



McDONALD INSTITUTE MONOGRAPHS

Temple places

Excavating cultural sustainability in prehistoric Malta

By Caroline Malone, Reuben Grima, Rowan McLaughlin,
Éóin 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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CONTENTS

Contributors	xv
Figures	xxii
Tables	xxv
Dedication	xxxi
Acknowledgements	xxxiii
Foreword	xxxix
<i>Chapter 1</i> Archaeological studies of Maltese prehistory for the <i>FRAGSUS Project</i> 2013–18	1
CAROLINE MALONE, SIMON STODDART, ROWAN McLAUGHLIN & NICHOLAS VELLA	
1.1. Introduction	1
1.1.1. <i>Island studies</i>	2
1.1.2. <i>Chronology and new scientific studies</i>	2
1.1.3. <i>Island criteria</i>	2
1.2. Background to <i>FRAGSUS</i> as an archaeological project	4
1.3. The Cambridge Gozo Project 1987–95	6
1.4. The <i>FRAGSUS Project</i> 2013–18	9
1.4.1. <i>Archaeological concerns in Maltese prehistory and the FRAGSUS Project</i>	9
1.4.2. <i>Time and artefacts</i>	9
1.4.3. <i>Architecture</i>	10
1.5. Five research questions	10
1.6. The field research programme, 2014–16: the selection of sites for excavation and sampling and the goals for each site	12
1.6.1. <i>Tač-Ċawla</i>	14
1.6.2. <i>Santa Verna</i>	14
1.6.3. <i>Kordin III</i>	14
1.6.4. <i>Skorba</i>	14
1.6.5. <i>Ġgantija</i>	18
1.6.6. <i>In-Nuffara</i>	21
1.7. Additional studies	21
1.8. Environmental and economic archaeology	21
1.9. Conclusions	24
<i>Chapter 2</i> Dating Maltese prehistory	27
ROWAN McLAUGHLIN, EÓIN W. PARKINSON, PAULA J. REIMER & CAROLINE MALONE	
2.1. Introduction: chronology building in the Maltese islands	27
2.1.1. <i>Malta and megalithism</i>	27
2.1.2. <i>Malta and the Mediterranean: the development of absolute chronologies</i>	28
2.2. Methodology	29
2.2.1. <i>Sources of data</i>	29
2.2.2. <i>AMS radiocarbon dating</i>	29
2.2.3. <i>Bayesian phase modelling</i>	29
2.2.4. <i>Density modelling</i>	30
2.3. Results	31
2.3.1. <i>Early Neolithic Ghar Dalam and Skorba phases</i>	31
2.3.2. <i>Fifth millennium hiatus</i>	31
2.3.3. <i>Żebbuġ phase</i>	32
2.3.4. <i>Mġarr / transitional Ġgantija phase</i>	32
2.3.5. <i>Ġgantija phase</i>	32
2.3.6. <i>Saflieni phase</i>	32
2.3.7. <i>Tarxien phase</i>	32
2.3.8. <i>Thermi phase</i>	33

2.3.9. <i>Tarxien Cemetery phase</i>	33
2.3.10. <i>Borġ in-Nadur phase</i>	33
2.3.11. <i>Preferred model summary</i>	34
2.3.12. <i>Kernel density model</i>	34
2.3.13. <i>Comparison with other regions</i>	36
2.4. <i>Non-prehistoric dates</i>	37
2.5. <i>Discussion</i>	37
2.6. <i>Conclusion</i>	38
 <i>Chapter 3</i>	
Excavations at Taċ-Ċawla, Rabat, Gozo, 2014	39
CAROLINE MALONE, ROWAN McLAUGHLIN, STEPHEN ARMSTRONG, JEREMY BENNETT, CONOR McADAMS, CHARLES FRENCH, SIMON STODDART & NATHANIEL CUTAJAR	
3.1. <i>Introduction</i>	39
3.1.1. <i>Location and physical setting</i>	40
3.1.2. <i>History of the site</i>	42
3.2. <i>The Van der Blom and Veen watching brief</i>	42
3.2.1. <i>The initial evaluation 1993–4</i>	42
3.2.2. <i>The archaeological investigation 1993–4</i>	44
3.2.3. <i>The Horton-Trump 1995 investigation</i>	47
3.2.4. <i>Pottery phases Ghar Dalam (c. 5500 BC)</i>	47
3.2.5. <i>Tarxien Phase c. 2800 to 2400 BC</i>	48
3.2.6. <i>Later levels of Punic, Roman and Medieval material c. 800 BC to AD 1500</i>	48
3.2.7. <i>Post Medieval</i>	48
3.2.8. <i>The 2014 excavations – methods</i>	48
3.3. <i>Results of the 1995 work and the 2014 work</i>	48
3.3.1. <i>Wall (172)</i>	50
3.3.2. <i>Internal floors and features within the structure: house layers</i>	53
3.3.3. <i>Level 1 deposits</i>	56
3.3.4. <i>Level 2 deposits</i>	60
3.3.5. <i>Level 3 deposits</i>	62
3.3.6. <i>Level 4 deposits</i>	65
3.3.7. <i>Level 5 deposits</i>	67
3.3.8. <i>Level 6 deposits</i>	69
3.3.9. <i>Level 7 deposits</i>	71
3.3.10. <i>Level 8 deposits</i>	73
3.4. <i>Superficial levels and the Roman vine channels</i>	75
3.4.1. <i>North Baulk and Main Quadrant</i>	75
3.4.2. <i>Box Trench 5</i>	75
3.4.3. <i>Box Trench 4 and main (Horton-Trump ‘H’) trench</i>	77
3.4.4. <i>Box Trench 6</i>	79
3.4.5. <i>The prehistoric deposits outside the wall east of the stone structure</i>	81
3.5. <i>The lower levels of extramural occupation</i>	83
3.5.1. <i>Summary</i>	83
3.5.2. <i>The Northern Sector</i>	83
3.5.3. <i>The North Central Sector</i>	88
3.6. <i>Destruction layers, middens and a torba remnant outside the building wall</i>	91
3.6.1. <i>The South Central Sector</i>	91
3.6.2. <i>The South Sector</i>	95
3.6.3. <i>Summary of the stratigraphic sequence of the eastern exterior of the stone structure</i>	96
3.6.4. <i>East extent of the Taċ-Ċawla site</i>	96
3.7. <i>Ancient soils and deposits and the Roman vine channels and pits</i>	103
3.8. <i>The agricultural channels in the northeast area of the site</i>	103
3.8.1. <i>The Roman agricultural channel sequence and fills</i>	104
3.9. <i>Recent historical remains</i>	114

