrow or spearhead. One other object is drawn in the grave, perhaps a lithic artifact.

Pombal *Sepultura* 7
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: unknown.
MNA skeletal inventory: 2007.68.1.
N: 2, adult (*Contentores* 4771, v.4; 4772, v. 3), adolescent 15-16.

J. Lino da Silva's plan shows one cranium lying at the western end of the grave pit, with long bones arranged schematically parallel to the long axis of the grave, extending to the eastern end. A robust adolescent aged 15-16 is represented by both cranial fragments and incomplete postcranial remains.

There may be one artifact in the grave, but it is difficult to tell from the drawing.

Pombal *Sepultura* 8
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 9
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 10
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 11
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 12

Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 13

Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.

No skeletal remains were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 14

Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: possible arrowhead.
MNA skeletal inventory: none.
N: unknown.

This grave is drawn as containing the cranium, pelvis, and long bones of a single individual. The individual lies on the back with the head towards the west. However, no MNA *Contentores* were labeled with this *Sepultura* number. There also appears to have been an arrowhead or spear-head in the grave, which may have been an intrusion from the earlier Chalcolithic occupation.

Pombal *Sepultura* 15

Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
MNA skeletal inventory: none.
N: unknown.
No skeletal remains or artifacts were drawn in this grave, and no MNA *Contentores* were labeled with this *Sepultura* number.

Pombal *Sepultura* 16

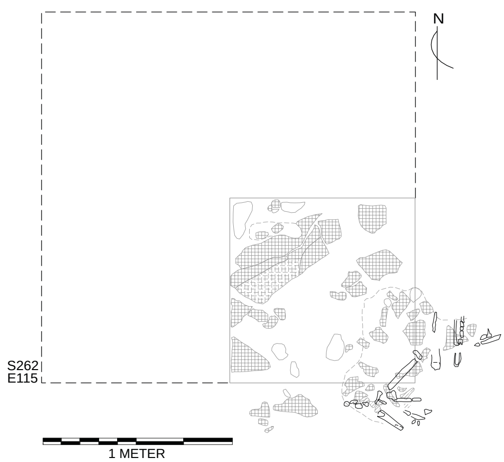
Orientation: east-west.
Construction/tomb type: unknown.
Associated artifacts: none.
N: unknown.

One skull and several long bones are drawn in this grave; these were clustered to the western end of the grave as though to make room for a second and later burial. However, no MNA *Contentores* were labeled with this *Sepultura* number. There were no artifacts shown in the drawing.

8. The South Field West Burial (Complex R)

<u>UL South Field West Burial; LC (none)</u>
Location: sqs. S262E115, S262E117, S264E116.
Orientation: unknown.
Construction/tomb type: no tomb structure identified.
Associated artifacts: none.
N: 1; late adolescent (17-19 years).

During the field season of 1998, a section of distal left tibia shaft from a gracile late adolescent (TP.67.98) was recovered from Level 1 of sq. S264E116 in the area of the site known as the South Field West. The following year, portions of a gracile distal left femur shaft (TP.6.99) were recovered from Level 1 of the adjacent sq. S262E117. On the last day of the 1999 field season, the articulated bones (humerus, radius, and ulna) of the left arm of a gracile individual (TP.198.99) were uncovered in Level 2 of that same square. Additional excavation in this square at the beginning of the 2000 field season recovered this articulated arm, along with three isolated teeth and fragments of the pelvis, right femur and tibia, both fibula shafts, and several hand and foot bones (TP.198.99-00). Laboratory examination of these remains strongly suggested that they all came from the same skeleton, an adolescent aged 17-19 years at death, most probably female, who had been buried in a shallow grave in the South Field; there was no duplication of skeletal elements recovered, and all of the bone fragments showed similar coloration and morphology. The uppermost portions of the skeleton had undoubtedly been destroyed by plowing. No formal tomb structure was identified, but fragments of roof tiles were recovered above and beneath the bones. Other than the infant burials discussed in Chapter II.2.2, this tomb is the only known burial located south of the natural drainage channel that divides the religious zone from that of the villa.



