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Temple places

Excavating cultural sustainability in prehistoric Malta

By Caroline Malone, Reuben Grima, Rowan McLaughlin, Eóin W. Parkinson, Simon Stoddart & Nicholas Vella

Volume 2 of Fragility and Sustainability – Studies on Early Malta, the ERC-funded *FRAGSUS Project*

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With contributions by
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Dedication – in memoriam
John Davies Evans David Hilary Trump

Malta may be small in scale but it has had a rich and important archaeological past which has been explored and enjoyed by many past scholars. A visit to the Archaeology Museums of Malta and Gozo testifies to a long history of collecting, scholarship and passion dating back to the early to mid-nineteenth century. It is a heritage that is beloved by Malta and its visitors alike.

The editors of this volume wish to pay tribute to two remarkable 'visitors' to Malta, each of whom, in their own way, made great contributions to our present appreciation of the islands' ancient past and supported our early researches, teams and ideas. Now we want to record our debt as some of the continuing scholars of Maltese prehistory, since we cannot imagine where we could have begun our current quest to take the story onwards and deeper without their prior work.

On behalf of the whole *FRAGSUS* team, we wish to dedicate this volume to their enduring memory.

Professor John Davies Evans (OBE) (1925–2011) arrived in Malta in 1952 from Cambridge to commence the task of organizing the war-damaged museum collections in preparation for a synthesis of Maltese prehistory. His task was enormous, and involved a new assessment of the pottery and material culture sequence of Maltese prehistory. He prepared his now classic study *The Prehistoric Antiquities of the Maltese Islands*, published in 1971, which has remained the primary compendium of reference to this day. Together with carefully targeted excavations, John Evans set in train the many questions that inspired not only David Trump, his successor, to explore and challenge the complex story of Malta's prehistoric past, but also ourselves over the last 35 years. John noted important aspects of sequence, material connectivity and, of course, the temples. These he recorded and described in such detail that his work remains vitally important today.

David Hilary Trump (OM) (1931–2016) succeeded John Evans, having already experienced Maltese prehistory in the field with him, and became the Curator of the Museum of Archaeology for five years until 1963. In that short time, he too made an enormous impression on the understanding of prehistoric Malta. His work at Skorba (as we discuss in Chapter 7) was inspired and informed, and it too set the direction for the future explorations of prehistory in the islands. David Trump maintained his interest in Malta throughout his career, leading regular study tours to the island and latterly, with ourselves, undertaking the sustained programme of fieldwork at the Xagħra Brochtorff Circle (1987–9). He wrote numerous books and papers on Malta's prehistory, popular and academic; and his contribution has been widely acknowledged through museum displays, the award of the Order of Merit of Malta and an Honorary Degree from the University of Malta for which he felt hugely honoured. But back in the United Kingdom, from whence both these scholars came, there has been less mention of their work on Malta. Evans moved eastwards to Crete in his research interests, and has been identified mainly with that work; whilst Trump, a retiring and extremely modest individual, did not promote his achievements on Malta during his teaching years at Cambridge, which was arguably too theoretical to fully appreciate his remarkable contribution.

Figure 0.1. *David Trump and John Evans together at the Deya Conference, Mallorca (*c. *1983) (reproduced with permission of Judith Conway, niece of John Evans).*

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Firstly, the *FRAGSUS Project* is the result of a very generous research grant from the European Research Council (Advanced Grant no. 323727), without which this and two partner volumes and the research undertaken could not have taken place. We heartily thank the ERC for its award and the many administrators in Brussels who monitored our use of the grant. The research team also wants to record our indebtedness to the administrators of the grant within our own institutions, since this work required detailed and dedicated attention. In particular we thank Rory Jordan in the Research Support Office (Queen's University Belfast – QUB), Laura Cousens (Cambridge University – UoC), Glen Farrugia and Cora Magri (University of Malta – UM), the Curatorial, Finance and Designs & Exhibitions Departments in Heritage Malta (HM) and Stephen Borg at the Superintendence of Cultural Heritage (SCH).

All archaeological excavations described in this volume were carried out using standard methods, in accordance with the policies of the SCH, in particular the guidance given in the document *Operating Procedures and Standards for Archaeology Services – February 2013*. Permits to enable excavation, survey, sampling and study were granted through the SCH and we are especially grateful to Anthony Pace and Nathaniel Cutajar for their unstinting efforts to ensure fieldwork was enabled.

Taċ-Ċawla

The Taċ-Ċawla excavations were directed by Prof. Caroline Malone, and the crew consisted primarily of students and staff from UoC, UM and QUB, supervised by Stephen Armstrong, Jeremy Bennett and Conor McAdams, with additional supervision from Dr Simon Stoddart, Dr Sara Boyle and Dr Emily Murray. We are also very grateful for Dr George Azzopardi who sought out accommodation for the project, assisted on site, and with his colleagues in HM enabled access to space for storage, environmental sampling and finds processing in Rabat. John Cremona and his colleagues in the Ministry for Gozo also played an important role in enabling site clearance and facilities at Taċ-Ċawla, and in securing the site following our work, with the long-promised surrounding wall. We also acknowledge a great number of local Gozitan businesses, hardware stockists, JCB drivers and cafe and restaurant owners, who supported our work in so many ways.

Santa Verna

The Santa Verna excavations were directed by Prof. Caroline Malone, assisted by Dr Simon Stoddart and Dr Rowan McLaughlin. The crew consisted primarily of a number of students and staff from UoC, QUB and UM, supervised by Stephen Armstrong, Jeremy Bennett, Dr Catriona Brogan and Eóin Parkinson. Dr Evan Hill wet-sieved the soil samples using flotation and the site was sampled for soil micromorphology and geochemistry by Prof. Charles French, Dr Sean Taylor and Conor McAdams. During the excavation, our understanding of the extant megalithic structure was improved by the superb plan produced by Stephen Ashley. Tiomoid Foley conducted a condition survey of the megalithic remains, the results of which were incorporated into an MSc project. Rupert Barker made a short film of the excavations – *A Day on a Dig* (https://youtu.be/cGNOGpq746I). Digital laser scanning was undertaken by John Meneely. Individuals whose efforts are warmly acknowledged include Stephen Armstrong, Dr Catriona Brogan, Dr Bela Dimova, Dr Paola Filippucci, Dr Reuben Grima, Laura James, Lottie Stoddart and Dr Sean Taylor, who supervised trenches, organized field assistants and gave logistical support to the running of the project. At Santa Verna, we particularly thank Dr George Azzopardi (HM) for his invaluable logistical

help at the start of the excavations and insightful comments made throughout, and Ella Samut-Tagliaferro, Cristian Mifsud, Mevrik Spiteri and Daphne M Sant Caruana, who accommodated the wet-sieving and flotation operations at the Ġgantija World Heritage site visitor centre. This was facilitated by Prof. Nick Vella and Chris Gemmell (UM), who organized and set up the sieving system. We acknowledge the interest taken in our work by other organizations including Xagħra parish council, Wirt Għawdex, and the staff and pupils at Gozo College. Indeed, the *FRAGSUS* team was delighted by the level of interest in the excavations shown by local residents and other visitors to the site. We particularly acknowledge the help, understanding and patience of the residents who offered us the use of their garage to store tools and equipment overnight, and the local farmer who provided gifts of bananas and kindly offered the use of his pumphouse as a tool shed. We especially thank Joseph Attard Tabone for his interest in and support of all our work, especially at Santa Verna.

Ġgantija

The Ġgantija excavations in 2015 were directed by Prof. Charles French, Dr Simon Stoddart, Dr Sean Taylor and David Redhouse, assisted by Stephen Armstrong, Jeremy Bennett, Dr Catriona Brogan, Conor McAdams, Aran McMahon, Eóin Parkinson, Jacob Pockney and Mariele Valci. Flotation of soil samples was undertaken by Dr Evan Hill. Digital laser scanning was undertaken by John Meneely. The field researchers comprised the geophysical survey team in 2014 under the supervision of David Redhouse and Dr Alistair Ruffell with assistance from Jeremy Bennett. Dr Sara Boyle and Jeremy Bennett undertook initial survey of the WC section area in 2014.

We thank especially HM and its staff on Gozo, who enabled access and provided much assistance at this busy World Heritage Site (the most visited ancient site in the islands), namely George Azzopardi, Daphne M Sant Caruana and Nicolene Sagona.

Kordin III

The excavations were directed jointly by Prof. Caroline Malone and Prof. Nicholas Vella, assisted by Dr Reuben Grima, Dr Rowan McLaughlin, Ella Samut-Tagliaferro and Dr Simon Stoddart. The crew consisted mainly of students from UM, who participated as part of their annual training excavation. They were supervised by Jeremy Bennett, Dr Catriona Brogan, Rebecca Farrugia, Dr Reuben Grima, Tore Lumsdalen and Eóin Parkinson. Flotation of soil samples was undertaken by Dr Evan Hill. Digital laser scanning was undertaken by John Meneely and Jeremy Bennett. We also acknowledge the kind assistance of Fondazzjoni Wirt Artna, the Malta Heritage Trust, who granted access to the site.

Skorba

The excavations were directed by Prof. Caroline Malone and Dr Rowan McLaughlin, who were assisted by Stephen Armstrong, Jeremy Bennett, Dr Catriona Brogan, Emma Hannah and Eóin Parkinson. OSL profiling and geoarchaeological sampling was performed by Prof. Charles French, Dr Timothy Kinnaird (University of St Andrews), Dr Simon Stoddart and Dr Sean Taylor. The site was laser scanned by Jeremy Bennett. We thank HM for enabling access to the site and Dr Josef Caruana and Katya Stroud for supporting the work.

In-Nuffara

The excavations were directed by Dr Simon Stoddart and Dr Rowan McLaughlin, who were assisted by Stephen Armstrong, Stephen Ashley, Robert Barratt, Donald Horne, Katie Hutton, Christina O'Regan and Leslie Torwie. Many thanks to Dr George Azzopardi (HM) and Ella Samut-Tagliaferro (SCH) for their logistical support. John Meneely laser scanned the silos and analysed the volumetric data. We thank Dr Anthony Pace and Nathaniel Cutajar and their staff from the SCH for enabling access to the site.

Post-excavation

The Department of Classics and Archaeology, UM, kindly offered storage space during the project and accommodated the post-excavation team in the sunny courtyard where pottery and finds were studied. We thank Chris Gemmell in particular for his invaluable help throughout the project, but especially in enabling storage of material and access to it for the project team and the logistics on various sites and for his skilled assistance in setting up the flotation processing. In Belfast, Emma Hannah undertook data entry, sample sorting and volume indexing, and Georgia Vince assisted with data entry and logistics and produced many of the excavation plans and section drawings used throughout this volume. She also archived and scanned the project records along with the original Cambridge Gozo Project, and these are now housed in the National Museum of Archaeology, Valletta. In Malta, pottery was studied by Stephen Armstrong, Stephen Ashley, Prof. Anthony Bonanno, Dr Catriona Brogan, Prof. Caroline Malone, Lisa Coyle McClung,

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Permits and access

The *FRAGSUS* team is very grateful to the heritage bodies of Malta, namely HM and the SCH and their officers, who enabled access to sites and provided the permissions and opportunities to study the buried archaeology. It cannot be over-emphasized just how privileged the *Project* has been in having access to excavate and examine the exceptional sites of prehistoric Malta. Not only is the entire category 'Maltese Temple' protected, but most sites are also inscribed within the UNESCO World Heritage Site listing for Malta. Some readers may wonder why very small trenches and sondages were permitted at all, whilst others may query the value of small investigations. This volume presents a range of scales of study from the small to the large across prehistoric sites and assesses the value of particular data sets that have been collected. Together with Volume 1, which examines the wider landscapes and environments of early Malta, and Volume 3, which examines the bones and lives of the ancient individuals, this volume fills the middle ground – the sites themselves, and we thank all our collaborators and volunteers in this venture. In particular, we thank the willing site assistants, volunteers, surveyors, cooks and illustrators who gave their time and energy to the archaeological work, and we list them below:

Spring and Summer 2014, Gozo – Taċ-Ċawla, In-Nuffara, Ta' Marżiena, Ġgantija, Gozo landscapes

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Foreword

Joseph Magro Conti

Consider, 5000 years ago you are on one of the smallest islands in the Mediterranean, which has no water sources, dependent on brief winter rain showers, shallow soil patches, with only stone, clay and salt as natural resources, perhaps a few trees and shrubs. How would you live in such environment? This second volume of the *FRAGSUS Project* (2013–18) provides readers with fresh information achieved through high quality scientific research on palaeoenvironmental analysis, radiocarbon dating, human and faunal bone studies as well as on ceramics, lithics, domestic contexts and monuments, fully addressing five main questions targeted by the project. The support of the European Research Council has been transformative in making this new knowledge about Maltese prehistory more understandable and accessible, as a reader will discover throughout this and the other two volumes.