3.10. The material culture of Taċ-Ċawla	114
3.10.1. <i>Ceramics</i>	114
3.10.2. <i>Lithics and artefacts</i>	115
3.11. The plant economy of Taċ-Ċawla	117
3.12. Summary	117
3.12.1. <i>Conclusions and discussion</i>	117
 Chapter 4 Santa Verna	123
ROWAN McLAUGHLIN, CHARLES FRENCH, EÓIN W. PARKINSON, SARA BOYLE, JEREMY BENNETT, SIMON STODDART & CAROLINE MALONE	
4.1. Introduction	123
4.2. The site	124
4.2.1. <i>Location and physical setting</i>	124
4.2.2. <i>History of the site</i>	124
4.2.3. <i>The 1911 excavations</i>	127
4.2.4. <i>The 1961 excavations</i>	127
4.2.5. <i>The Cambridge Gozo Survey</i>	127
4.2.6. <i>The 2014 Survey</i>	129
4.3. The 2015 excavations	129
4.3.1. <i>Methodology</i>	129
4.3.2. <i>Trench A</i>	134
4.3.3. <i>Trench B</i>	135
4.3.4. <i>Trench C</i>	135
4.3.5. <i>Trench D</i>	137
4.3.6. <i>Trench D western extension</i>	143
4.3.7. <i>Trench D northern extension</i>	143
4.3.8. <i>Trench E</i>	146
4.3.9. <i>Keyhole investigations between Trenches C, D and E</i>	149
4.3.10. <i>Trench F</i>	151
4.3.11. <i>Trench G</i>	151
4.4. Soil micromorphology and geochemistry	151
4.4.1. <i>Introduction</i>	151
4.4.2. <i>Physical and elemental characterization</i>	151
4.4.3. <i>Summary of earthen floor micromorphology</i>	151
4.4.4. <i>Conclusion</i>	153
4.5. Discussion	153
4.5.1. <i>Pre-temple features and deposits</i>	153
4.5.2. <i>The prehistoric temple at Santa Verna</i>	157
4.5.3. <i>Destruction and collapse of the temple</i>	163
4.5.4. <i>Evidence of Punic, Roman and Arab phases</i>	164
4.5.5. <i>The medieval chapel of Santa Verna</i>	164
4.5.6. <i>Previous excavation campaigns at the site</i>	165
4.6. The megalithic survey	166
4.7. Summary and conclusions	166
 Chapter 5 Ġgantija	169
CATRIONA BROGAN, CHARLES FRENCH, SEAN TAYLOR, JEREMY BENNETT, EÓIN W. PARKINSON, ROWAN McLAUGHLIN, SIMON STODDART & CAROLINE MALONE	
5.1. Introduction	169
5.2. Location and physical setting of the site	169
5.3. History of the site	170
5.3.1. <i>Museum Department excavations</i>	172
5.4. 2014 survey and excavations	173
5.4.1. <i>Methodology</i>	174

5.4.2. Results	174
5.5. 2015 excavations	180
5.5.1. Excavation rationale	180
5.5.1. Methodology	180
5.5.1. Excavation results	181
5.6. Discussion	187
5.6.1. Introduction	187
5.6.2. Pre-temple features and deposits	187
5.6.3. Stone structure	189
5.6.4. Modern activity	191
5.7. Conclusion	191
Chapter 6 Kordin III	193
ROWAN McLAUGHLIN, CATRIONA BROGAN, EÓIN W. PARKINSON, ELLA SAMUT-TAGLIAFERRO, SIMON STODDART, NICHOLAS VELLA & CAROLINE MALONE	
6.1. Introduction	193
6.2. The site	193
6.2.1. Location and physical setting	193
6.2.2. History of the site	194
6.3. Methodology and personnel	199
6.4. Results: Trench I	201
6.4.1. Trench IA	201
6.4.2. Trench IB	208
6.4.2. Trench IB	208
6.4.3. Trench IC	212
6.5. Results: Trench II	214
6.5.1. Trench IIA	214
6.5.2. Trench IIB	215
6.6. Results: Trench III	217
6.7. Results: Trench IV	219
6.7.1. Trench IVA	219
6.7.2. Trench IVB	219
6.8. Discussion	220
6.8.1. Palaeosols	220
6.8.2. Possible Skorba phase features	221
6.8.3. Mgarr phase layers	221
6.8.4. Pre-temple Ġgantija phase layers	221
6.8.5. The megalithic 'temple' and its date	221
6.8.6. Later activity	222
6.8.7. Re-arrangement of the megaliths	222
6.9. Conclusion	223
Chapter 7 Skorba	227
CATRIONA BROGAN, EÓIN W. PARKINSON, ROWAN McLAUGHLIN, CHARLES FRENCH & CAROLINE MALONE	
7.1. Introduction	227
7.2. The site	227
7.2.1. Location and physical setting	227
7.2.2. History of the site	228
7.2.3. The 1961–63 campaign	228
7.3. Methodology of the 2016 campaign	230
7.4. Results	231
7.4.1. Northern corner	232
7.4.2. Central sondage	232

7.4.3. Eastern corner	235
7.4.4. The upper levels	235
7.5. Discussion	239
7.5.1. Contemporary settlement in southern Italy	241
7.6. Conclusion	242
Chapter 8 In-Nuffara	245
STEPHEN ARMSTRONG, CATRIONA BROGAN, ANTHONY BONANNO, CHARLES FRENCH, ROWAN McLAUGHLIN, EÓIN W. PARKINSON, SIMON STODDART & CAROLINE MALONE	
8.1. Introduction	245
8.2. The site	245
8.2.1. Location and physical setting	245
8.2.2. History of the site	246
8.3. Surface survey	247
8.4. The 2015 excavations	248
8.4.1. Excavation rationale	248
8.4.2. Methodology and personnel	249
8.4.3. Results	249
8.4.4. Geoarchaeological report	254
8.5. Discussion	256
8.5.1. The Bronze Age settlement at In-Nuffara and contemporary use of the rock-cut pit	256
8.5.2. The silos and their construction	257
8.5.3. Site abandonment and later activity at In-Nuffara	258
8.5.4. Punic, Roman and later activity at In-Nuffara	258
8.6. Conclusions	258
8.7. The pottery from In-Nuffara	260
8.7.1. Introduction: In-Nuffara pottery overview report	260
8.7.2. The catalogue	261
8.7.3. Catalogue numbers	261
8.8. Characteristics and manufacture	261
8.8.1. Fabric	260
8.8.2. Surface treatment	260
8.8.3. Decoration	260
8.9. Comparanda	262
8.9.1. Noteworthy missing shapes	262
8.9.1. Unique representations, without parallels elsewhere	262
8.10. Stratigraphic context and date	262
8.11. Recent archaeometric results	263
8.12. Impact of the above on the In-Nuffara assemblage	263
8.13. Concluding remarks	263
8.14. Catalogue of Bronze Age pottery from In-Nuffara	263
Chapter 9 Economy, environment and resources in prehistoric Malta	281
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	
9.1. The environment of early Malta	281
9.2. Material resources	281
9.2.1. Indigenous materials	281
9.2.2. Exotic materials: their origins and distribution	286
9.3. Economy and foodways	287
9.3.1. Introduction: the lines of evidence	287