UL South Field West Burial

Appendix II

Skeletal Representation

1. Introduction

The six Tables in this Appendix summarize in schematic form the skeletal representation for each individual in the named area of the Torre de Palma site. The entry for each individual lists the following data:

1. The UL Tomb designation and, where appropriate, the MNA *Sepultura* designation
2. The LC number
3. Age
4. Sex
5. Cranium
6. Spine
7. Thorax
8. Arm
9. Hand
10. Pelvis
11. Leg
12. Foot

The purpose of this Appendix is to give the reader an idea of the degree of completeness of each individual listed:

F = less than 25% complete
P = 25% to 90% complete
C = 90% to 100% complete

2. List of Tables

II.1. Pre-Christian Tombs

TP Cat. #/MNA Cat. #	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
IRON AGE										
MNA 2005.405.7; Urna 5152	12-14 months	?	F	P		F			F	
MNA 2000.421.18, *Sep.* XVIII	adult?	?								
THE ERA OF THE ROMAN VILLAS										
TP.109.92	neonate	?	PP		F	CP		CP	CP	
TP.113.93	0-6 months	?	PP	P	C	CC	CC	CC	CC	CC
TP.66.95; cremation in urn	6 years ±24 months	?	PP	F	P	PP		PP	PP	F

II.2. The Northwest Cemetery

UL Tomb	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
NORTHWEST CEMETERY											
NW 2	7	20-30	F	C	F				CP	PC	
		30-40	F	C	P	P	P		PP	CP	P
		50-60	M	P	F	P	P		PP	PC	PP
		infant 0-1	?					F			
NW 3	12	30-40	F	P		C		F	PP	CC	
NW 4	13	40-50	M	P	F	P	CC	P		CC	PP
NW 5	16	30-40	F	P	P	C	CP	PP	CC	CC	PP
		adult	?	F			F	F		F	
		infant 1-2	?				P			PP	
NW 6	17	30-40	F	P	C	C	CC	P	CC	CP	PP
		adult	F	P			C		CC	CC	P
		adult	F	P			C		C		PP
		adult	M	C			CC	F	CC	C	P
		adult	M	C					CP	CC	
		adult	?	P					F		
NW 7	20	adult	?							F?	
		child 2-3	?								
NW 9	19	50-60+	F		P	P	P	PP	PP	CC	FF
		adult	F				P			C	
		40-50	M	C		P	P		PP	CC	
NW 10	18	30-50	F				CC		F		
		40-50	M	C	P	P	PP	FF	PP	CC	FF
NW 11	14	40-50	F	C	P	C		PP	CC	CC	PP
		40-50	M	C	C	C	PC	PP	CC	CP	PP
		20-25	F		P			F			PP
NW 12	10	20-30	F			C	CC			P	
		50-60	M	C	P	C	CC	PP	CC	CC	PP
		adol	?							C	
		juvenile 6-7	?	C	P	P	C		PP	CC	
		juvenile 7-8	?	C	P	C	PP	PP	CP	CC	P
		child 3-4								P	
NW 13	8	40-50	M	P	P	F	FF	P		P	PP
		20-30	F	F			PP	F		P	PP
		child 6-7	?	F							
NW 14	11	50-60	M	P	P			F	PP	F	F
NW 15	25	adult	?							P	P
NW 16	24	50-60	M			P	FF	P		PF	
		adult	F			F		P			PP
		infant	?								

II.2. The Northwest Cemetery (cont.)

UL Tomb	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
NW 17	22	30-40	M	C		P	F	F		F	P
NW 18	26	40-50	M	F	P	F	PP	F		PP	PP
		juv 10-12	?	C	F	F	FF		FF	PP	
NW 19/*Sepultura* 27	27	40+	M	F		F	P	F	FF	PP	
NW 21	30	60+	M		P	P	P	F	FF	P	PP
Sepultura 25		40-50	F	C	P	C	PP	PP	PP	CC	PP
		50-60	M	C	C	C	PP	PP	PP	CC	PP
Sepultura 26		30-40	M		P	C	PC	PP	F	CC	PP
Sepultura 28		20-30	M		P	C	CP	P	PC	CC	PP
		40-50	M	P	P	C	PC	F	PP	CC	F
NW 34	6	40-50 A	M	P			PP	PP	FF	PP	PP
		juv 7-8 B	?	F			PP			CC	
(collectively for C, D, E)		adult C	M	P	P	P	PP		FF	PP	PP
		30-40 D	F	P							
		40-50 E	F	P							
		child F	?	F			PP				
NW 36	9	adult	F	F	F		P			PP	
		40-60	M	P		P			P	PP	
		late adol	?							PC	
HUMAN REMAINS WHOSE ORIGINAL TOMB ASSOCIATION IS UNCERTAIN											
TP.20.85	none	adult	M							P	
		adult	F							F	
TP.21.85, the Small Reburial (*skeletal elements are tabulated collectively for the adults.)	none	40-50	M	7	1	3	6	1	5	6	1
		adult	M								
		adult	M								
		adult	F								
		adult	F								
		adult	F								
		adult	?								
		child 5-6	?						P	P	
		adol 14-16	?						P	P	