The coming of *FRAGSUS* was a long journey. Twenty-seven years passed since I first met the main protagonists of this project, Prof. Caroline Malone and Dr Simon Stoddart. They left a long-lasting positive impression on me. I was an archaeology undergraduate at the University of Malta in 1993, under the academic guidance of Prof. Anthony Bonanno, with colleagues Nicholas Vella (now Professor, and former Head of the Archaeology Department at the University of Malta) and Dr Anthony Pace (my predecessor as Superintendent of Cultural Heritage). I was on my first archaeological research excavation by an Anglo-Maltese mission at the unique Neolithic mass burial site of the Xagħra Brochtorff Circle in Malta's sister island of Gozo. A couple of decades later I had the opportunity to participate on other research digs in Malta with Malone-Stoddart, this time as part of *FRAGSUS* at Kordin III Neolithic temples in Malta, a site about which I had long endeavoured to raise awareness for its better understanding and management.

The Temple Period is renowned for the monumental megalithic structures (presumed temples) and the associated underground mass burial places, which offer an aura about the Neolithic mindset, belief system, organisation, ritual and physical capabilities in engineering and art. But what should be further intriguing to the reader is another aspect of human life – how the early people lived? What evidence is there for this aspect from the Temple Period? Previously, such questions were largely without much evidence except sporadic discoveries of typical deposits and material culture, but which were very lacking in data to advance site prediction and environmental data collection. The very few huts so far discovered and interpreted as domestic were ephemeral and thus prone to unrecorded destruction during building construction. I was pleased to contribute my knowledge of domestic sites to the publication of the Gozo study in 2009, and delighted to write this Foreword. This work records the next stages of discovery of the inhabitation record of the Maltese islands, most notably at Taċ-Ċawla, a site preserved from development by the action of the Superintendence.

In the past fifty years, the Maltese Islands have undergone successive building booms, each significantly endangering Malta's historic environment. In my quest as an applied archaeologist/heritage manager for over two decades at the Planning Authority and for the past two years as Superintendent of Cultural Heritage, I have endeavoured to collaborate with disparate stakeholders to save or mitigate impacts on the fragile remains of the past, and to raise awareness. The findings from *FRAGSUS* will be an especially useful source of information for policy makers, heritage managers, regulatory agencies and conservation scientists in their quest to preserve and understand Malta's past. The study enables them to make informed decisions about future human impacts on the archaeological heritage, mainly caused by

Figure 0.2. *Joseph Magro Conti at Kordin.*

building development on the small island environment and its island society and economy.

This volume is a seminal interdisciplinary study, not only for Maltese prehistory but also a milestone in world prehistory more generally. As prehistory pre-dates the invention of writing, the approach of *FRAGSUS*'s research agenda turns archaeo-environmental data into 'words' by digging deep into the embryonic matrix of garden soils on which the temples builders sustained themselves. The project can now explain queries about this sustainability, a theme that is still relevant to modern generations. With the use of multidisciplinary and multinational teams of specialists, the study placed innovative scientific approaches at the fore, and addressed silent aspects that go beyond the traditional art-historical basics of Grand Traditions. The investigations into the core essence of life five millennia ago belong to new scientific approaches.

The *FRAGSUS Project* has addressed lacunae and used unconventional approaches in theory and method to obtain robust scientifically-backed results that have filled in significant gaps in the research agenda of Maltese prehistory and beyond. Equally, the results have surely raised many questions for future research agendas. I look forward to further collaboration, and I am eager to see more collaborative projects between Maltese veterans and upcoming academics and our overseas colleagues.

Joseph Magro Conti
Superintendent of Cultural Heritage, Malta
September 2020

Appendix to Chapter 9

Economy, environment and resources in prehistoric Malta

Rowan McLaughlin, Finbar McCormick, Sheila Hamilton-Dyer,
Jennifer Bates, Jacob Morales-Mateos, Charles French, Petros Chatzimpaloglou,
Catriona Brogan, Alastair Ruffell, Nathan Wright, Patrick J. Schembri,
Christopher O. Hunt, Simon Stoddart & Caroline Malone

A9.1. Palaeobotanical assemblages

Table A9.1.1a. *Macrobotanical raw seed counts from Tac̀-Ċawla (+1 mm fraction).*

Context	71	75	81	85	85	93	93	101	109	109	109	120	126	128	130	130	134	137	138	139
Sample No.	90	89	91	48	50	92	93	95	47	51	94	169	97	54	53	55	52	61	59	62
CEREALS																				
Hordeum vulgare 1.0		1						1							1					
Hordeum vulgare 1.0 naked																				
Hordeum vulgare 1.0 hulled																				
Hordeum vulgare embryo																				
Hordeum vulgare apex																				
Hordeum vulgare 0.25																				
Hordeum vulgare weedy? (small)												1								
Hordeum vulgare weedy? (small) embryo																				
Triticum turgidum/durum/aestivum 1.0			1										2			1				
Triticum aestivum subsp. *spelta* 1.0					1							2								
Triticum sp. embryo												1								
Triticum sp. apex																				
Triticum sp. 1.0				1																1
Triticum sp. 0.25																				
Triticum weedy? (small)																				
H/T 1.0																				
H/T 0.25															1				1	3
H/T embryo					1															
H/T apex																				
cf. millet mid length embryo																		1		
cf. millet small length embryo																				
PULSES																				
Lens sp. 1.0					1										1					2
Lens sp. 0.5																			1	
cf. *Lens* sp. 0.25																				
Lathyrus cf. *sativus1.0*																				
cf. *Lathyrus* sp. 0.5																				
Pisum sp. 1.0															1					3
Pisum sp. 0.5					3															
FABACEAE 0.5		4	1					3									1		1	2
FABACEAE 0.25					1		1			1			1				1			
FABACEAE 1.0																				
FRUIT																				
Unknown fruit																				
WEEDS																				
Small FABACEAE 0.5													1							1
Small FABACEAE 0.25																				1
Small FABACEAE 1.0																				
Brassica/Sinapus				1													1			
cf. ASTERACEAE																				
Cf. *Luzula silvatica/forsteri*																				
Nigella sp.																				
PAPAVERACEAE																				
CONCOLVULACEAE													1							
ROSOIDEAE			1										1				1		1	1
Carex sp. trilete type		2											1							1
Carex sp. trilete type – big																				

Table A9.1.1a *(cont.).*

Context	140	143	148	151	154	155	159	159	163	168	171	178	183	185	186	187	192	193/4	194	195
Sample No.	99	56	98	63	64	65	101	109	66	137	105	103	141	69	133	142	112	111	107	108
CEREALS																				
Hordeum vulgare 1.0				2																
Hordeum vulgare 1.0 naked																				
Hordeum vulgare 1.0 hulled																				
Hordeum vulgare embryo																				
Hordeum vulgare apex				2																
Hordeum vulgare 0.25																				
Hordeum vulgare weedy? (small)																				
Hordeum vulgare weedy? (small) embryo																				
Triticum turgidum/durum/aestivum 1.0				2				1												
Triticum aestivum subsp. *spelta* 1.0		2							1						1					
Triticum sp. embryo			1						1											
Triticum sp. apex																				
Triticum sp. 1.0			1	3						1										
Triticum sp. 0.25																				
Triticum weedy? (small)																				
H/T 1.0									1											
H/T 0.25			1	8		1			1											2
H/T embryo			1																	
H/T apex																				
cf. millet mid length embryo			1																	
cf. millet small length embryo																				
PULSES																				
Lens sp. 1.0			2	2																
Lens sp. 0.5																				
cf. *Lens* sp. 0.25				5																
Lathyrus cf. *sativus*1.0																				
cf. *Lathyrus* sp. 0.5																				
Pisum sp. 1.0																				
Pisum sp. 0.5				2																
FABACEAE 0.5			1	2								1								
FABACEAE 0.25		1		1					1											
FABACEAE 1.0				2																
FRUIT																				
Unknown fruit																				
WEEDS																				
Small FABACEAE 0.5	1																			
Small FABACEAE 0.25																				
Small FABACEAE 1.0																				
Brassica/Sinapus															1	1				
cf. ASTERACEAE																				
Cf. *Luzula silvatica/forsteri*																				
Nigella sp.																				
PAPAVERACEAE		1		1																
CONCOLVULACEAE					1														3	
ROSOIDEAE	3	1		3								1			7					
Carex sp. trilete type			2	1																
Carex sp. trilete type – big																				

Table A9.1.1a *(cont.).*

Context	71	75	81	85	85	93	93	101	109	109	109	120	126	128	130	130	134	137	138	139
Sample No.	90	89	91	48	50	92	93	95	47	51	94	169	97	54	53	55	52	61	59	62
Carex sp. flat type																				1
cf. *Rumex* sp.																				
MMT																				2
Secale sp. (rye – small) 1.0																				
Secale sp. (rye – small) embryo																				
Cf. *Lolium (multiflorum?)*																				
Cf. *Lolium* 1.0																				
Cf. *Lolium* embryo																				
Cf. *Lolium* apex																				
Cf. *Lolium* 0.25																				
cf. *Glymus* 1.0																				
cf. *Glymus* embryo																				
cf. *Glymus* 0.25																				
Vulpia sp. 1.0													1							
Vulpia sp. 0.25														1						3
Vulpia sp. apex													2	1						1
Vulpia sp. embryp													1							
Bromus sp. 1.0																				
Bromus sp. apex																				
cf. *Festucasp*. 1.0																				
cf. *Aleopurus* sp. 1.0																				
cf. *Arrhenatherum* sp. 1.0																				
cf. *Arrhenatherum* sp. embryo																				
cf. *Arrhenatherum* sp. apex																				
cf. *Arrhenatherum* sp. 0.25																				
Long grass 3																				
Small long grass apex		2								1										
Small long grass embryo																				
Small long grass 0.25		1													2		2			1
Small long grass 1.0																	1			
Small grass apex			1							2										
Small grass embryo															1					
Small grass 0.25				1	1					2		2	2		1		3			1
Small grass 1.0		2		1									1							
Big grass apex														2		2				
Big grass embryo																				
Big grass 1.0																1				
Big grass 0.25				4						2		4	1	3		1	3		1	
Small grass T. type or (RUBIACEAE)		2										2	2		1	1				5
Rubiaceae																				
Chenopodium	7												1							
CARYOPHYLACEAE		1							1				1							5
Small indet. millet						1														
Indet. seed		2	6	1	9	1		2		1		3			4	3	3		1	15
IBF	1	20	2	27	19	1	4	37	7	33	10	17		12	13	22	33	2	7	34
Unknown		1 oval	3 round		4 round with tip		1 oval					1 oval 1 flat pointed	3 round/oval 1 flat		2 oval		1 round pointed	1 0.5 small pulse	1 round	8 oval/round