9.3.2. <i>Palaeoecology</i>	289
9.3.3. <i>Plant remains</i>	289
9.4. Faunal remains: mammal bone	294
9.4.1. <i>Introduction</i>	294
9.4.2. <i>Fragmentation</i>	295
9.4.3. <i>Species distribution</i>	295
9.4.4. <i>Sheep/goat</i>	295
9.4.5. <i>Cattle and pig</i>	298
9.5. Other species	299
9.6. Mammal bones: discussion	299
9.6.1. <i>Livestock and religion</i>	302
9.7. Birds and fish	303
9.7.1. <i>Bird bones</i>	303
9.7.2. <i>Fish bones</i>	304
9.8. Faunal remains: conclusions	304
9.9. Human remains	305
9.9.1. <i>Dental wear</i>	305
9.9.2. <i>Stable isotopes</i>	305
9.10. Conclusions: the economic basis of prehistoric Malta	306
 Chapter 10 The pottery of prehistoric Malta	 309
CAROLINE MALONE, CATRIONA BROGAN & ROWAN McLAUGHLIN	
10.1. Introduction	309
10.1.1. <i>History</i>	310
10.1.2. <i>Dating pottery</i>	311
10.1.3. <i>Recent research on Maltese pottery</i>	311
10.2. The FRAGSUS ceramic research programme	313
10.2.1. <i>Pottery phase descriptions</i>	314
10.2.2. <i>The typology and recognition of pottery types in Malta</i>	320
10.2.3. <i>The FRAGSUS pottery analysis: general data from across the sites</i>	323
10.2.4. <i>Pottery frequency</i>	323
10.2.5. <i>Phase frequency on the 2014–16 excavated sites</i>	323
10.2.6. <i>Fragmentation of pottery</i>	323
10.3. Għar Dalam pottery (Phase 1)	324
10.3.1. <i>Għar Dalam pottery from FRAGSUS sites</i>	326
10.3.2. <i>Għar Dalam style representation</i>	326
10.3.3. <i>Għar Dalam: catalogue descriptions</i>	326
10.3.4. <i>Għar Dalam: style characteristics</i>	327
10.3.5. <i>Għar Dalam: fabric, finish and decoration</i>	330
10.3.6. <i>Regional style</i>	330
10.4. Skorba pottery (Phase 2)	331
10.4.1. <i>Skorba (Red and Grey) bowl and jar forms from Santa Verna and Skorba: catalogue descriptions</i>	334
10.4.2. <i>Skorba general forms: catalogue descriptions</i>	334
10.4.3. <i>Red Skorba: catalogue descriptions</i>	335
10.4.4. <i>Forms and shapes</i>	335
10.5. Żebbuġ pottery (Phase 3)	339
10.5.1. <i>The Żebbuġ assemblage</i>	339
10.5.2. <i>Trefontane style: forms</i>	340
10.5.3. <i>Trefontane</i>	340
10.5.4. <i>Trefontane-Żebbuġ bowls: catalogue descriptions</i>	342
10.5.5. <i>Żebbuġ bowls: catalogue descriptions</i>	344
10.5.6. <i>Żebbuġ cups, handles, lugs, bases and profiles: catalogue descriptions</i>	346
10.5.7. <i>Żebbuġ jars and bowls: catalogue descriptions</i>	346

10.5.8. Żebbuġ inverted jars and bowls, sherds and decoration: catalogue descriptions	349
10.5.9. The Żebbuġ assemblage	349
10.6. Mġarr pottery (Phase 4)	351
10.6.1. The FRAGSUS assemblage	351
10.6.2. Mġarr inverted bowls: catalogue descriptions	351
10.6.3. Mġarr patterned sherds and bowls: catalogue descriptions	354
10.6.4. Mġarr decoration	354
10.6.5. Mġarr inverted and everted forms and lugs: catalogue descriptions	355
10.7. Ġgantija pottery (Phase 5)	357
10.7.1. Ġgantija ceramic repertoire	357
10.7.2. Ġgantija everted tapered rim bowls and cups: catalogue descriptions	359
10.7.3. Ġgantija everted rolled rim bowls: catalogue descriptions	359
10.7.4. Ġgantija tapered rim bowls: catalogue descriptions	361
10.7.5. Ġgantija inverted rolled rim jars: catalogue descriptions	363
10.7.6. Ġgantija inverted tapered rim bowls and cups: catalogue descriptions	366
10.7.7. Ġgantija inverted tapered rim bowls: catalogue descriptions	366
10.7.8. Ġgantija rolled rim jars (biconical forms): catalogue descriptions	367
10.7.9. Ġgantija rolled and collared rim jars and bowls: catalogue descriptions	367
10.7.10. Ġgantija deep and tapered rim jars: catalogue descriptions	371
10.7.11. Ġgantija lids, bases and base decorated sherds: catalogue descriptions	373
10.7.12. Ġgantija handles, lugs and decorated sherds: catalogue descriptions	373
10.8. Saflieni pottery (Phase 6)	374
10.8.1. Saflieni vessels and sherds: catalogue descriptions	374
10.8.2. Discussion of Saflieni ceramics	376
10.9. Tarxien pottery (Phase 7)	376
10.9.1. The Tarxien assemblage	376
10.9.2. Tarxien open carinated bowls and cups: catalogue descriptions	376
10.9.3. Tarxien small carinated bowls and cups: catalogue descriptions	378
10.9.4. Tarxien inverted jars and bowls: catalogue descriptions	381
10.9.5. Tarxien textured and rusticated surface vessels: catalogue descriptions	384
10.9.6. Tarxien rusticated coarseware and larger vessels: catalogue descriptions	384
10.9.7. Tarxien two-sided patterned vessels, lids and bases: catalogue descriptions	386
10.9.8. Tarxien handles and lugs: catalogue descriptions	389
10.10. Early Bronze Age pottery	389
10.10.1. Pottery from Thermi-Tarxien Cemetery phases	391
10.10.2. Thermi and Early Bronze Age pottery from Taċ-Ċawla: catalogue descriptions	393
10.10.3. Bronze Age and Thermi pottery: catalogue descriptions	395
10.11. Conclusions	397
Chapter 11 Small finds and lithics: reassessing the excavated artefacts and their sources in prehistoric Malta	399
CAROLINE MALONE, PETROS CHATZIMPALOGLOU & CATRIONA BROGAN	
Part I – The excavated artefacts	
11.1. Introduction	399
11.2. Small finds – ‘Temple’ Culture artefacts	399
11.2.1. Stone artefacts – querns and ground stone	399
11.2.2. Ceramic objects, figurines	403
11.2.3. Shell, beads	403
11.2.4. Bone tools and artefacts	403
11.3. Lithic tools: raw materials and technology	406
11.3.1. Chert – Santa Verna	410
11.3.2. Obsidian – Santa Verna	412
11.3.3. Chert – Taċ-Ċawla	412