II.3. The Church

UL Tomb / MNA *sepultura*	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
WESTERN BASILICA TOMBS											
Tomb S / *Sepultura* E	47	30-40 (ind A)	F	P		P	CC		PP	CC	
		adol 15-17 (ind B)	?	P							
		adult (ind C)	M	PP	P	P	CP		PP	C	
		juv 6-7 (ind D)	?	P			PP			P	
		30-40 (ind E)	F				C			C	
Sepultura B	49	30-40	M		P	P	P	PP	PP	CP	PP
Sepultura F	46	adult	M	C		P	F		F		P
		adult	?								P
Sepultura D	52	30-40	F	C	3	P	CC	P	CC	CC	
		45-60	M	P		P		PP			PP
		40-50	?								
Tomb 3, ind A	111	30-35	F	C	P	P	CP	PP	CC	CC	77*
Tomb 3, ind B		40-50	M	P					P	FP	
Tomb 3, ind C		45-60	M	P		P	FF		P	CF	

II.3. The Church (cont.)

UL Tomb / MNA *Sepultura*	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
Tomb 3, ind D	111	30-35	M			P	CC		FP	PP	
Tomb 3, ind E		40-50	M	P		P			PP		
Tomb 3, ind F		juvenile 8-12	?	P	2	P	PP	F	PP	PC	PP
EASTERN BASILICA TOMBS											
Tomb E	62	infant 0-1	?							P	F
Tomb 8	104	30-40	F	C	F	P	PC		PP	CC	P
		child 2-3	?	P		P			PF	PP	
		neonate	?								
Tomb 1	109	adol 17-19	?		P	P	C	PP	PP	CC	PP
Tomb 11	112	40+	M					P			P
TOMBS IN THE BAPTISTRY AND SOUTH OF THE CHURCH WALL											
Tomb C / *Sepultura* 7-A	63	adol 16-18	?	C	C	P	CC	PP	CC	CC	PP
		infant 0-1 year	?	F						F	
Tomb Y / *Sepultura* 8-A	65	child 3-5	?							P	
Tomb AA / *Sepultura* 9-A	67	juvenile 11-12	?	C	F	P	CC		PP	CC	
Tomb BB / *Sepultura* 4-A	68	30-40	F	P	P	P	PP	PP	F	PC	PP
		adult	M	F	F	F		F			
		adult	?		F						
Tomb CC / *Sepultura* 10-A	69	adult	F	F	F						F
		child 5-6	?	P	P	P	PP			PF	
		juvenile 6-7	?	P	F	P	P		P	PP	F
		infant 1.5-2	?				PP		CC	PP	
Tomb DD / *Sepultura* 6-A	70	adult	F	C	P		CC	PP	PC	CC	PP
		40-50	M	C	P	P	P	PP	CC	CC	PP
		adult	M	C	P	P	CC	PP	CC	CC	PP
		juvenile 11-12	?	C	P	P	CP	FF	PP	C	PP
		adol 14-16	?								
Tomb EE / *Sepultura* 5-A	71	adult	F		P	P	P	P	PP	PP	PP
		30-40	M	P			P		PP	PP	
		40-50	M	P			P		FP	P	
		adult	?								
		juvenile 9-11	?	F							
Tomb V / *Sepultura* 3-A	72	5 adults*	F,MM,?	PPPP	P	P	7*	F	F	7*	2*
*skeletal elements are tabulated		adolescent 12-14	?	P			C		PP	C	FF
collectively for adults		juvenile 7-9	?	P					P	CP	
Tomb W / *Sepultura* 2-A	73	20-25	F	P			PP			P	PP
		adult	M		P		CC			CC	PP
		adult	?				PP			P	
		juvenile 7-9	?				CC			C	
Tomb X / *Sepultura* 1-A	74	50-60	F	C	P	P	CP		PP	CC	
		50+	M				CP		FP	CC	
		adult	M				P				
		adolescent 13-14	?							P	
HUMAN REMAINS WHOSE ORIGINAL TOMB ASSOCIATION IS UNCERTAIN											
Sepultura P	43	30-40	F	P	P	P	CC	F	P	PC	
		adult	M		F		P		P	F	PP
		infant (12-18 m)	?						P	C	
Sepultura A	46	30-40	F	C	C	P	PP	F	PP	CC	PP
		40-50	F	P	C	P	PP		PP	PC	
		50+	F	P		P	PP		PP	PP	
		30-40	M	P		P	PP			PP	
Sepultura D	52	30-40	F	C	3	P	CC	P	CC	CC	
		45-60	M	P		P		PP			PP
		40-50	?								