Table A9.1.1a *(cont.).*

Context	140	143	148	151	154	155	159	159	163	168	171	178	183	185	186	187	192	193/4	194	195
Sample No.	99	56	98	63	64	65	101	109	66	137	105	103	141	69	133	142	112	111	107	108
Carex sp. flat type			1																	
cf. *Rumex* sp.																				
MMT			1																	
Secale sp. (rye – small) 1.0																				
Secale sp. (rye – small) embryo																				
Cf. *Lolium (multiflorum?)*											1									
Cf. *Lolium* 1.0																				
Cf. *Lolium* embryo																				
Cf. *Lolium* apex																				
Cf. *Lolium* 0.25																				
cf. *Glymus* 1.0																				
cf. *Glymus* embryo																				
cf. *Glymus* 0.25																				
Vulpia sp. 1.0																				
Vulpia sp. 0.25												1								
Vulpia sp. apex	5		2									1								
Vulpia sp. embryp																				
Bromus sp. 1.0																				
Bromus sp. apex																				
cf. *Festucasp*. 1.0																				
cf. *Aleopurus* sp. 1.0																				
cf. *Arrhenatherum* sp. 1.0																				
cf. *Arrhenatherum* sp. embryo																				
cf. *Arrhenatherum* sp. apex																				
cf. *Arrhenatherum* sp. 0.25																				
Long grass 3																				
Small long grass apex					1							1								
Small long grass embryo																				
Small long grass 0.25	1			5								3			2					
Small long grass 1.0			1	1																
Small grass apex									2	3										
Small grass embryo																				
Small grass 0.25			2	4				1	2	1					3					
Small grass 1.0							1													
Big grass apex													2		2					
Big grass embryo		1																		
Big grass 1.0																				1
Big grass 0.25				2			5								1					
Small grass T. type or (RUBIACEAE)	4	1		3										2						
Rubiaceae				2																
Chenopodium		1																		
CARYOPHYLACEAE															2					
Small indet. millet																				
Indet. seed	10	5	2	9			6	1	1	1		5	2		4		2	1	1	1
IBF	40	30	27	94	21	4	54	26	57	14	2	21	6	6	24	4	3	22	6	3
Unknown	4 pointed round		15 round 2 unknown	5 round			1 round		4 round		2 oval	11 round		1 MMT	4 round/flat					

Table A9.1.1a *(cont.).*

Context	195	195	196	197	197	203	205	205	206	206	206	206	206/233	207	208	211	213
Sample No.	**110**	**114**	**116**	**109**	**113?**	**75**	**72**	**117**	**73**	**74**	**78**	**118**	**119**	**147**	**1020**	**77**	**80**
CEREALS																	
Hordeum vulgare 1.0			1					1			1						
Hordeum vulgare 1.0 naked																	
Hordeum vulgare 1.0 hulled																	
Hordeum vulgare embryo																	
Hordeum vulgare apex																	
Hordeum vulgare 0.25																	
Hordeum vulgare weedy? (small)																	
Hordeum vulgare weedy? (small) embryo																	
Triticum turgidum/durum/aestivum 1.0																	
Triticum aestivum subsp. *spelta* 1.0				2										1			
Triticum sp. embryo														1			
Triticum sp. apex														1			
Triticum sp. 1.0			1											1			
Triticum sp. 0.25														2			
Triticum weedy? (small)																	
H/T 1.0																	
H/T 0.25			1		2					1				2			
H/T embryo														2			
H/T apex			1	1										1			1
cf. millet mid length embryo																	
cf. millet small length embryo																	
PULSES																	
Lens sp. 1.0											1						
Lens sp. 0.5																	
cf. *Lens* sp. 0.25																	
Lathyrus cf. *sativus1.0*							1										
cf. *Lathyrus* sp. 0.5																	
Pisum sp. 1.0																	
Pisum sp. 0.5					2												
FABACEAE 0.5					4												
FABACEAE 0.25					3		1							1			2
FABACEAE 1.0																	
FRUIT																	
Unknown fruit																	
WEEDS																	
Small FABACEAE 0.5																	
Small FABACEAE 0.25																	
Small FABACEAE 1.0																	
Brassica/Sinapus															1		
cf. ASTERACEAE																	
Cf. *Luzula silvatica/forsteri*																	
Nigella sp.																	
PAPAVERACEAE																	
CONCOLVULACEAE		1															
ROSOIDEAE							1							1	1		
Carex sp. trilete type																	
Carex sp. trilete type – big																	

Table A9.1.1a *(cont.).*

Context	233	233	233	238	238	243	243	243	243	243	244	244	244	245	246	246
Sample No.	122	123	123	124	126	?!	127	130	130	135	129	134	136	83	82	85
CEREALS																
Hordeum vulgare 1.0			1	2	2		1			3	1		1			
Hordeum vulgare 1.0 naked			1													
Hordeum vulgare 1.0 hulled										1						
Hordeum vulgare embryo		1														
Hordeum vulgare apex	1			1			1			2						1
Hordeum vulgare 0.25																
Hordeum vulgare weedy? (small)												1				
Hordeum vulgare weedy? (small) embryo																
Triticum turgidum/durum/aestivum 1.0		1									1					
Triticum aestivum subsp. *spelta* 1.0				2				2		4	1	3	1			
Triticum sp. embryo					1											
Triticum sp. apex																
Triticum sp. 1.0			1													
Triticum sp. 0.25																
Triticum weedy? (small)				1												
H/T 1.0																
H/T 0.25				7	1	1	1	1		2	5		3			
H/T embryo																
H/T apex											1					
cf. millet mid length embryo	1															
cf. millet small length embryo																
PULSES																
Lens sp. 1.0		1		1						6	3	1	1			
Lens sp. 0.5				2						3			5			
cf. *Lens* sp. 0.25																
Lathyrus cf. *sativus*1.0																
cf. *Lathyrus* sp. 0.5								1								
Pisum sp. 1.0								1	3	2			1		1	
Pisum sp. 0.5											1	3				
FABACEAE 0.5		5		1			3	1		1	3	1				
FABACEAE 0.25			1				1	3	1	9	1	3	7			1
FABACEAE 1.0							2						1			
FRUIT																
Unknown fruit																
WEEDS																
Small FABACEAE 0.5			1				2	1								
Small FABACEAE 0.25																
Small FABACEAE 1.0																
Brassica/Sinapus																
cf. ASTERACEAE																
Cf. *Luzula silvatica/forsteri*																
Nigella sp.												1?		1		
PAPAVERACEAE													2			
CONCOLVULACEAE						1										
ROSOIDEAE				2		3	11		2	11	5	5	12			
Carex sp. trilete type				1	1	1		2		1		2	5			
Carex sp. trilete type – big				1												

Table A9.1.1a *(cont.).*

Context	195	195	196	197	197	203	205	205	206	206	206	206	206/233	207	208	211	213
Sample No.	110	114	116	109	113?	75	72	117	73	74	78	118	119	147	1020	77	80
Carex sp. flat type																	
cf. *Rumex* sp.																	
MMT		1	1														
Secale sp. (rye – small) 1.0				1										1			
Secale sp. (rye – small) embryo				1													
Cf. *Lolium (multiflorum?)*																	
Cf. *Lolium* 1.0																	
Cf. *Lolium* embryo																	
Cf. *Lolium* apex																	
Cf. *Lolium* 0.25																	
cf. *Glymus* 1.0																	
cf. *Glymus* embryo																	
cf. *Glymus* 0.25																	
Vulpia sp. 1.0								1 + 1 apex									
Vulpia sp. 0.25			1														
Vulpia sp. apex																	
Vulpia sp. embryp																	
Bromus sp. 1.0																	
Bromus sp. apex																	
cf. *Festucasp*. 1.0																	
cf. *Aleopurus* sp. 1.0					1												
cf. *Arrhenatherum* sp. 1.0																	
cf. *Arrhenatherum* sp. embryo																	
cf. *Arrhenatherum* sp. apex																	
cf. *Arrhenatherum* sp. 0.25																	
Long grass 3													1				
Small long grass apex				1									1				
Small long grass embryo													2				
Small long grass 0.25	1			1					1				1	1			
Small long grass 1.0																	
Small grass apex			3											2			
Small grass embryo																	
Small grass 0.25			5											1			
Small grass 1.0			1														
Big grass apex			3					1		1			1				
Big grass embryo																	
Big grass 1.0								2									
Big grass 0.25				2		1	1	2		1							1
Small grass T. type or (RUBIACEAE)							1	6	1		2				1		
Rubiaceae																	
Chenopodium																	
CARYOPHYLACEAE		1														1	
Small indet. millet																	
Indet. seed		2	21	12	2	3	1	2		1		1		1			1
IBF	4	2	56	39	55		17	13	2	7	12	12	7	41	9	5	8
Unknown		1 round nobbly			1 nutlet papaver like surface 3 round			1 oval 2 round pointed				1 round	1 round 1 round pointed				

Table A9.1.1a *(cont.).*

Context	233	233	233	238	238	243	243	243	243	243	244	244	244	245	246	246
Sample No.	122	123	123	124	126	?!	127	130	130	135	129	134	136	83	82	85
Carex sp. flat type								1								
cf. *Rumex* sp.							1			1						
MMT		1														
Secale sp. (rye – small) 1.0																
Secale sp. (rye – small) embryo																
Cf. *Lolium (multiflorum?)*																
Cf. *Lolium* 1.0									6							
Cf. *Lolium* embryo																
Cf. *Lolium* apex																
Cf. *Lolium* 0.25																
cf. *Glymus* 1.0									1							
cf. *Glymus* embryo									1							
cf. *Glymus* 0.25									1							
Vulpia sp. 1.0					1			2	14	1	1					
Vulpia sp. 0.25				2	1			2	10	2			1			
Vulpia sp. apex				1	2	1		2	33	3	3		1			2
Vulpia sp. embryp									2							
Bromus sp. 1.0									1		1					
Bromus sp. apex																
cf. *Festucasp*. 1.0																
cf. *Aleopurus* sp. 1.0											2					
cf. *Arrhenatherum* sp. 1.0													1			
cf. *Arrhenatherum* sp. embryo																
cf. *Arrhenatherum* sp. apex																
cf. *Arrhenatherum* sp. 0.25																
Long grass 3																
Small long grass apex		1			2					1	2	2	3			
Small long grass embryo																
Small long grass 0.25		1					1				1					1
Small long grass 1.0																
Small grass apex	1				1		1						1			
Small grass embryo					1								1			
Small grass 0.25	3			2				1	1	2	2	3	1		1	
Small grass 1.0					1											
Big grass apex																
Big grass embryo																
Big grass 1.0																
Big grass 0.25	1		2			1			1							3
Small grass T. type or (RUBIACEAE)	1		1		5	1	2	1	11	8	7		18			
Rubiaceae											1					
Chenopodium	1			1									1			
CARYOPHYLACEAE			1				1	1	2	2	2	1	3			
Small indet. millet																
Indet. seed	3		2	3	7		2	4	5	4	4	4	10		3	3
IBF	18	36	18	68	34	17	49	23	12	113	41	63	96			25
Unknown		1 small round	2 round	9 round	7 round	6 round	1 nutlet papaver like surface 13 round	6 round/oval	10 round	2 nutlet papaver like surface 2 flat 15 round	27 round	1 nutlet papaver like surface 9 round	3 nutlet papaver like surface 22 round			1 round