11.3.4. Obsidian and chert – Tač-Ċawla	413
11.3.5. Chert and obsidian – Ġgantija	417
11.3.6. Chert and obsidian – Skorba	417
11.3.7. Chert and obsidian – Kordin III	417
11.4. Discussion	418
Part II – The lithic sources	
11.5. Assessing the lithic assemblages and sourcing chert artefacts	420
11.6. Lithic provenance	420
11.6.1. Geological background and chert rocks	421
11.7. Materials and methods	423
11.7.1. Field research	423
11.7.2. Laboratory research	423
11.7.3. Chert sources of Malta and Sicily	424
11.7.4. Geochemical examination	428
11.8. Lithic assemblages	431
11.8.1. Macroscopic examination	432
11.8.2. Mineralogical examination	434
11.8.3. Geochemical examination	435
11.9. Summary and conclusions	440
11.9. Chaîne opératoire	442
11.10. Integration with FRAGSUS	445
 Chapter 12 Megalithic site intervisibility: a novel phenomenological approach	 447
JOSEF CARUANA & KATYA STROUD	
12.1. Introduction	447
12.2. GIS and the study of the Neolithic in Malta	447
12.2.1. Technical background and crucial advances in pixel coverage	447
12.3. The Neolithic landscape	447
12.3.1. Project aims	448
12.3.2. Methodology	448
12.4. QGIS and associated analyses	449
12.5. The parameters used	450
12.5.1. Height	450
12.5.2. Extent of view	450
12.5.3. Height of observer	450
12.5.4. Curvature	450
12.6. Assumptions and limitations	450
12.7. Results and observations	451
12.7.1. Correlation analysis	451
12.8. Agglomerative hierarchical clustering	454
12.9. Conclusion	454
 Chapter 13 Conclusions	 457
CAROLINE MALONE, CATRIONA BROGAN, REUBEN GRIMA, EÓIN W. PARKINSON, ROWAN McLAUGHLIN, SIMON STODDART & NICHOLAS VELLA	
13.1. Introduction	457
13.2. Excavation, sampling and some lessons learnt	457
13.2.1. Challenges and opportunities	457
13.2.2. Excavation and recording methods	464
13.2.3. Public engagement	466
13.3. New discoveries	471
13.3.1. Prehistoric settlement	471
13.3.2. 'Temples' and their evolution	474
13.3.3. Dating and the culture sequence	474

13.3.4. Material culture	476
13.4. The bigger picture	478
13.4.1. The FRAGSUS questions revisited	479
13.5. Postscript	482
References	483
Index	503
 Appendices (online only)	
<i>Appendix to Chapter 2</i>	513
A2.1. AMS radiocarbon dates	513
A2.2. Chronological Query Language (CQL2) definition of the preferred model	516
<i>Appendix to Chapter 3</i>	517
A3.1. Tač-Ċawla context register	518
A3.2. Small find register	546
A3.3. Soil samples	557
A3.4. Pottery numbers and frequency by context and phase	559
A3.5. Pottery weights	566
A3.6. AMS dates	572
A3.7. Tač-Ċawla: micromorphological analysis of the occupation deposits	573
A3.8. Short report on the environmental samples and handpicked shells from the Tač-Ċawla, Gozo, excavation	587
A3.9. Tač-Ċawla Roman materials from the agricultural channels	597
<i>Appendix to Chapter 4</i>	611
A4.1. Santa Verna context register	611
A4.2. Small find register	614
A4.3. Pottery counts and frequency by context and phase	618
A4.4. AMS dates	622
A4.5. Santa Verna: soil micromorphology of the temple floor sequence	622
A4.6. Physical properties of the Santa Verna megaliths	628
<i>Appendix to Chapter 5</i>	631
A5.1. Ġgantija context register	631
A5.2. Finds register 2014 WC Section	632
A5.3. Pottery counts and frequency by context and phase	633
A5.4. AMS dates	635
A5.5. Geoarchaeology report: micromorphology	636
A5.6. Harris Matrix diagram of stratigraphic sequence of Test Pit 1	640
<i>Appendix to Chapter 6</i>	641
A6.1. Kordin III context register	641
A6.2. Small find register	647
A6.3. Pottery register by number in context and phase	652
A6.4. AMS dates	656
A6.5. Kordin III soil sample register	657
A6.6. SV, LOI, RF Loss of Ignition, etc., soil samples	660
A6.7. Kordin marine shell register	661

<i>Appendix to Chapter 7</i>	665
A7.1. Skorba context register	665
A7.2. Small find register	666
A7.3. Pottery database	667
A7.4. AMS dates	668
A7.5. Skorba soil samples	668
A7.6. OSL (optically stimulated luminescence) sample list	669
A7.7. Soil micromorphology and geochemistry	670
<i>Appendix to Chapter 8</i>	675
A8.1. In-Nuffara context register	676
A8.2. Small find register	677
A8.3. Palynological analysis of samples from In-Nuffara	678
A8.4. AMS dates	685
A8.5. Soil sample register	686
A8.6. In-Nuffara: soil micromorphology of selected pit fills	687
<i>Appendix to Chapter 9</i>	691
A9.1. Palaeobotanical assemblages	692
A9.2. Zooarchaeological assemblages	714
<i>Appendix to Chapter 10</i>	723
A10.1. Drawn pottery	724
A10.2. Ceramic thin section analysis of Temple Period, Neolithic and Bronze Age material from Malta	742
A10.3. Phase sequence and forms after Evans (1971) and Trump (1966, 1989)	750
<i>Appendix to Chapter 11</i>	763
A11.1. Worked stone artefacts	763
A11.2. Terracotta and shell artefacts	765
A11.3. Worked bone and shell artefacts	765
A11.4. Taċ-Ċawla obsidian assemblage, length and width	766
A11.5. Chert and obsidian numbers from the FRAGSUS sites	769
A11.6. Geological description and analysis of lithic samples	775