II.3. The Church (cont.)

UL Tomb / MNA *sepultura*	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
TP.01.86	102	adol 17-19	?	P	P	P	CC	PP	PP	PP	PP
Large Reburial (*skeletal elements are tabulated collectively: adults in CAPS, subadults in lower case; L and R elements combined)	53	20-30	F,F	14P*	75 verts*	P	14*	4*	11*	25*	2*
		20-30	M								
		30-40	M,M,M,M								
		30-40	F,F								
		50+	M,M								
		adults	?								
		infant 12-18 mos.	?	3 F*	20 verts*	F				P	
		child 3-4	?						PP	PP	
		child 6-7	?			P	P		CP	PP	
		juvenile 7-8	?			P	P		PF	PP	
		adolescent 12-13	?				P			PP	
TP.83.84	none	adult 30-40	M?	P	F	F	F	F	FF		PP
		neonate	?		F	P				P	F
		child 2-3 years	?	F	F	P	P	F	FF	P	F
TP 84.84	none	child 2-3 years	?			F					

II.4. Southwest Cemetery

UL Tomb / MNA *Sepultura*	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
SOUTHWEST CEMETERY											
SW 1	77	30-40	F	F	F	F	F		F	P	FF
SW 2	76	adult					F		F	F	F
		adol	?								
SW 4	78	30-40	M?	P			P		F	P	
		juv 11-12	?	F							
SW 5	95	adult	?							F	
SW 7	81	20-30	F	F	F	P	PP	P	F	PP	PP
SW 8	82	30-40	F	P	F	F	P	F	PF	PP	PP
		adult	M				P				
		adol 13-15	?	P			PC	F	F	PP	
SW 10	83	adult	M	F						PP	F
		juv	?					F			
SW 11	85	adult	M?	F	F		P			P	P
SW 12	86	adult	F?				F			P	PP
		adult	M?	F	P		P		P	PP	P
SW 13	87	20-25	F		P		PP	F	PP	PP	PP
		40-50	M	P	P		P	F	PP	PP	PP
		juv 12-13	?	P							
SW 14	88	30-40	?	F	F		P	P	P	PP	P
		adol 15-17	?	P	F		PP			F	PP
SW 15	98	30-40	M	P	P		P	P	F	PP	P
SW 18	92	adult	?	F						FF	
SW 19	93	adult	?							FF	
SW 22	80	30-40	F	P	F	F	F		P	PP	
Sepultura A	116	40-50	M	P			P		PP	PP	F
		adult	?	P						FF	
		juv 7-8	?	F	F		F			PP	
Sepultura B	117	30-40	F	P	P	P	F	F	PP	PP	P
		child	?	F							

II.4. Southwest Cemetery (cont.)

UL Tomb	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
Sepultura E	118	50+	M	P				F			
Sepultura F	119	20-25	M?	P							
Sepultura M	120	30-35	M	P	P	P	P		PP	CP	PP
		adult	F		F		P		PP	PP	
		child 4-5	?	P					P	CP	
Sepultura 'imperceptivel'	121	adult	?							F	
		juv 11-12	?	F	F	P	C	PP	PP	CP	PP
HUMAN REMAINS NOT ASSOCIATED WITH A TOMB											
TP.22.85	none	adult	M?							FF	

II.5. *Cemitério do Pombal*

Sepultura	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
1	adult	F		P	P	PP	PP	CP	CP	FP
	adult	M				P			P	FF
2	adult A	F	PP		P	F	F	FF		
	adult B	?	PP		P					F
	adult C	M	PP		P					
	adult D	?	PP							
	adult E	?	PP							
	*collective adult remains			P	P	PPPP			PPCP	
		?	PP	P	P	PP		PP	CC	
3	40-50	M	PP	P	P	P	CC	PP	PP	CC
4	30-50	M			P	CC			CC	
	adol 12-16	?			F	PP			CC	
7	adol 15-16	M?	PP		P	PP	PP	F	PP	PP