Table A9.1.1a *(cont.).*

Context	252	256	261	262	267	268	268	268	268	268	268	268	269
Sample No.	132	131	139	146	145	143	150	153	154	156	160	*	166
CEREALS													
Hordeum vulgare 1.0	1					2	1	1		9	3		
Hordeum vulgare 1.0 naked													
Hordeum vulgare 1.0 hulled						1							
Hordeum vulgare embryo										2			
Hordeum vulgare apex			1				2				2		
Hordeum vulgare 0.25								1		5			
Hordeum vulgare weedy? (small)							1	3					
Hordeum vulgare weedy? (small) embryo										2			
Triticum turgidum/durum/aestivum 1.0										1	1		
Triticum aestivum subsp. *spelta* 1.0							1	1		3	2		
Triticum sp. embryo											1		
Triticum sp. apex								1					
Triticum sp. 1.0			1						2			1	
Triticum sp. 0.25													
Triticum weedy? (small)													
H/T 1.0										2			
H/T 0.25	1		2			5		7	1	17	3		
H/T embryo						3				1	1		
H/T apex						2		2		2	3		
cf. millet mid length embryo								1					
cf. millet small length embryo										4			
PULSES													
Lens sp. 1.0	1		2				1					4	
Lens sp. 0.5													
cf. *Lens* sp. 0.25												1	
Lathyrus cf. *sativus1.0*													
cf. *Lathyrus* sp. 0.5													
Pisum sp. 1.0		1	1				1	1			2		
Pisum sp. 0.5							2				2		
FABACEAE 0.5	1		2	2				5	1	2	1		
FABACEAE 0.25						3		3	3	2	3	1	
FABACEAE 1.0			1										
FRUIT													
Unknown fruit										1			
WEEDS													
Small FABACEAE 0.5			2				2	1		3			
Small FABACEAE 0.25								2				1	
Small FABACEAE 1.0							1			1			
Brassica/Sinapus						5	1	3		3			
cf. ASTERACEAE							1						
Cf. *Luzula silvatica/forsteri*	4												
Nigella sp.													
PAPAVERACEAE	1						2						
CONCOLVULACEAE									1				
ROSOIDEAE			6			10	14	14	1	36	12		
Carex sp. trilete type			2				5	7		20	3		
Carex sp. trilete type – big													

Table A9.1.1a *(cont.).*

Context	272	272	273	273	276	279	280	283	286	301
Sample No.	165	165	152	165	157	179	161	163	164	163
CEREALS										
Hordeum vulgare 1.0				1				1		
Hordeum vulgare 1.0 naked										
Hordeum vulgare 1.0 hulled										
Hordeum vulgare embryo										
Hordeum vulgare apex										
Hordeum vulgare 0.25										
Hordeum vulgare weedy? (small)										
Hordeum vulgare weedy? (small) embryo										
Triticum turgidum/durum/aestivum 1.0				3						
Triticum aestivum subsp. *spelta* 1.0										
Triticum sp. embryo										
Triticum sp. apex										
Triticum sp. 1.0			1							
Triticum sp. 0.25										
Triticum weedy? (small)										
H/T 1.0										
H/T 0.25			5	3						
H/T embryo										
H/T apex										
cf. millet mid length embryo										
cf. millet small length embryo										
PULSES										
Lens sp. 1.0			1		1					
Lens sp. 0.5										
cf. *Lens* sp. 0.25										
Lathyrus cf. *sativus*1.0										
cf. *Lathyrus* sp. 0.5							1			
Pisum sp. 1.0										
Pisum sp. 0.5			1							
FABACEAE 0.5			3							
FABACEAE 0.25			1	3						
FABACEAE 1.0					1					
FRUIT										
Unknown fruit										
WEEDS										
Small FABACEAE 0.5										
Small FABACEAE 0.25										
Small FABACEAE 1.0										
Brassica/Sinapus	1		1			1				
cf. ASTERACEAE										
Cf. *Luzula silvatica/forsteri*	1									
Nigella sp.										
PAPAVERACEAE			1							
CONCOLVULACEAE								1		
ROSOIDEAE			5	3						
Carex sp. trilete type			4	3					1	
Carex sp. trilete type – big										

Table A9.1.1a *(cont.).*

Context	252	256	261	262	267	268	268	268	268	268	268	268	269
Sample No.	132	131	139	146	145	143	150	153	154	156	160	*	166
Carex sp. flat type						3		4	1	20	5		
cf. *Rumex* sp.							1	1		1	1		
MMT													
Secale sp. (rye – small) 1.0										1			
Secale sp. (rye – small) embryo													
Cf. *Lolium (multiflorum?)*													
Cf. *Lolium* 1.0							17	6		26		1	
Cf. *Lolium* embryo										2			
Cf. *Lolium* apex										2			
Cf. *Lolium* 0.25							1	3		1			
cf. *Glymus* 1.0							2						
cf. *Glymus* embryo													
cf. *Glymus* 0.25													
Vulpia sp. 1.0	1					60	237	72	3	393	91		1
Vulpia sp. 0.25			2			23	121	68	12	151	51		
Vulpia sp. apex			1			45	187	63	26	485	136		
Vulpia sp. embryp							26	10	2	36			
Bromus sp. 1.0						1		1		1	5		
Bromus sp. apex							1	1					
cf. *Festucasp*. 1.0						6		1		2	4		
cf. *Aleopurus* sp. 1.0								1		9	1		
cf. *Arrhenatherum* sp. 1.0										7			
cf. *Arrhenatherum* sp. embryo										2			
cf. *Arrhenatherum* sp. apex										3			
cf. *Arrhenatherum* sp. 0.25										4			
Long grass 3													
Small long grass apex	2		1		1	13	8	1	2	11			
Small long grass embryo					1		6	5		8			
Small long grass 0.25	1		2			4	22	7		127			
Small long grass 1.0							1	4		3			
Small grass apex				1	2	3	1	1					1
Small grass embryo					2						3		
Small grass 0.25			1			4	2	2		13	10	2	
Small grass 1.0							7		1	1			
Big grass apex	1												
Big grass embryo													
Big grass 1.0													
Big grass 0.25					1			2		1	3		
Small grass T. type or (RUBIACEAE)	cf. 1		9			15	34	33	8	120	22	1	
Rubiaceae								3		1			
Chenopodium		1					1			1			
CARYOPHYLACEAE	1		1			6	11	5	3	72	10		
Small indet. millet													
Indet. seed		3	4	1	8	1	40	19	6	102	8	3	2
IBF	11	3	62	7	10	40	61	128	38	245	98	16	29
Unknown	1 cf. consolida/ rhanunc.	1 round 1 flat	4 nutlet papaver like surface 17 round			3 nutlets 36 round	7 nutlet papaveraceae like surface 42 round	7 nutlet papaveraceae like surface 31 round	13 round	26 nutlet papaveraceae-like surface 119 round 1 unknown cup like	5 nutlet papaver like surface 42 round	2 round	

Table A9.1.1a *(cont.).*

Context	272	272	273	273	276	279	280	283	286	301
Sample No.	165	165	152	165	157	179	161	163	164	163
Carex sp. flat type				2						
cf. *Rumex* sp.										
MMT										
Secale sp. (rye – small) 1.0										
Secale sp. (rye – small) embryo										
Cf. *Lolium (multiflorum?)*										
Cf. *Lolium* 1.0										
Cf. *Lolium* embryo										
Cf. *Lolium* apex										
Cf. *Lolium* 0.25										
cf. *Glymus* 1.0										
cf. *Glymus* embryo										
cf. *Glymus* 0.25										
Vulpia sp. 1.0			1	2		1 embryo				
Vulpia sp. 0.25				6						
Vulpia sp. apex				8						
Vulpia sp. embryp										
Bromus sp. 1.0										
Bromus sp. apex										
cf. *Festucasp*. 1.0										
cf. *Aleopurus* sp. 1.0										
cf. *Arrhenatherum* sp. 1.0										
cf. *Arrhenatherum* sp. embryo										
cf. *Arrhenatherum* sp. apex										
cf. *Arrhenatherum* sp. 0.25										
Long grass 3										
Small long grass apex				1						
Small long grass embryo										
Small long grass 0.25										1
Small long grass 1.0										
Small grass apex										
Small grass embryo										
Small grass 0.25				3						
Small grass 1.0										
Big grass apex		1				1				
Big grass embryo										
Big grass 1.0										
Big grass 0.25										
Small grass T. type or (RUBIACEAE)			2	6						
Rubiaceae				1						
Chenopodium								1		
CARYOPHYLACEAE	2		1							
Small indet. millet										
Indet. seed			4	2			1			3
IBF	5	8	87	49	5	5	2	5	7	1
Unknown			1 nutlet papaver like surface 4 round	1 nutlet papaver like surface 13 round	1 round tip		2 curled 1 oval	1 oval		1 oval

Table A9.1.1b. *Macrobotanical raw chaff and non-seed counts from Taċ-Ċawla (+1 mm fraction).*

Context	85	120	140	151	154	159	163	168	186	196	197	206/233
Sample No.	48	169	99	63	64	101	66	137	133	116	109	119
CHAFF												
Triticum spikelet fork	1	1			2		5	1		4	1	
Triticum glume base							5	1	1	4	1	
Triticum rachis F-T												
Hordeum rachis internode				1								
Hordeum rachis internode 2-row										1		1
Grass glume base								2				
Grass glume fragment						1	1	1		4		
Grass rachis fragment			1							3		
Grass chaff fragment												

Context	207	233	238	244	244	246	267	268	268	268	273
Sample No.	147	122	126	129	136	85	145	150	156	160	165
CHAFF											
Triticum spikelet fork	8						1				
Triticum glume base	3										
Triticum rachis F-T						1					
Hordeum rachis internode				2							1
Hordeum rachis internode 2-row										1	
Grass glume base					1		2				
Grass glume fragment			1					2	1		
Grass rachis fragment		1			1					1	
Grass chaff fragment								1			

Table A9.1.1c. *Taċ-Ċawla soil sample numbers, macrobotanical litres analysed, and phytolith sample.*

Context	Soil Sample	Litres	Phytolith
50	86	7	Y
63	87	7	Y
71	90	10	Y
75	89	10	Y
80	14	12	Y
81	91	13	Y
85	50	15	Y
85 spit 2	48	14	Y
93	92	10	Y
93	93	12	Y
101	95	7	Y
102	96	1	Y
108	45	4	Y
109	51	16	Y
109 under pot	94	8	Y
109	47	18	Y
120	169	10	Y
126	94	8	Y
128	54	9	Y
130	55	10	Y
130	53	11	Y
134	52	14	Y
137	61	10	Y
138	59	11	Y
139	62	18	Y
140	99	11	Y
143	56	8	Y
151	63	14	Y
154	64	19	Y
155	65	10	Y
157	68	8	Y
159	101	17	Y
159	102	14	Y
163	66	18	Y
168	84	9	Y
168	137	11	Y
171	105	8	Y
178	103	8	Y
178	104	5	Y
178	?!	5	Y
183	141	14	Y
184	98	8	Y
185	69	16	Y
186	133	18	Y