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Figures

0.1	<i>David Trump and John Evans together at the Deya Conference, Mallorca.</i>	xxxii
0.2	<i>Joseph Magro Conti at Kordin.</i>	xl
1.1	<i>Early excavation images of Tarxien in 1915 during the superficial clearance.</i>	5
1.2.	<i>Xaghra Brochtorff Circle excavations from 1987–94.</i>	7
1.3.	<i>The Cambridge Gozo Survey 1987–95, recording landscape features and surface scatters.</i>	8
1.4.	<i>General view of Taċ-Ċawla, 2014, and members of the 2014 team.</i>	15
1.5.	<i>General views of work at Santa Verna, 2015.</i>	16
1.6.	<i>General views of work at Kordin III, 2015.</i>	17
1.7.	<i>General views of work at Skorba, 2015.</i>	18
1.8.	<i>General views of work at Ġgantija, 2016.</i>	19
1.9.	<i>General views of work at In-Nuffara, 2015.</i>	20
1.10.	<i>Ceramic processing and finds work.</i>	22
1.11.	<i>Location map of sites investigated by the FRAGSUS Project.</i>	23
1.12	<i>Research intensity on Maltese prehistory.</i>	24
1.13.	<i>Images of scholars and fieldworkers of Maltese prehistory.</i>	25
1.14.	<i>Research pioneers of prehistoric Malta.</i>	26
2.1.	<i>OxCal plot of phases of Maltese prehistory.</i>	34
2.2.	<i>Kernel density estimates for radiocarbon-dated phases of Maltese prehistoric sites.</i>	35
2.3.	<i>KDE models of archaeological phases and the density of dated charcoal from sediment cores.</i>	35
2.4.	<i>KDEs of the temporal distribution of Maltese radiocarbon dates.</i>	36
3.1	<i>Site location map.</i>	40
3.2.	<i>Site location details.</i>	41
3.3.	<i>Site layout of Trench E in 1994.</i>	43
3.4.	<i>Location of scatters surveyed in 1960s and trial trenches in 1993 and 1995.</i>	44
3.5.	<i>General trench layout in 1995: section, trench photograph and stone figurine.</i>	46
3.6.	<i>Site layout in 2014.</i>	49
3.7.	<i>The excavated stone structures and the remnant vine channels and pits.</i>	50
3.8.	<i>The double-sided structure wall and related post- and stake holes.</i>	51
3.9.	<i>The exterior face of the wall (172) in the eastern zone.</i>	52
3.10.	<i>The relationship of wall (287) in BT5 to extramural and internal levels.</i>	53
3.11.	<i>Wall contexts of the Neolithic structure and digital scan of stone walls.</i>	54
3.12.	<i>Structure wall in BT5.</i>	55
3.13.	<i>Structure wall in BT6.</i>	55
3.14.	<i>Recording and excavation of the North Baulk inside the structure.</i>	55
3.15.	<i>Section drawings of BT5.</i>	57
3.16.	<i>Section drawings of BT6 and exploratory trench.</i>	58
3.17.	<i>Location of main box trenches.</i>	58
3.18.	<i>The lower cobble layers and underlying terra rossa in BT6.</i>	59
3.19.	<i>Plan showing locations of principal contexts in Level 1.</i>	59
3.20.	<i>BT6, revealing bedrock overhang, floors and foundation deposits.</i>	60
3.21.	<i>View of the excavations in the western extent of the site.</i>	60
3.22.	<i>The stony cobbled and bedrock base in the eastern quadrant.</i>	61
3.23.	<i>Plan showing location of principal contexts in Level 2.</i>	61
3.24.	<i>Sections cut through structure floors – north side of 1995 trench.</i>	62
3.25.	<i>Level 3 deposits within the ‘house’ structure.</i>	63
3.26.	<i>Re-cut 1995 trench recording location of BT4.</i>	64
3.27.	<i>Layers revealed in BT4.</i>	64
3.28.	<i>The 1995 trench recorded in 2014.</i>	65
3.29.	<i>Level 4 showing main cobble deposits.</i>	66
3.30.	<i>View of the trenches through the eastern half of the structure.</i>	66
3.31.	<i>Level 5 showing main cobble deposits.</i>	67
3.32.	<i>Section record of the North Baulk.</i>	68

3.33.	<i>Photograph of baulk in the North West Quadrant.</i>	68
3.34.	<i>The cleaning and recording of the North Baulk.</i>	70
3.35.	<i>The cleaned floor in Level 7 in the east of the structure.</i>	70
3.36.	<i>Level 6 yellow brown deposits.</i>	71
3.37.	<i>Cleaned floor deposit in Context (195), showing charcoal and burnt lenses.</i>	72
3.38.	<i>Section cut through floors close to the stone wall.</i>	72
3.39.	<i>Level 7 deposits – dark lenses and floors.</i>	73
3.40.	<i>Location of the main Level 8 deposits.</i>	74
3.41.	<i>General view looking south of excavation beyond the 1995 trench.</i>	74
3.42.	<i>View of the extramural layers visible in BT5.</i>	76
3.43.	<i>View of the intermediate stage of excavation of BT6.</i>	77
3.44.	<i>View of the excavation of the internal floors and structure wall.</i>	77
3.45.	<i>Internal floors and remnant walls of the structure.</i>	78
3.46.	<i>The wall structures looking west.</i>	78
3.47.	<i>Upper excavation levels of the area to the north of the stone structure.</i>	79
3.48.	<i>Partially cleared vine pits.</i>	80
3.49.	<i>View of the late stages of excavation showing walls and bedrock.</i>	80
3.50.	<i>Vine pits (8) and (9) and the emerging stones of wall (172).</i>	81
3.51.	<i>The sequence of contexts in the extra-mural deposits in Level 1 and Level 2.</i>	82
3.52.	<i>Northeast Sector postholes and reconstruction plan.</i>	84
3.53.	<i>Intermediate levels in the extramural area and upper prehistoric levels in the extramural area.</i>	86
3.54.	<i>Exposed bedrock in the area immediately outside wall (172).</i>	87
3.55.	<i>Postholes under excavation.</i>	88
3.56.	<i>Section of (268) longitudinal W–E, and cross sections N–S.</i>	89
3.57.	<i>The external cobbled area (210), dumps and displaced wall stones.</i>	90
3.58.	<i>Primary contexts around the structure walls and cleared bedrock in the Main Quadrant.</i>	90
3.59.	<i>Location of stone spread (178).</i>	92
3.60.	<i>View of the north-facing section of the mini baulk and floors within the structure.</i>	93
3.61.	<i>Southwest-facing section of BT3.</i>	93
3.62.	<i>Contexts in southern extramural zone.</i>	94
3.63.	<i>Southern extramural zone with rock-cut and primary features.</i>	94
3.64.	<i>Plan of the east zone of excavation, showing the parallel vine pits/channels.</i>	97
3.65.	<i>Excavated rock features in the southeast excavation area.</i>	97
3.66.	<i>Excavations in the southeast area in 2014.</i>	97
3.67.	<i>Plan of Context (109), section record, and clay oven fragments and drawing.</i>	99
3.68.	<i>Obsidian core and associated pottery.</i>	100
3.69.	<i>Sections and location plan recording the stratigraphy in the southeast area of excavation.</i>	101
3.70.	<i>Box Trench profiles and their numbered contexts.</i>	102
3.71.	<i>Paving stones in Channel 1 and sherd scatters in Context (120).</i>	102
3.72.	<i>Sandstone quern in situ in Context (120) between Channels 2 and 3.</i>	105
3.73.	<i>Layout of the vine pit/agricultural channels across the excavation area.</i>	106
3.74.	<i>Differential coloration of the agricultural channels, looking west.</i>	107
3.75.	<i>The agricultural features during excavation.</i>	108
3.76.	<i>The excavated vine pits and features in plan and profile east of the stone structure (172).</i>	109
3.77.	<i>The mollusc pits in section and plan.</i>	110
3.78.	<i>Photographs of the sectioned snail pit.</i>	110
3.79.	<i>Excavation of the shallow deposits on the east side of the site.</i>	112
3.80.	<i>Bedrock features along the east baulk of the excavation, showing potential posthole and torba deposits.</i>	112
3.81.	<i>Post-medieval kiln or burning pit, showing rubble base and circular edge.</i>	113
3.82.	<i>Possible layout of the Neolithic domestic structures at Taċ-Ċawla.</i>	115
3.83.	<i>Taċ-Ċawla, main trench early in the excavation.</i>	116
3.84.	<i>The site at the close of the 2014 season.</i>	116
3.85.	<i>Later phases of activity at Taċ-Ċawla: Classical and Thermi phases.</i>	118
3.86.	<i>Temple Period phases of activity at Taċ-Ċawla: Tarxien and Ġgantija phases.</i>	118