II.6. Medieval Chapel

UL TOMB/TP #	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
2	110	30-40	M	P	P	P	PP				
10	113	child 5-6	?	F	P			PP	PP	PP	
9	114	infant 18-24 mos	?	P	P	P	CC		PP	CC	PP
4	115a	infant 3 mos	?	F	F		P		P	PP	
5	115b	infant 18-24 mos	?	F	P	P	CP	3	CC	CC	F
6	115c	neonate	?							P	
7	115d	infant 18-24 mos	?		F	F	F	6	PC	CC	PP
HUMAN REMAINS WHOSE ORIGINAL TOMB ASSOCIATION IS UNCERTAIN											
TP.6.83	122	adult	?							F	PP
TP.9.83	123	adult	?								F
TP.9.83	123	child 2-3	?	P	P	P	PC				
TP.9.83	123	infant 12-18 mos	?	F		P	P		P		
TP.13.98; TP.113.84	none	35-40	F	P	F	C	FC	F		P	F
TP.13.98; TP.113.84		adult	M	F		P	PP			CP	
TP.13.98; TP.113.84		adult	?			F	P				
TP.13.98; TP.113.84		neonate	?						FF	FF	
TP.13.98; TP.113.84		infant 0-6 months	?			F	F			F	

II.6. Medieval Chapel (cont.)

UL TOMB/TP #	LC	Age	Sex	Skull	Spine	Thorax	Arm	Hand	Pelvis	Leg	Foot
TP.13.98; TP.113.84		infant 12–24 mos	?	F	F						
TP.13.98; TP.113.84		child 5-6	?	F	F		PF	F		P	
TP.13.98; TP.113.84		adolescent 16-17	M?		P	P	PP	F			
TP.74.84	none	neonate	?	F							
TP.74.84		infant 9-12 mos	?	P							
TP.74.84		child 3-5	?	F			P				
TP.74.84		adolescent	?	F				F			
TP.82.84	none	infant 6-18 mos	?							P	
TP.116.84	none	infant 1.5-2	?							P	
TP.123.84	none	neonate	?								
TP.123.84		infant 6-12 mos	?	F							
TP.123.84		infant (Tomb 9?)	?	F							
TP.123.84		adult	?	F							
N023E024 B	none	adult	?	P							
N023E024 B		child 4-5	?						P	P	
N023E024.A	none	infant c. 12 mos	?	P							
N023E024.A		child, 4-5	?	P							
MNA 4769, V.2	none	adult 30-40	F	C	F			2			
MNA 4767, V.2	none	juvenile, 6-8 years	?	F							

Appendix III

Faunal Analysis

III.1. Scientific and Common Names of Animal and Shell Taxa Recovered at Torre de Palma

Mammals

Bos taurus – Domestic Cattle
Ovicaprids: *Ovis aries* – Domestic Sheep; *Capra hircus* – Domestic Goat
Sus scrofa – Domestic Pig
Equids: *Equus caballus* – Domestic Horse; *Equus asinus* – Donkey; Mule – donkey x horse
Canids: *Canis familiaris* – Domestic dog
Deer: *Cervus elaphus* – Red Deer
Cervus dama – Fallow Deer
Capreolus capreolus – Roe Deer
Lepus sp. – Hare
Oryctolagus cuniculus – Rabbit
Sus scrofa fer. – Wild Boar

Birds

Gallus gallus – Chicken, Domestic Fowl
Anser sp.– Goose
Turdus sp. – Thrush
Ciconia sp. – Stork

Terrestrial Gastropods

Rumina decollata (Linnaeus)
Eobania vermiculata (Müller)

Marine Gastropods

Monodonta cf. *turbinata* (von Born) – Toothed Winkle or Thick Topshell

Marine Bivalves

Glycymeris glycymeris (Linnaeus) – Dog Cockle
Ostrea edulis (Linnaeus) – Common European Oyster
Cardium (=Cerastoderma) edule (Linnaeus) – Common Cockle

Freshwater Bivalves

Unio sp. – Freshwater Clam

III.2. Cattle: NISP per Fusion Category (after Silver, 1969)