Context	Soil Sample	Litres	Phytolith
187	142	12	Y
192	112	6	Y
193	106	9	Y
193/194	111	10	Y
194	107	11	Y
195	108	9	Y
195	114	4	Y
195	110	9	Y
196	115	8	Y
196	116	8	Y
197	109	6	Y
197	113	9	Y
201	70	7	Y
203	76	16	Y
203	75	16	Y
203	71	14	Y
205	117	9	Y
205	72	6	Y
205/233	119	10	Y
206	74	8	Y
206	78	7	Y
206	73	6	Y
206	118	9	Y
207	147	11	Y
208	120	6	Y
211	77	15	Y
213	80	10	Y
233	122	12	Y
233	125?!	18	Y
233	123	10	Y
235	?!	9	Y
238	125?!	14	Y
238	124	14	Y
241	148	13	Y
243	130	12	N
243	128	8	N
243	127	11	Y
243	138	10	Y
243	135	11	Y
244	134	11	Y
244	136	12	Y
244	129	17	Y
245	83	11	Y
246	82	10	N

Table A9.1.1c *(cont.).*

Context	Soil Sample	Litres	Phytolith
246	85	14	Y
252	132	14	Y
256	141	17	Y
260	162	2	Y
261	139	11	Y
262	146	15	Y
265	140	3	Y
267	145	3	Y
268	155	15	Y
268	143	13	Y
268	154	13	Y
268	150	15	Y
268	160	14	Y
268	156	18	Y
268	153	18	Y
269	166	11	Y
272	149	14	Y
272	165?!	16	Y
273	152	14	Y
273	165?!	10	Y
279	179	10	Y
280	169	16	Y
283	163	16	Y
286	164	18	Y
302	?!	20	Y
2003	16	14	Y
2006	?!	7	Y
Total: 78 contexts	**Total: 115 soil samples**	**Total: 1219 litres sediment**	**Total: 112 phytolith samples**

Table A9.1.2a. *Macrobotanical Minimum Number of Seeds from Taċ-Ċawla.*

Context	50	63E	71	75	80	81	85	85	93	93	101	102	108	109	109	109	120	126	128	130	130
Sample No.	86	87	90	89	49	91	48	50	92	93	95	96	45	47	51	94	169	97	54	53	55
CEREALS				1		1	1	2			1						4	2		2	1
Hordeum vulgare MNI				1							1									1	
Hordeum vulgare 1.0 naked																					
Hordeum vulgare 1.0 hulled																					
Hordeum vulgare weedy? (small) MNI																	1				
Triticum turgidum/aestivum 1.0						1		1									2	2			1
Triticum sp. MNI							1										1				
Triticum weedy? (small)																					
H/T MNI								1												1	
cf. millet mid length embryo																					
cf. millet small length embryo																					
PULSES				2		1		4		1	2				1			1		2	
Lens sp. MNI								1												1	
Lathyrus MNI																					
Pisum MNI								2												1	
FABACEAE MNI				2		1		1		1	2				1			1			
FRUIT																					
Unknown fruit																					

Context	134	137	138	139	140	143	151	154	155	157	159	159	163	168	168	171	178	178	179	183	184
Sample No.	52	61	59	62	99	56	63	64	65	68	101	109	66	84	137	105	?!	103	104	141	98
CEREALS		1	1	2		2	9		1			1	4		1						4
Hordeum vulgare MNI							3														
Hordeum vulgare 1.0 naked																					
Hordeum vulgare 1.0 hulled																					
Hordeum vulgare weedy? (small) MNI																					
Triticum turgidum/aestivum 1.0						2	2					1	1								
Triticum sp. MNI				1			3						1		1						2
Triticum weedy? (small)																					
H/T MNI			1	1			1		1				2								1
cf. millet mid length embryo		1																			1
cf. millet small length embryo																					
PULSES	1		2	6		1	8						1					1			3
Lens sp. MNI			1	2			3														2
Lathyrus MNI																					
Pisum MNI				3			1														
FABACEAE MNI	1		1	1		1	4						1					1			1
FRUIT																					
Unknown fruit																					

Context	185	186	187	192	193	193/4	194	195	195	195	196	196	197	197	201	203	203	205	205	206	206
Sample No.	69	133	142	112	106	111	107	108	110	114	115	116	109	113?	70	71	75	72	117	73	74
CEREALS		1						1				3	3	1					1		1
Hordeum vulgare MNI												1							1		
Hordeum vulgare 1.0 naked																					
Hordeum vulgare 1.0 hulled																					
Hordeum vulgare weedy? (small) MNI																					
Triticum turgidum/aestivum 1.0		1											2								
Triticum sp. MNI												1									
Triticum weedy? (small)																					
H/T MNI								1				1	1	1							1
cf. millet mid length embryo																					
cf. millet small length embryo																					
PULSES														4				2			
Lens sp. MNI																					
Lathyrus MNI																		1			
Pisum MNI														1							
FABACEAE MNI														3				1			
FRUIT																					
Unknown fruit																					

Table A9.1.2a *(cont.).*

Context	206	206	206/233	207	208	211	213	233	233	235	238	238	241	243	243	243	243	244	244	244	245
Sample No.	78	118	119	147	1020	77	80	122	123	?!	124	126	148	?!	127	130	135	129	134	136	83
CEREALS	1			5			1	2	5		7	4		1	3	3	1	4	4	3	
Hordeum vulgare MNI	1							1	2		3	2			2		4	1		1	
Hordeum vulgare 1.0 naked									1												
Hordeum vulgare 1.0 hulled																	1				
Hordeum vulgare weedy? (small) MNI																			1		
Triticum turgidum/aestivum 1.0				1					1		2					2	4	2	3	1	
Triticum sp. MNI				2					1			1									
Triticum weedy? (small)											1										
H/T MNI				2			1				1	1		1	1	1	1	1		1	
cf. millet mid length embryo								1													
cf. millet small length embryo																					
PULSES	1			1			1		4		3				4	6	11	6	4	7	
Lens sp. MNI	1								1		2						8	3	1	4	
Lathyrus MNI																1					
Pisum MNI																4	2	1	2	1	
FABACEAE MNI				1			1		3		1				4	1	1	2	1	2	
FRUIT																					
Unknown fruit																					

Context	246	246	252	256	260	261	262	265	267	268	268	268	268	268	268	268	269	272	273	273
Sample No.	82	85	132	131	162	139	146	140	145	143	150	153	154	156	160	bottom of pit	166	165	152	165
CEREALS		1	2			3				6	4	1	3	24	12	1			2	5
Hordeum vulgare MNI		1	1			1				2	2	2		11	5					1
Hordeum vulgare 1.0 naked																				
Hordeum vulgare 1.0 hulled										1										
Hordeum vulgare weedy? (small) MNI											1	3		1						
Triticum turgidum/aestivum 1.0											1	1		4	3					3
Triticum sp. MNI						1						1	2		1	1			1	
Triticum weedy? (small)																				
H/T MNI			1			1				3		2	1	4	3				1	1
cf. millet mid length embryo												1								
cf. millet small length embryo														4						
PULSES	1	1	2	1		5	1			1	3	4	1	2	4	6			4	1
Lens sp. MNI			1			2					1					5			1	
Lathyrus MNI																				
Pisum MNI	1			1		1					2	1			3				1	
FABACEAE MNI		1	1			2	1			1		3	1	2	1	1			2	1
FRUIT																				
Unknown fruit														1						

Context	276	279	280	283	286	301	302	GG2006	GG2008
Sample No.	157	179	161	163	164	163	?!	?!	16
CEREALS				1					
Hordeum vulgare MNI				1					
Hordeum vulgare 1.0 naked									
Hordeum vulgare 1.0 hulled									
Hordeum vulgare weedy? (small) MNI									
Triticum turgidum/aestivum 1.0									
Triticum sp. MNI									
Triticum weedy? (small)									
H/T MNI									
cf. millet mid length embryo									
cf. millet small length embryo									
PULSES	2		1					1	
Lens sp. MNI	1								
Lathyrus MNI			1						
Pisum MNI								1	
FABACEAE MNI	1								
FRUIT									
Unknown fruit									

Table A9.1.2b. *Ubiquity of crops at Taċ-Ċawla and Ġgantija.*

Context	TCC	GGJ		
Sample No.	111	2		raw
CEREALS	47.7	0		53
Hordeum vulgare MNI	22.5	0		25
Hordeum vulgare 1.0 naked	0.9	0		1
Hordeum vulgare 1.0 hulled	1.8	0		2
Hordeum vulgare SUM (not weedy)	22.5			
Hordeum vulgare weedy? (small) MNI	4.5	0		5
Triticum turgidum/durum/ aestivum 1.0	21.6	0		24
Triticum sp. MNI	15.3	0		17
Triticum SUM (not weedy)	30.6			
Triticum weedy? (small)	0.9	0		1
H/T MNI	27.9	0		31
cf. millet mid length embryo	3.6	0		4
cf. millet small length embryo	1.8	0		2
PULSES	41.4	50		46
Lens sp. MNI	17.1	0		19
Lathyrus MNI	2.7	0		3
Pisum MNI	15.3	50		17
FABACEAE MNI	36.0	0		40
FRUIT	0.9	0		0
Unknown fruit	0.9	0		1

Table A9.1.2c. *Density of crops at Taċ-Ċawla and Ġgantija.*

Context	TCC			GGJ
Sample No.	per litre	per 10 litres		ONLY 1 so Not an average
CEREALS	0.13	1.3		
Hordeum vulgare MNI	0.04	0.4		
Hordeum vulgare 1.0 naked	0.0009	0.009		
Hordeum vulgare 1.0 hulled	0.0015	0.015		
Hordeum SUM (not weedy)	0.038	0.38		
Hordeum vulgare weedy? (small) MNI	0.004	0.04		
Triticum turgidum/durum/ aestivum 1.0	0.03	0.3		
Triticum sp. MNI	0.02	0.2		
Triticum SUM (not weedy)	0.05	0.5		
Triticum weedy? (small)	0.0006	0.006		
H/T MNI	0.03	0.3		
cf. millet mid length embryo	0.003	0.03		
cf. millet small length embryo	0.0019	0.019		
PULSES	0.0977	0.977		0.14 per litre
Lens sp. MNI	0.03	0.3		
Lathyrus MNI	0.0027	0.027		
Pisum MNI	0.019	0.19		0.14 per litre
FABACEAE MNI	0.046	0.46		
FRUIT	0.00054	0.0054		
Unknown fruit	0.00054	0.0054		

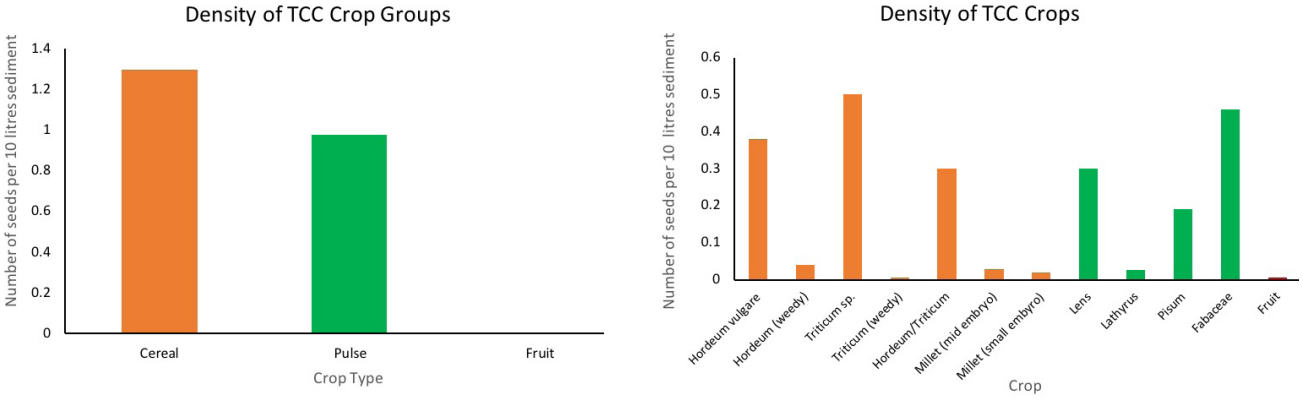

Figure A9.1.1. *Bar charts representing the division of Taċ-Ċawla crops between cereal and pulses, and by species.*