3.87.	<i>Earlier phases of activity at Tač-Ċawla: Żebbuġ and Skorba phases.</i>	118
3.88.	<i>Lithic distribution at Tač-Ċawla.</i>	119
3.89.	<i>Pottery-lithic distributions at Tač-Ċawla – summed probability plots.</i>	120
3.90.	<i>The FRAGSUS teams during the 2014 season.</i>	121
4.1.	<i>Location map of Santa Verna.</i>	124
4.2.	<i>‘Plan of a Phoenician Temple’: preparatory drawing from Houël’s 1789 engravings.</i>	125
4.3.	<i>The 1911 plan of Santa Verna.</i>	126
4.4.	<i>Selection of photos from the 1911 excavations at Santa Verna.</i>	128
4.5.	<i>South-facing section of the 1961 Trench ‘A’.</i>	129
4.6.	<i>Density of Early Neolithic pottery found in the Santa Verna survey.</i>	130
4.7.	<i>Density of Early Temple Period pottery found in the Santa Verna survey.</i>	130
4.8.	<i>Density of Ghar Dalam, Grey & Red Skorba and Temple Period sherds recovered in 2014.</i>	131
4.9.	<i>Relative proportion of sherds recovered from north and east of Santa Verna.</i>	131
4.10.	<i>Relative proportion of sherds recovered from west of Santa Verna.</i>	131
4.11.	<i>Ground penetrating radargrams of Santa Verna.</i>	132
4.12.	<i>The Santa Verna megaliths partially enveloped with vegetation.</i>	132
4.13.	<i>Site scan of Santa Verna at close of excavation.</i>	133
4.14.	<i>2015 trench layout showing major megaliths.</i>	133
4.15.	<i>Post-excavation photo of Trench A, showing bedrock, looking west.</i>	134
4.16.	<i>Snail figurines from Santa Verna, 2015.</i>	135
4.17.	<i>Post-excavation photo of Trench B, showing terra rossa, looking east.</i>	135
4.18.	<i>Obsidian blade (SF19) from Context (8).</i>	136
4.19.	<i>Sherd of stamped pottery from (17), similar to Sicilian Stentinello ware.</i>	136
4.20.	<i>Post-excavation plan of Santa Verna temple.</i>	137
4.21.	<i>Vertical section of Trump 1961 trench and location of micromorphology samples.</i>	138
4.22.	<i>Saddle quern fragment embedded within torba floor (23).</i>	139
4.23.	<i>Vertical section of 1911 sondage [54].</i>	140
4.24.	<i>South-facing vertical section.</i>	141
4.25.	<i>Threshold stone (57), with Context (59) in the background.</i>	142
4.26.	<i>Fragment of a rim of a large stone bowl from Context (58).</i>	142
4.27.	<i>Stones (59) as they were in 1911 (left) and 2015 (right).</i>	143
4.28.	<i>The western edge surface {21} and floor (121), also showing 1911 sondage [120].</i>	144
4.29.	<i>Detail of preserved plaster at the edge of floor (121).</i>	144
4.30.	<i>Layer (116), a patch of torba of presumed Skorba date.</i>	145
4.31.	<i>Trench D, northeast facing vertical section showing Cut [76] into pre-Temple deposits.</i>	145
4.32.	<i>‘Fire pit’ feature in surface {21}.</i>	146
4.33.	<i>South-facing vertical section of sondage in Trench E.</i>	147
4.34.	<i>The lobed wall (91) of the outer right temple apse running through Trench E.</i>	147
4.35.	<i>Polygonal ‘tiles’, Context (92).</i>	148
4.36.	<i>Obsidian arrowhead from (52) (SF132).</i>	148
4.37.	<i>Photograph from Bradley (1912) of workers at Santa Verna.</i>	149
4.38.	<i>Post-excavation laser scans.</i>	149
4.39.	<i>Photograph of the keyhole investigations between Trenches C, D and E.</i>	150
4.40.	<i>Photograph of chert objects from topsoil (13) in Trench F.</i>	150
4.41.	<i>Thin section photomicrographs from Santa Verna and Ġgantija.</i>	152
4.42.	<i>Ghar Dalam pottery from Context (8) in Trench B.</i>	154
4.43.	<i>Painted ware sherds illustrated in Ashby et al. (1913), of Żebbuġ style.</i>	155
4.44.	<i>Bayesian model multiplot for the Żebbuġ phase and construction of Santa Verna.</i>	156
4.45.	<i>Plans of Santa Verna on discovery and with 2015 excavation features alongside extant megaliths.</i>	157
4.46.	<i>Site profile from north to south.</i>	158
4.47.	<i>Photograph of tiles (92) taken at the time of their discovery.</i>	158
4.48.	<i>Outline plans of the Santa Verna temple.</i>	160
4.49.	<i>Outline plan of the Santa Verna temple, with Ġgantija as a comparison.</i>	161
4.50.	<i>Tarxien phase sherds from (33), the foundation of the Phase V floor.</i>	162