Fusion Age Category	Element	Early		Late	
		Fused.Unfused	% Fused	Fused.Unfused	% Fused
7.10 mos.	Scapula	2.0		4.0	
	Pelvis	2.0		1.0	
			100%		100%
12.18 mos.	Distal humerus	.		2.0	
	Proximal radius	1.0		4.0	
	Phalanx 1	5.0		14.0	
	Phalanx 2	4.0		5.0	
			100%		100%
24.36 mos.	Distal tibia	0.1		1.0	
	Distal metacarpal	3.2		4.0	
	Distal metatarsal	1.1		.	
	Distal metapodial	0.1		1.1	
	Calcaneus	1.1		1.1	
			45%		78%
42+ mos.	Proximal humerus	1.0		0.2	
	Distal radius	0.1		2.0	
	Proximal ulna	1.0		.	
	Proximal femur	.		.	
	Distal femur	.		.	
			67%		50%

F=fused epiphysis; UN=unfused epiphysis

III.3. Cattle: NISP per Dental Age Category (after Grant, 1982)

Tooth	Period	Dental Wear Stage																
		C	V	E	H	a	b	c	d	e	f	g	h	j	k	l	m	n
dp_4	Late																	1
P_4	Late										1							
M_1	Early															1		
	Late														1			
M_2	Early															1		
	Late														1			
M_3	Early											1						
	Late									1				1				
M_1/M_2	Early											1			1	1		
	Late											1		1		1		

III.4. Principal Domesticates: NISP per Skeletal Element

Skeletal Part Category	Element	Cattle		Sheep/goat		Pig	
		Early	Late	Early	Late	Early	Late
Head + teeth	Horn core	.	1	1	5	.	.
	Cranium	.	3	3	5	3	11
	Maxilla	.	.	.	2	5	22
	Max. deciduous teeth	1	.	2	.	.	10
	Max. permanent teeth	4	14	29	60	16	60
	Mandible	8	4	13	31	15	33
	Mand. deciduous teeth	.	3	5	10	6	12
	Mand. permanent teeth	14	21	20	63	35	91
	Hyoid	.	.	.	1	.	.
Primary cuts	Scapula	.	1	6	15	3	11
	Humerus	1	7	14	18	2	15
	Pelvis	2	8	6	13	5	3
	Femur	.	1	5	14	2	4
Secondary cuts	Radius	.	8	14	35	4	10
	Ulna	.	1	1	9	.	9
	Tibia	.	1	12	22	3	3
	Fibula	.	.	.	.	1	1
Limb Extremities	Astragalus	1	3	3	10	2	3
	Calcaneus	4	6	1	10	2	2
	Metacarpal	6	6	.	12	7	7
	Metatarsal	2	5	.	8	6	5
	Metapodial	5	2	.	5	3	12
	Carpal/Tarsal	2	14	1	2	.	5
	Phalanx 1	6	18	3	10	6	8
	Phalanx 2	4	7	.	1	3	8
	Phalanx 3	.	2	.	1	2	1
TOTAL		**60**	**136**	**139**	**362**	**131**	**346**

III.5. Sheep/goat: NISP per Fusion Category (after Silver, 1969)

Fusion Age Category	Element	Early		Late	
		Fused.Unfused	% Fused	Fused.Unfused	% Fused
12 mos.	Scapula	1.1		6.0	
	Pelvis	3.0		6.1	
	Distal humerus	3.0		3.1	
	Proximal radius	3.0		8.1	
			91%		88%
14.36 mos.	Proximal femur	0.1		0.3	
	Distal tibia	4.1		8.3	
	Phalanx 1	2.0		4.3	
	Phalanx 2	.		0.1	
			75%		55%
47.48 mos.	Distal metacarpal	1.0		3.1	
	Distal metatarsal	1.1		0.1	
	Distal metapodial	0.1		1.2	
	Proximal tibia	0.1		1.1	
			40%		50%
48.60 mos.	Proximal humerus	.		0.1	
	Distal radius	1.1		0.4	
	Proximal ulna	0.1		1.2	
	Calcaneus	.		3.4	
			33%		27%

Fused=fused epiphysis; Unfused=unfused epiphysis

III.6. Sheep/goat: NISP per Dental Age Category (after Grant, 1982)

Tooth	Period	Dental Wear Category																
		C	V	E	H	a	b	c	d	e	f	g	h	j	k	l	m	n
dp_4	Early										1			1		1		
	Late						1	1			1						1	
P_4	Early											1		1				
	Late										1	1	2	1		2		
M_1	Early											2						
	Late										1	2	3		1		1	
M_2	Early									1		1						
	Late											4		1				
M_3	Early							1										
	Late							2		1		4						
M_1/M_2	Early											2						
	Late											9			1			