Table A9.1.2d. *Proportion of crops at Taċ-Ċawla.*

Context	TCC	
Sample No.	per 10 litres	%
SUM OF 'CROPS'	2.3014	
CEREALS	1.3	57.3
Hordeum vulgare MNI	0.4	17.4
Hordeum vulgare 1.0 naked	0.009	0.4
Hordeum vulgare 1.0 hulled	0.015	0.7
Hordeum SUM (not weedy)	0.424	18.4
Hordeum vulgare weedy? (small) MNI	0.04	1.7
Triticum turgidum/durum/aestivum 1.0	0.3	13.0
Triticum sp. MNI	0.2	8.7
Triticum SUM (not weedy)	0.5	21.7
Triticum weedy? (small)	0.006	0.3
H/T MNI	0.3	13.0
cf. millet mid length embryo	0.03	1.3
cf. millet small length embryo	0.019	0.8
PULSES	0.977	42.5
Lens sp. MNI	0.3	13.0
Lathyrus MNI	0.027	1.2
Pisum MNI	0.19	8.3
FABACEAE MNI	0.46	20.0
FRUIT	0.0054	0.2
Unknown fruit	0.0054	0.2

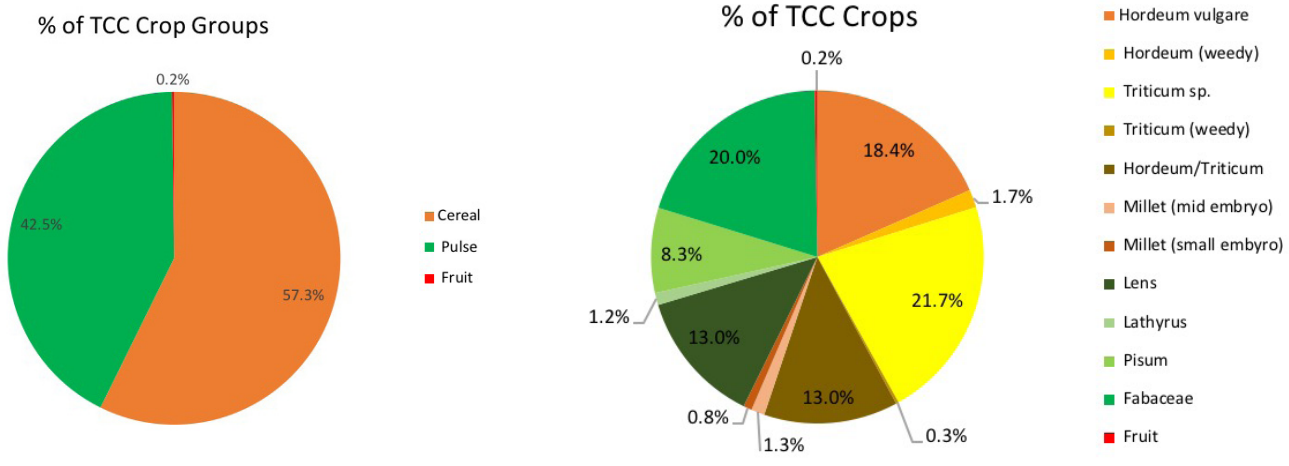

Figure A9.1.2. *Pie charts showing the division of crop groups and the percentage of crops from Taċ-Ċawla.*

Table A9.1.3. *Macrobotanical raw counts from Santa Verna (+1 mm fraction).*

Trench	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**D**	**E**	**E**	**C**	**C**	**C**	**C**	**C**	**B**	**A**	**A**		
Context	**121**	**119**	**115**	**111**	**107**	**104**	**98**	**94**	**73**	**71**	**45**	**24**	**106**	**89**	**85**	**62**	**46**	**20**	**18**	**9**	**11**	**6**		
Sample No.				**29**	**27**	**26**				**40**	**30**	**43**	**28**	**23**	**14**								**total**	
Volume of sediment (l)	**34**	**20**	**5**	**16**	**15**	**22**	**20**	**19**	**19**	**20**	**18**	**20**	**12**	**17.5**	**17**	**18**	**20**	**20**	**11**	**12**	**10**	**3**	**368.5**	
Crops																								%
Triticum sp., grain (wheat)					1		1		1									1					4	3.05%
Hordeum vulgare var. *nudum*, grain (naked barley)	2			1			1							1									5	3.82%
Hordeum vulgare, grain (barley)		2			1										1								4	3.05%
Hordeum vulgare, rachis (barley)						1									1								2	1.53%
Cerealia, grain	2	1			1	2			1	1	2		1	1	1		1				1		15	11.45%
Cerealia fragment	5			1												1							7	5.34%
Lens cf. *culinaris*, seed (lentil)		1		1	1				1														4	3.05%
Wild plants																								0.00%
Avena sp.														1									1	0.76%
Calendula sp.												2											2	1.53%
Erodium sp.																		9					9	6.87%
Fabaceae, large seeded	1	1		2	5							3			2				6				20	15.27%
Fabaceae, small seeded	6		1		2									1	2	2		2	10		3	1	30	22.90%
Poaceae, large seeded	1	1	1		1										1								5	3.82%
Scorpiurus sp.		2								1	4			1	1					1			10	7.63%
Sherardia arvensis			1	3								1											5	3.82%
Vicia/Lathyrus sp.	2					1						3		1					1				8	6.11%
Indeterminated fragment		4	1				1	4		4				1				2	2		1		20	
Indeterminated seed							1																1	
Total	**19**	**12**	**4**	**8**	**12**	**4**	**4**	**4**	**3**	**6**	**6**	**9**	**1**	**7**	**8**	**4**	**1**	**14**	**19**	**1**	**5**	**1**	**152**	

Table A9.1.4a. *Macrobotanical raw counts from Ġgantija (+1 mm fraction).*

Trench/year	**TR.1 2015**	**TR.1 2015**	**WC 2015**	**WC 2015**	**WC 2015**	**WC 2015**	**WC 2015**	**WC 2015**	**2014**	**2014**	**2014**		
Context	**001**	**003**	**1004**	**1015**	**1016**	**1021**	**1041**	**1042**	**2008**	**1002**	**tr1**		
Sample No.									**16**		**90-120**	**total**	
Volume of sediment in litres	**18**	**24**	**19**	**16**	**15**	**12**	**10**	**10**	**14**	**6**	**10.5**	**154.5**	
Crops													
Triticum sp., grain (wheat)		1				2					2	5	26.67%
Hordeum vulgare var. *nudum*, grain (naked barley)	1											1	0.00%
Wild plants													0.00%
Fabaceae small seeded						2						2	13.33%
Malva sp.			1	2	1		1	1				6	40.00%
Poacea, large seeded	1											1	0.00%
Vicia/Lathyrus sp.						1	1					2	13.33%
Indeterminated fragments										1		1	6.67%
Total	**2**	**1**	**5**	**2**	**5**	**6**	**2**	**1**	**1**	**1**	**2**	**28**	

Table A9.1.4b. *Macrobotanical raw counts from Ġgantija (+1 mm fraction) compared by context.*

Context	**2006**	**2008**
Sample	**1**	**16**
CEREALS		
PULSES		
cf. *Pisum* 0.5	1	
WEEDS		
Long grass 1 apex	1	
Indet. seed		4
IBF		6

Table A9.1.5. *Macrobotanical raw counts from Kordin III (+1 mm fraction).*

KORDIN III (2015)																		
Trench/Area	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1a**	**1a**	**1a**	**2**	**2**	**2**	**3**	**3**		
Context	**30**	**35**	**41**	**51**	**51**	**77**	**78**	**91**	**91**	**96**	**97**	**139**	**148**	**149**	**210**	**216**		
Sample No.	**91**	**99**	**97**	**88**	**93**	**75**	**80**	**85**	**128**	**12**	**104**	**32**	**64**	**72**	**13**	**42**	**total**	
Volume of sediment in litres	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**480**	
Crops																	**Total**	
Triticum sp., grain (wheat)								1		1							2	0.07%
Hordeum vulgare var. *nudum*, grain (naked barley)						2				2							4	0.13%
Cerealia, grain		3											1				4	0.13%
Cereal fragment									1								1	0.03%
Oryza sativa, grain (rice)																1	1	0.03%
Wild plants																		
cf. *Avena* sp., grain		2															2	0.07%
Brachypodium sp.		2										2					4	0.13%
Bromus sp.				1								2					3	0.10%
Fabaceae, large seeded											1						1	0.03%
Fabaceae, small seeded	1																1	0.03%
Poaceae, large seeded		3	1		1												5	0.17%
Indeterminated seed														1			1	
Indeterminated fragment			v				v								v			
Total	**1**	**10**	**1**	**1**	**1**	**2**		**1**	**1**	**3**	**1**	**4**	**1**	**1**		**1**	**29**	

Table A9.1.6. *Macrobotanical raw counts from Skorba (+1 mm fraction).*

Context	**30**	**28**	**27**	**26**	**24**	**23**	**22**	**22**	**22**	**16**	**15**	**13**	**12**	**11**	**11**	**7**	**3**	**2**	**2**		
Sample No.	**24**	**22**	**21**	**19**	**18**	**17**	**15**	**14**	**13**	**11**	**10**	**6**	**8**	**9**	**5**	**wall 14**	**4**	**2**	**3**	**total**	
Volume of sediment in litres	**17**	**14.5**	**6**	**9.5**	**6**	**7**	**9**	**9**	**8**	**8**	**10**	**8**	**9**	**6**	**9**	**9**	**6**	**11**	**7**	**169**	
Crops																					
Triticum sp., grain (wheat)																		1		1	1.05%
Hordeum vulgare, grain (barley)		1									1									2	2.11%
Hordeum vulgare var. *nudum*, grain (naked barley)										1			1							2	2.11%
Hordeum vulgare, rachis segment (barley)															1					1	1.05%
Cerealia, grain (cereal)		1			3	1		1	1				2		1	1		1		12	12.63%
Lens cf. *culinaris* (lentil)	1								1				1							3	3.16%
Wild Plants																					0.00%
Asteracea											1									1	1.05%
Avena sp.					1								1							2	2.11%
Fabaceae, small seeded	2				1	1	4	9	5	2	4	1	12			1	1			43	45.26%
Malva sp.					1															1	1.05%
Poaceae, large seeded	1		1		1		1	1	1				3							9	9.47%
Poligonacea																			1	1	1.05%
Scorpiurus sp.	2	1	1	1	2						1							1		9	9.47%
Vicia/Lathyrus sp.											2					1				3	3.16%
Indeterminated type 1														1						1	1.05%
Indeterminated type 2	1							1	1										1	4	4.21%
Total	**7**	**3**	**2**	**1**	**9**	**2**	**5**	**12**	**9**	**3**	**9**	**1**	**20**	**1**	**2**	**3**	**1**	**3**	**2**	**95**	