4.51.	<i>Extract from Ashby et al.'s (1913) plan, overlain with the excavation results.</i>	163
4.52.	<i>Tarxien phase pottery from Santa Verna found in 1911.</i>	164
4.53.	<i>Photographs showing the discovery of a Globigerina Limestone slab.</i>	165
4.54.	<i>Schematic plan showing megaliths categorized by volume.</i>	166
4.55.	<i>Digital laser scan, showing stones placed to overlap adjacent members.</i>	166
5.1.	<i>Location map of Ġgantija.</i>	170
5.2.	<i>Hoüel's (1787) engraving of the Xaghra Brochtorff Circle and Ġgantija Temples.</i>	171
5.3.	<i>Lacroix's illustrations of notable artefacts kept by Bayer from Ġgantija.</i>	171
5.4.	<i>The trilithon structure and retaining wall as depicted by Brocktorff (1820s).</i>	172
5.5.	<i>Smyth's engraving (1829) of Ġgantija.</i>	173
5.6.	<i>The fault line at Ġgantija revealed through GPR.</i>	174
5.7.	<i>Orthophotograph of the Ġgantija temples showing resistivity results for the 'olive grove'.</i>	175
5.8.	<i>Plan of Trench 1/2014.</i>	176
5.9.	<i>Trench 2/2014 after excavation.</i>	176
5.10.	<i>Vertical section of Trench 3/2014 showing the wall structure, Context (2004).</i>	177
5.11.	<i>Mid-excavation plan of Trench 3/2014 showing the wall structure, Context (2004).</i>	178
5.12.	<i>Photograph of Trench 3/2014 in the olive grove, looking south.</i>	178
5.13.	<i>The southeast-facing vertical section beneath the former office/WC.</i>	179
5.14.	<i>Section drawing of the southeast-facing section showing in situ megaliths and stratified deposits.</i>	179
5.15.	<i>Typical Tarxien phase sherds recovered from Context (2012).</i>	180
5.16.	<i>Plan of Ġgantija showing the location of Trench 1/2014 ext. (1) and Trench 1/ 2015 (2).</i>	180
5.17.	<i>East-facing vertical section drawing of Trench 1/2014 ext.</i>	181
5.18.	<i>Southeast-facing vertical section drawing of Trench 1/2014 ext.</i>	182
5.19.	<i>Trench 1/2014 ext. post-excavation, with in situ megalith.</i>	182
5.20.	<i>Two Ġgantija phase cups recovered from Context (004).</i>	183
5.21.	<i>Post-excavation plan of Trench 1/2015.</i>	184
5.22.	<i>Post-excavation plan of sondage at the base of Trench 1/2015.</i>	184
5.23.	<i>Superficial vertical section in Trench 1/2015, with micromorphology sample locations.</i>	185
5.24.	<i>Deep vertical section at the base of Trench 1/2015, with micromorphology sample locations.</i>	185
5.25.	<i>Photograph of the excavated ramp structure.</i>	186
5.26.	<i>Pottery from Context (1002)/(1003).</i>	186
5.27.	<i>Mid-excavation photograph of Trench 1/2015.</i>	188
5.28.	<i>Tarxien phase pottery from Contexts (1015) and (1016).</i>	188
5.29.	<i>Laser scan of Trench 1/2015 post-excavation, clearly showing the wall structure.</i>	189
6.1.	<i>Location map of Kordin III.</i>	193
6.2.	<i>The temples of Kordin I and Kordin II as recorded by Caruana (1896).</i>	194
6.3.	<i>Ashby's plans of Kordin I, II and III (Ashby et al. 1913).</i>	195
6.4.	<i>Orthophotograph and survey map of the Kordin site locations.</i>	196
6.5.	<i>Location of prehistoric sites in the area (digital elevation model from LiDAR).</i>	196
6.6.	<i>Location map of Kordin III with viewsheds calculated through LiDAR.</i>	197
6.7.	<i>Image of Kordin III in 1925, surrounded by the enclosing wall.</i>	197
6.8.	<i>Site photos from Ashby and Peet's excavation at the Kordin sites.</i>	198
6.9.	<i>Ashby's plan of Kordin III showing the locations of Evans' and Trump's trenches.</i>	199
6.10.	<i>Evans' plan of Kordin III (adapted from Ashby et al. 1913).</i>	199
6.11.	<i>Evans' and Trump's section and trench drawings.</i>	200
6.12.	<i>Kordin III and the University of Malta 2006 survey.</i>	200
6.13.	<i>Overlay of the 2015 trenches at Kordin III.</i>	201
6.14.	<i>Overview of Trench I.</i>	202
6.15.	<i>Trench 1A and 1C contexts.</i>	203
6.16.	<i>Bayesian model of the radiocarbon dates from sondages in Trench I.</i>	204
6.17.	<i>Plan of eastern end of Trench I.</i>	205
6.18.	<i>Photograph of torba floor (89) and sondage in Context (97).</i>	205
6.19.	<i>Photographic section and section record of (70) and (71).</i>	207
6.20.	<i>Mġarr pottery from midden deposit (71).</i>	207