III.7. Sheep/goat: NISP per Dental Wear Category (after Payne, 1987)

Tooth	Period	Dental Wear Category																				
		C,V,E,H	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
dp_4	Early														1	1					1	
	Late							2								1		1				
P_4	Early											1			1							
	Late										1	1			3			2				
M_1	Early											2										
	Late										1	4	1		1			1				
M_2	Early									1		1										
	Late											4		1								
M_3	Early							1														
	Late							2				1		4								
M_1/M_2	Early											2										
	Late											9			1							

III.8. Pig: NISP per Fusion Category (after Silver, 1969)

Fusion Age Category	Element	Early		Late	
		Fused.Unfused	% Fused	Fused.Unfused	% Fused
11 mos.	Scapula	0.1		3.2	
	Pelvis	2.1		1.0	
	Distal humerus	2.0		0.3	
	Proximal radius	1.0		3.1	
	Phalanx 2	2.1		5.3	
			70%		57%
19.23 mos.	Distal tibia	2.1		1.1	
	Distal fibula	0.1		.	
	Distal metacarpal	0.2		0.1	
	Distal metatarsal	1.2		0.1	
	Distal metapodial	1.2		1.3	
	Phalanx 1	4.2		3.4	
			44%		33%
31.35+ mos.	Proximal humerus	0.1		.	
	Distal radius	.		.	
	Proximal ulna	0.1		0.1	
	Distal ulna	0.1		.	
	Proximal femur	.		.	
	Distal femur	.		1.1	
	Proximal tibia	.		.	
	Calcaneus	0.1		0.1	
			0%		25%

Fused=fused epiphysis; Unfused=unfused epiphysis

III.9. Pig: NISP per Dental Wear Category (after Grant, 1982)

Tooth	Period	Dental Wear Category																
		C	V	E	H	a	b	c	d	e	f	g	h	j	k	l	m	n
dp_4	Early						1		1	2	1							
	Late							1										
P_4	Early					1	1											
	Late							1	1	1								
M_1	Early							2										
	Late										1	2						1
M_2	Late							2	1	2	1			1				
M_3	Late							2	1									

III.10: Reference List for Comparative Sites with Zooarchaeological Data

Site	Date (century AD)	Site Type	Reference
Torre de Palma	1^{st} – $4/5^{th}$	villa	This report
Alcáçova de Santarém	1^{st} – 4^{th}	settlement	Davis, 2006
Amoinhas (Loures)	2^{nd} – 4^{th}	villa	Costa, 2011
Botija (Cáceres)	Roman	settlement	Castaños Ugarte, 1991
Casa do Governador (Lisbon)	1^{st} – 4^{th}	settlement	Valenzuela Lamas, 2014
Castanheira do Ribatejo	1^{st} – 2^{nd}	villa	Cardoso, 2009
Castelo da Lousa	1^{st}	villa/trading post	Lange, 2010
Conimbriga	Roman	urban settlement	Cardoso, 1995
Conimbriga	3^{rd} – 4^{th}	urban settlement	Detry et al., 2014
Creiro (Setúbal)	1^{st} – 5^{th}	industrial tank	Detry and Tavares da Silva, 2016
Hijoviejo (Badajoz)	Roman	settlement	Castaños Ugarte, 1998
Hornachuelos (Badajoz)	Roman	settlement	Castaños Ugarte, 1998
Mirobriga	Roman	settlement	Mackinnon, unpublished report
Monte da Cegonha	1^{st} – 6^{th}	villa	Saragoça et al., 2016
NARQ.BCP (Lisbon)	1^{st} – 5^{th}	settlement	Valenzuela Lamas, 2014
San Julián	Roman	settlement	Morales Muñiz, 1992
São Miguel de Odrinhas (Sintra)	4^{th} – 5^{th}	villa	Gonçalves, 2014
São Pedro	3^{rd} – 5^{th}	villa	Davis, 2005
Tourega (Évora)	Roman	villa	Lange and Vaz Pinto, 2001
Troia	1^{st} – 5^{th}	settlement	Nabais, 2014
Quinta das Longas (Elvas)	4^{th}	villa	Cardoso and Detry, 2005

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