Table A9.1.7. *Macrobotanical raw counts from In-Nuffara (+1 mm fraction).*

Trench/Area	**30**	**silo 30**	**30**	
Context	**39**	**41**	**43**	
Sample No.	**36**	**47**	**30**	**total**
Volume of sediment in litres	**30**	**30**	**30**	**90**
Crops				
Hordeum vulgare, grain (barley)		1		1
Cerealia, grain			1	1
Cerealia fragment	2			2
Indeterminated fragment		v		
Total	**2**	**1**	**1**	**4**

A9.2. Zooarchaeological assemblages

Table 9.2.1. *Taċ-Ċawla. Fragments and MNI distribution.*

	Cattle	Sheep/goat	Pig	Dog	Cat
Horn Core					
Skull Frag	1	13	3	-	-
Mandible	9	69	5	-	1
Loose Teeth	55	336	10	-	-
Scapula	12	72	7	-	-
Humerus	7	84	11	-	-
Radius	6	73	4	-	-
Ulna	2	32	9	-	-
Metacarpal	7	48	3	1	-
Pelvis	7	56	4	-	-
Femur	10	67	6	-	-
Tibia	6	71	7	-	-
Metatarsal	6	32	6	-	-
Calcaneus	14	41	7	-	-
Astragalus	6	37	3	-	-
Phalanx 1	16	154	7	-	-
Phalanx 2	10	34	4	-	-
Phalanx 3	9	7	2	-	-
NISP	183	1226	98	1	1
NISP %	12.1	81.2	6.5	0.1	0.1
MNI	8	38	8	1	1
MNI%	14.3	67.9	14.3	1.8	1.8

Table A9.2.2. *Taċ-Ċawla. Distribution of identifiable sheep (92.3%) and goat bones.*

	Sheep	Goat
Humerus dist.	20	2
Metacarpal dist.	14	1
Femur prox.	6	0
Astragalus	23	2
Metatarsal dist.	9	1

Table A9.2.3. *Taċ-Ċawla. Cattle fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	4	9	-	-
Femur	0	3	4	2
Humerus	0	4	3	2
Metacarpal	-	-	-	1
Metatarsal	-	-	1	1
Pelvis	2	2	-	-
Radius	4	1	-	-
Tibia	1	2	2	1
Ulna	1	0	-	-

Table A9.2.4. *Taċ-Ċawla. Pig fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	0	5	-	-
Femur	0	1	0	5
Humerus	1	2	1	5
Pelvis	1	1	-	-
Radius	2	1	-	-
Tibia	-	-	1	6
Ulna	1	2	-	-

Table A9.2.5. *Taċ-Ċawla. Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	10	27	-	-
Femur	16	19	10	16
Humerus	6	9	42	16
Metacarpal	-	-	14	13
Metatarsal	-	-	12	22
Pelvis	11	9	-	-
Radius	30	11	5	26
Tibia	10	9	18	34
Ulna	7	14	-	-

Table A9.2.6. *Taċ-Ċawla. Sheep/Goat age-slaughter data based on tooth eruption and wear, after Higham (1967) and Grant (1982).*

Higham MWS	Sheep dentition	Grant TWS (M_3)	Estimated age in months	No.
4	M_1 in primary eruption		3	2
5	M_1 in secondary eruption		4	6
6	M_1 in tertiary eruption		5	2
11	M_2 in tertiary eruption		11–12	2
12	M_2 in wear, PM2-4 and M3 un-erupted		12–21	1
13	PM_{2-4} and M_3 in eruption		21–24	5
14	All permanent teeth erupted, M_3 cusp 3 unworn	b	25–26	
		c		3
		d		
15	M_3 cusp 3 in primary wear	e	26–28	1
17	M_3 in tertiary wear	g-h	adult	3
		k		2

Table A9.2.7. *Taċ-Ċawla. Cattle age-slaughter data based on tooth eruption and wear after Higham (1967) and Grant (1982).*

Higham MWS	Cattle dentition	Grant TWS (M3)	Estimated age in months	No.
23	PM4 in tertiary wear	k	over 50	1 (38.8 mm)

Table A9.2.8. *Taċ-Ċawla. Pig age-slaughter data based on tooth eruption and wear, after Higham (1967) and Grant (1982).*

Higham MWS	Pig dentition	Grant TWS (M_3)	Estimated age in months	N
8	M_1 in tertiary eruption		6–7	1
20	M_3 in tertiary eruption, cusp one in primary wear	b	21–23	1

Table A9.2.9. *Taċ-Ċawla. Cattle measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Gl/Gli	Bd
Astragalus	178	64.1	39.4
Astragalus	205	67.0	44.3
Calcaneus	83	126.1	
Calcaneus	234	122.0	
Metacarpal	134		59.3
Metacarpal	243		52.0
Metacarpal	268		64.2
Metatarsal	251		45.5
Metatarsal	30		41.9
Metatarsal	74		45.1
Tibia	134		59.8

Table A9.2.10. *Taċ-Ċawla. Pig measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Bd
Radius	93	24.8
Radius	241	27.1
Tibia	134	29.0

Table A9.2.11. *Taċ-Ċawla. Sheep and Goat astragalus measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Gli	Bd
Goat	Astragulus	247	29.7	19.7
Goat	Astragalus	266	29.8	19.6
Sheep	Astragalus	109	25.1	16.3
Sheep	Astragalus	130	24.5	15.2
Sheep	Astragalus	134	26.1	15.4
Sheep	Astragalus	134	27.4	16.5
Sheep	Astragalus	135	26.8	17.1
Sheep	Astragalus	197	22.5	16.7
Sheep	Astragalus	233	25.7	17.1
Sheep	Astragalus	233	25.6	15.2
Sheep	Astragalus	238	24.7	16
Sheep	Astragalus	243	26.7	17.1
Sheep	Astragalus	243	25.1	15.9
Sheep	Astragalus	243	25.1	16.3
Sheep	Astragalus	243	26.5	17.1
Sheep	Astragalus	247	25.0	14.9
Sheep	Astragalus	261	27.3	16.7
Sheep	Astragalus	266	25.6	15.6
Sheep	Astragalus	50	24.6	17.5
Sheep	Astragalus	69	26.1	16.4
Sheep	Astragalus	81	24.9	16.2
Sheep	Astragalus	81	26.5	15.3
Sheep	Astragalus	81	25.4	15.9
Sheep	Astragalus	81	25	16.7

Table A9.2.12. *Taċ-Ċawla. Sheep and goat astragalus measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Gl
Goat	Calcaneus	206	63.0
Sheep	Calcaneus	69	53.8
Sheep	Calcaneus	130	54.0
Sheep	Calcaneus	247	51.7
Sheep	Calcaneus	266	53.4

Table A9.2.13. *Taċ-Ċawla. Sheep femur measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Bp
Sheep	Femur	1002	43.6
Sheep	Femur	134	38.8
Sheep	Femur	205	35.8
Sheep	Femur	206	39.2
Sheep	Femur	243	41.7
Sheep	Femur	74	37.6

Table A9.2.14. *Taċ-Ċawla. Sheep and goat humerus measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Bd	Bt
Goat	Humerus	146	27.6	26.5
Goat	Humerus	247		29.7
Sheep	Humerus	109		26
Sheep	Humerus	120		26.3
Sheep	Humerus	130	29.2	28.9
Sheep	Humerus	145		26.1
Sheep	Humerus	146	24.4	
Sheep	Humerus	178		26.3
Sheep	Humerus	191		24.9
Sheep	Humerus	195		26.3
Sheep	Humerus	206	26.8	26.2
Sheep	Humerus	206	26.8	26.7
Sheep	Humerus	206	25.1	24.6
Sheep	Humerus	233		28.1
Sheep	Humerus	238		26
Sheep	Humerus	243	28.8	28.2
Sheep	Humerus	247	25.9	24.4
Sheep	Humerus	247	26.8	26
Sheep	Humerus	261		27.8
Sheep	Humerus	266		26.3
Sheep	Humerus	266		26.8
Sheep	Humerus	268	28.2	27.1
Sheep	Humerus	268	26.9	26.5
Sheep	Humerus	30		26.3
Sheep	Humerus	93		23.8
Sheep	Humerus	120		28.1
Sheep	Humerus	134		33.6

Table A9.2.15. *Taċ-Ċawla. Sheep and goat metacarpal measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Gl	Bp	Bd	Sd
Goat	Metacarpal	120			25.9	
Sheep	Metacarpal	134			22.7	
Sheep	Metacarpal	134			23.4	
Sheep	Metacarpal	178	112.7	21	23.9	14.4
Sheep	Metacarpal	179	119.4	20.8		12.8
Sheep	Metacarpal	193			22.9	
Sheep	Metacarpal	197			23.6	
Sheep	Metacarpal	206			22.6	
Sheep	Metacarpal	206			21.2	
Sheep	Metacarpal	243			21.8	
Sheep	Metacarpal	244			25.5	
Sheep	Metacarpal	248			22.6	
Sheep	Metacarpal	27	111.5	19.8	22.9	12
Sheep	Metacarpal	30	112.8	20.3	21.8	12.3

Table A9.2.16. *Taċ-Ċawla. Sheep and goat metatarsal measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Gl	Bp	Bd	Sd
Goat	Metatarsal	244			26.9	
Sheep	Metatarsal	109			20.6	
Sheep	Metatarsal	134			22.7	
Sheep	Metatarsal	140			22.1	
Sheep	Metatarsal	205		18.7		
Sheep	Metatarsal	206	135.1	18.1	22.4	11.2
Sheep	Metatarsal	233			22	
Sheep	Metatarsal	268		16.9		
Sheep	Metatarsal	42			22.6	
Sheep	Metatarsal	69			23	
Sheep	Metatarsal	75			22.5	

Table A9.2.17. *Santa Verna. Fragments and MNI distribution.*

	Cattle	Sheep/goat	Pig	Dog
Horn Core	2	1		
Skull Frag	5	1	2	1
Mandible	5	22	1	-
Loose Teeth	28	69	10	-
Scapula	3	12	2	-
Humerus	2	14	3	1
Radius	1	17	2	-
Ulna		10	1	-
Metacarpal	1	14	3	-
Pelvis	1	18	3	-
Femur	2	7	2	-
Tibia	4	16		-
Metatarsal	3	16	1	-
Calcaneus	3	29	1	-
Astragalus	2	21		-
Phalanx 1	6	42	11	-
Phalanx 2	6	23	6	-
Phalanx 3	6	16	4	-
NISP	80	348	52	2
NISP %	16.6	72.2	10.8	0.4
MNI	2	16	3	1
MNI%	9.1	72.7	13.6	4.5

Table A9.2.18. *Santa Verna. Cattle fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	1	-	-	-
Femur	-	-	-	2
Humerus	-	-	2	1
Metacarpal	-	-	-	1
Metatarsal	-	-	-	2
Radius	1	-	-	-
Tibia	-	-	-	-

Table A9.2.19. *Santa Verna. Pig fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Femur	-	2	-	-
Humerus	-	1	-	2
Radius	1	-	-	-

Table A9.2.20. *Santa Verna. Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	5	18	-	-
Femur	-	3	-	-
Humerus	1	-	-	4
Metacarpal	-	-	-	9
Metatarsal	-	-	3	6
Pelvis	3	2	-	-
Radius	10	1	-	6
Tibia	2	-	3	3
Ulna	-	2	-	-

Table A9.2.21. *Santa Verna. Sheep astragalus measurements (in mm) after Von den Driesch (1976).*

Species	Bone	Context	Gli	BD
Sheep	Astragalus	17	26.7	17.0
Sheep	Astragalus	20	26.9	16.8
Sheep	Astragalus	26	23.7	15.1
Sheep	Astragalus	33	26.0	16.6
Sheep	Astragalus	38	28.8	18.4
Sheep	Astragalus	52	28.4	18.3
Sheep	Astragalus	53	28.1	17.6
Sheep	Astragalus	58	26.8	16.1
Sheep	Astragalus	58	26.7	17.1
Sheep	Astragalus	98	24.5	15.5
Sheep	Astragalus	98	25.8	16.1

Table A9.2.22. *Santa Verna. Sheep humerus measurement.*

		Context	Bd	Bt
Sheep	Humerus	98	24.2	-

Table A9.2.23. *Santa Verna. Sheep and Goat metacarpal measurements.*

Species	Bone	Context	GL	BP	Bd	SD
Goat	Metacarpal	42	100.8	26.8	29.8	18.6
Sheep	Metacarpal	33	-	22.7	-	-
Sheep	Metatarsal	98			21.3	

Table. A9.2.24. *Santa Verna. Cattle measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Gl/Gli	Bd
Astragalus	20	-	38.5
Astragalus	60	65.3	39.6
Metatarsal	42	-	65.5

Table A9.2.25. *Tac Kordin III. Fragments and MNI distribution.*

	Cattle	Sheep/goat	Pig
Horn Core	-	2	-
Skull Frag	-	3	1
Mandible	1	6	-
Loose Teeth	3	26	3
Scapula	1	6	2
Humerus	3	7	2
Radius	2	5	2
Ulna	2	7	1
Metacarpal	3	8	1
Pelvis	1	8	-
Femur	-	3	1
Tibia	-	9	1
Metatarsal	-	10	1
Calcaneus	1	4	-
Astragalus	-	6	-
Phalanx 1	4	18	3
Phalanx 2	-	5	-
Phalanx 3	8	7	1
NISP	29	140	19
NISP %	15.4	74.5	10.1
MNI	3	6	2
MNI%	27.3	54.5	18.2

Table A9.2.26. *Kordin III. Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	1	4	-	-
Femur	1	2	-	-
Humerus	-	-	2	2
Metacarpal	-	-	1	3
Metatarsal	-	-	3	2
Pelvis	3	2	-	-
Radius	3	0	1	1
Tibia	1	-	6	2
Ulna	1	3	-	-

Table A9.2.27. *Kordin III. Cattle fusion data. I distal humerus in fusion.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	1	-	-	-
Femur	1	-	-	-
Humerus	-	-	-	2*

Table A9.2.28. *Kordin III. Pig fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Radius	1	1		
Tibia			1	-

Table A9.2.29. *Kordin III. Cattle measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Gl/Gli	Bd
Metacarpal	78		59.2

Table A9.2.30. *Kordin. Sheep measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Gl/Gli	Bp	Bd
Astragalus	57	27.9		17.9
Astragalus	125	25.8		16.9
Astragalus	211	28.2		18.1
Femur	75		40.9	
Metacarpal	210			23.5
Goat				
Radius	71		39.4	

Table A9.2.31. *Kordin. Pig measurements (in mm) after Von den Driesch (1976).*

Bone	Context	Bp	Bd
Radius	77	27.9	
Tibia	210		29.1

NOTE: No mandibular ageing data in this assemblage.

Table A9.2.32. *Skorba: fragments and MNI distribution.*

	Cattle	Sheep/goat	Pig	Dog
Horn Core	-	1	-	-
Skull Frag	-	-	1	-
Mandible	1	4	1	-
Loose Teeth	13	40	5	-
Scapula	1	2	-	-
Humerus	-	4	-	-
Radius	-	1	-	-
Ulna	-	1	-	-
Metacarpal	-	3	-	-
Pelvis	-	3	-	-
Femur	1	-	1	1
Tibia	-	1	1	-
Metatarsal	-	3	3	-
Calcaneus	1	-	-	1
Astragalus	1	1	1	-
Phalanx 1	2	1	1	-
Phalanx 2	2	2	2	-
Phalanx 3	-	3	3	-
NISP	22	70	19	2
NISP %	19.5	61.9	16.8	1.8
MNI	1	3	1	1
MNI%	16.7	50.0	16.7	16.7

Table. A9.3.33. *Skorba. Cattle fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	-	1	-	-
Femur	-	1	-	-
Tibia	-	-	-	-
Ulna	-	-	0	1

Table A9.2.34. *Skorba. Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	1	3	-	-
Humerus	-	1	2	1
Metacarpal	-	-	1	
Metatarsal	-	-	1	-
Pelvis	1	1	-	-
Tibia	-	-	-	1

Table A9.2.35. *Skorba. Pig fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Femur				1
Radius				1

Table A9.2.36. *Skorba. Sheep/Goat age-slaughter data based on tooth eruption and wear, after Higham (1967) and Grant (1982).*

Higham MWS	Sheep dentition	Grant TWS (M3)	Estimated age in months	No.
13	PM_{2-4} and M_3 in eruption		21-24	1
17	M_3 in tertiary wear	g-h	adult	1

Table A9.2.37. *Skorba. Bone measurements (in mm) after Von den Driesch (1976).*

Context	Species	Bone	GL/Gll	Bp	Bd	Bt
7	Cattle	Astragalus	69.9		48.2	
11	Goat	Metacarpal			29.9	

Table A9.2.38. *Ġgantija. Fragments and MNI distribution.*

	Cattle	Sheep/goat	Pig
Horn Core	-	2	
Skull Frag	-	-	2
Mandible	1	3	2
Loose Teeth	5	7	2
Scapula	-	2	2
Humerus	-	3	
Radius	-	5	2
Ulna	1	2	2
Metacarpal	1	2	2
Pelvis	-	-	3
Femur	-	-	1
Calcaneus	1	-	-
Astragalus	-	-	-
Phalanx 1	1	-	1
Phalanx 2	1	-	-
Phalanx 3	1	-	1
NISP	12	26	20
NISP %	20.7	44.8	34.5
MNI	1	4	1

Table A9.2.39. *Ġgantija . Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	-	1		
Femur	1	1		
Humerus	-	-	-	2
Metacarpal				
Metatarsal	-	-	-	1
Pelvis	3			
Radius	2	-	2	2
Tibia	-	1	-	1

Table A9.2.40. *Ġgantija. Bone measurements (in mm) after Von den Driesch (1976).*

Context	Species	Bone	Bp	Bd	Bt
1015	Cattle	Metacarpal		59.5	
1015	Sheep	Femur	37.7		
51	Sheep	Humerus		24.8	23.9
77	Sheep	Metatarsal		23.1	
1015	Pig	Radius	25.6		

Table A9.2.41. *In-Nuffara. Fragments and MNI distribution.*

	Cattle	Sheep/Goat	Pig
Skull Frag	-	-	*
Mandible	1	7	
Loose Teeth	6	42	3
Scapula	-	6	
Humerus	-	9	1
Radius	1	14	-
Ulna	-	13	-
Metacarpal	-	12	-
Pelvis	-	20	-
Femur	1	11	-
Patella	-	3	-
Tibia	-	12	-
Metatarsal	-	7	-
Calcaneus	-	14	-
Astragalus	-	5	1
Phalanx 1	1	40	-
Phalanx 2	-	25	-
Phalanx 3	-	12	-
NISP	10	252	5
NISP %	3.7	94.4	1.9
MNI	1	9	1
MNI%	9.1	81.8	9.1

Table A9.2.42. *In-Nuffara. Sheep/goat fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Calcaneus	3	9	-	-
Femur	5	1	-	-
Humerus	-	4	4	5
Metacarpal	-	-	1	3
Metatarsal	-	-	1	3
Pelvis	6	5		
Radius	3	5	2	8
Tibia	1	5	2	4
Ulna	-	7	-	-

Table A9.2.43. *In-Nuffara. Cattle fusion data.*

Element	Prox. fused	Prox. unfused	Dist. fused	Dist. unfused
Femur	1	-	-	-

Table A9.2.44. *In-Nuffara. Bone measurements (in mm) after Von den Driesch (1976). * astragalus only.*

Context	Species	Bone	GL/GLl*	Bp	Bd	Bt	SD
41	Sheep	Astragalus	28.8		17.7		
41	Sheep	Astragalus	24.4		-		
41	Sheep	Astragalus	23.0		13.4		
43	Sheep	Astragalus	24.8		16.1		
43	Sheep	Astragalus	24.7		15.8		
43	Sheep	Calcaneus	52.7				
43	Sheep	Calcaneus	48.0				
41	Sheep	Metacarpal	118.2	21.1	23.5		11.6
41	Goat	Metacarpal	101.3	22.1	23.8		14.4
41	Sheep	Metatarsal			20.3		
42	Sheep	Radius	137.6	26.5	23.9		14.4
41	Goat	Radius		27.0			

Table A9.2.45. *In-Nuffara. Sheep/Goat age-slaughter data based on tooth eruption and wear, after Higham (1967) and Grant (1982).*

Higham MWS	Sheep dentition	Grant TWS (M3)	Estimated age in months	No.
14	All permanent teeth erupted, M_3 cusp 3 unworn	b	25-26	
		c		
		d		2

Table A9.2.46. *Dog measurements (in mm) after Von den Driesch (1976).*

Site	Context	Bone	Gl	Bp	Bd	SD	L M1	B M1
Taċ-Ċawla	71	Calcaneus	42.4		7.7	5.8		
Santa Verna	20	Skull					11.3	13.0
	20	Humerus			26.6			
	17	Calcaneus	38.9					
Skorba	16	Femur		27.1				
	16	Calcaneus	50.1					

Temple places

The ERC-funded *FRAGSUS Project* (*Fragility and sustainability in small island environments: adaptation, culture change and collapse in prehistory, 2013–18*) led by Caroline Malone (Queen's University Belfast) has focused on the unique Temple Culture of Neolithic Malta, and its antecedents and successors through investigation of archaeological sites and monuments. This, the second volume of three, presents the results of excavations at four temple sites and two settlements, together with analysis of chronology, economy and material culture.

The project focused on the integration of three key strands of Malta's early human history (environmental change, human settlement and population) set against a series of questions that interrogated how human activity impacted on the changing natural environment and resources, which in turn impacted on the Neolithic populations. The evidence from early sites together with the human story preserved in burial remains reveals a dynamic and creative response over millennia. The scenario that emerges implies settlement from at least the mid-sixth millennium BC, with extended breaks in occupation, depopulation and environmental stress coupled with episodes of recolonization in response to changing economic, social and environmental opportunities.

Excavation at the temple site of Santa Verna (Gozo) revealed an occupation earlier than any previously dated site on the islands, whilst geophysical and geoarchaeological study at the nearby temple of Ġgantija revealed a close relationship with a spring, Neolithic soil management, and evidence for domestic and economic activities within the temple area. A targeted excavation at the temple of Skorba (Malta) revisited the chronological questions that were first revealed at the site over 50 years ago, with additional OSL and AMS sampling. The temple site of Kordin III (Malta) was explored to identify the major phases of occupation and to establish the chronology, a century after excavations first revealed the site. Settlement archaeology has long been problematic in Malta, overshadowed by the megalithic temples, but new work at the site of Taċ-Ċawla (Gozo) has gathered significant economic and structural evidence revealing how subsistence strategies supported agricultural communities in early Malta. A study of the second millennium BC Bronze Age site of In-Nuffara (Gozo) likewise has yielded significant economic and chronological information that charts the declining and changing environment of Malta in late prehistory.

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