6.21.	<i>Three stone discs from Context (71) (SF167).</i>	208
6.22.	<i>Small features in Trench 1B.</i>	208
6.23.	<i>Possible stone pendant (SF132), from Context (67).</i>	209
6.24.	<i>The smashed threshold stone (SfM model).</i>	209
6.25.	<i>The smashed threshold in context.</i>	210
6.26.	<i>Photo-model of megalithic wall (6) and fragments of plaster (15).</i>	211
6.27.	<i>Section drawing of plaster fragments in Context (14).</i>	211
6.28.	<i>Fragment of plaster with pigment (SF15) from topsoil in Trench IB.</i>	211
6.29.	<i>Post-excavation photograph of [37] and [42] looking west.</i>	212
6.30.	<i>Struck chert (SF109) from Context (31).</i>	212
6.31.	<i>North-facing section in Trench 1C.</i>	213
6.32.	<i>East-facing section in Trench 1C.</i>	213
6.33.	<i>South-facing section in Trench 1C.</i>	213
6.34.	<i>Sherd of Mġarr pottery from (93) and slingstone from (5).</i>	214
6.35.	<i>Mid-excavation photograph of Trench IC showing (93) after removal of (78).</i>	214
6.36.	<i>Trench II during excavation in 2015.</i>	215
6.37.	<i>Torba floor (151) and related layers.</i>	216
6.38.	<i>Plan and photographs of Trench II.</i>	217
6.39.	<i>Trench III showing excavation progress.</i>	218
6.40.	<i>Pottery and obsidian artefacts.</i>	219
6.41.	<i>Trench IV showing excavation progress.</i>	220
6.42.	<i>Plan of 2015 structures overlain on Ashby's 1909 plan.</i>	222
6.43.	<i>Sectioned deposits revealing 'modern' tin cup beneath megalith.</i>	223
6.44.	<i>View of excavations before site closure, Trench I.</i>	224
6.45.	<i>Laser scan of Trench I.</i>	224
6.46.	<i>The team at Kordin.</i>	225
7.1.	<i>Location map of Skorba.</i>	228
7.2.	<i>Map of Skorba and nearby Temple Period sites and local topography.</i>	228
7.3.	<i>Trump's (1966) excavation plan of Skorba with locations of 2011/ 2016 excavations.</i>	229
7.4.	<i>Trench M during excavation in 2011.</i>	230
7.5.	<i>Work during the 1961 excavation season with position of the 2016 trench indicated.</i>	231
7.6.	<i>Location of the 2016 trench.</i>	231
7.7.	<i>Photograph of the 2015 trench.</i>	232
7.8.	<i>Detailed plans of the 2015 trench.</i>	233
7.9.	<i>Southwest-facing vertical section of the trench.</i>	234
7.10.	<i>Harris matrix for the 2015 excavation at Skorba.</i>	234
7.11.	<i>Shell beads (SF5) recovered from the FRAGSUS excavation at Skorba.</i>	234
7.12.	<i>Section of northwest end of trench, exposing Trump's sondage cut.</i>	235
7.13.	<i>Drawings of southeast-facing section (Trump's 'Y') and the Ghar Dalam wall stratigraphy.</i>	236
7.14.	<i>Section drawing of northeast corner of the trench.</i>	237
7.15.	<i>Deposits in the eastern corner.</i>	237
7.16.	<i>Photograph of the wall.</i>	237
7.17.	<i>Photograph of initial clearance of the trench.</i>	238
7.18.	<i>Southeast-facing section of the trench, showing OSL sampling locations.</i>	239
7.19.	<i>The column extracted for OSL dating in the northeast corner.</i>	239
7.20.	<i>Views of the 2016 excavations at Skorba.</i>	240
8.1.	<i>Location map of In-Nuffara.</i>	246
8.2.	<i>View of In-Nuffara mesa and the Ramla Valley.</i>	246
8.3.	<i>Sketch of a vertical section of two adjoining silo pits from the 1960 excavation.</i>	247
8.4.	<i>Orthographic, LiDAR and topographic imagery of In-Nuffara.</i>	248
8.5.	<i>The remains of a partially eroded rock-cut pit along the limestone cliff-face.</i>	249
8.6.	<i>Structure from Motion orthograph and plan of the trench.</i>	250
8.7.	<i>Photograph of the trench after topsoil removal, with silos visible.</i>	250
8.8.	<i>North-facing section record of Silo 1.</i>	251

8.9.	<i>Photographs of the in situ capstone of Silo 1 following the removal of topsoil.</i>	251
8.10.	<i>North-facing half section of the archaeological deposits within Silo 2.</i>	252
8.11.	<i>Structure from Motion model of the half sectioned deposits in Silo 2.</i>	253
8.12.	<i>Spindle whorls recovered from Silo 2.</i>	254
8.13.	<i>3-D laser scan section and plan of the silos.</i>	255
8.14.	<i>Ceramics catalogue numbers 1–17.</i>	266
8.15.	<i>Ceramics catalogue numbers 18–26.</i>	269
8.16.	<i>Ceramics catalogue numbers 27–37.</i>	271
8.17.	<i>Ceramics catalogue numbers 38–45.</i>	275
8.18.	<i>Ceramics catalogue numbers 46–50.</i>	276
8.19.	<i>Ceramics catalogue numbers 51–65.</i>	278
9.1.	<i>Holocene potential vegetation map of Malta, c. 6000 BC.</i>	282
9.2.	<i>Lagoon wetlands map of Malta in the early Holocene.</i>	284
9.3.	<i>Map showing the origins of exotic materials brought to Malta in prehistory.</i>	286
9.4.	<i>The temporal distribution of economic evidence obtained by the FRAGSUS Project.</i>	288
9.5.	<i>The Maltese pollen data over time.</i>	291
9.6.	<i>Temporal distribution of cereals and legumes.</i>	292
9.7.	<i>a) Cultivated plant seeds; b) wild plants; c, d) horsebeans from Tarxien Cemetery.</i>	293
9.8.	<i>MNI percentage distribution.</i>	296
9.9.	<i>NISP percentage distribution.</i>	296
9.10.	<i>Tač-Ċawla sheep age slaughter pattern.</i>	296
9.11.	<i>Percentage distribution of sheep/goat bones from Tač-Ċawla.</i>	300
9.12.	<i>Percentage distribution of sheep/goat bones from Santa Verna.</i>	300
9.13.	<i>Percentage distribution of sheep/goat bones from Kordin III.</i>	300
9.14.	<i>Percentage distribution of sheep/goat bones from In-Nuffara.</i>	300
9.15.	<i>Percentage distribution of cattle bones from Tač-Ċawla.</i>	301
9.16.	<i>Percentage distribution of cattle bones from Santa Verna.</i>	301
9.17.	<i>Percentage distribution of pig fragments from Tač-Ċawla.</i>	301
9.18.	<i>Percentage distribution of pig fragments from Santa Verna.</i>	301
9.19.	<i>Tooth of a sand tiger shark from Tač-Ċawla.</i>	304
9.20.	<i>Graphs of cereal pollen detectability.</i>	306
10.1.	<i>Evans' typological scheme for Maltese phases, 1953.</i>	317
10.2.	<i>a) Number of sherds found per phase at FRAGSUS excavations at temple sites; b) total number; c) total number from the Cambridge Gozo Survey.</i>	318
10.3.	<i>Estimated vessel sizes recorded from rim diameter in the different phases of pottery production.</i>	319
10.4.	<i>Pottery frequency, fragmentation and relative presence.</i>	320
10.5.	<i>Aoristic totals of pottery by phase.</i>	321
10.6.	<i>Context-by-context comparison of fragmentation for Żebbuġ and Ġgantija pottery at Tač-Ċawla.</i>	322
10.7.	<i>Għar Dalam pottery forms.</i>	328
10.8.	<i>Għar Dalam: classification of patterns.</i>	329
10.9.	<i>Skorba (Red and Grey) bowl and jar forms from Santa Verna and Skorba.</i>	336
10.10.	<i>Skorba general forms.</i>	337
10.11.	<i>Red Skorba.</i>	338
10.12.	<i>Trefontane-Żebbuġ bowls.</i>	343
10.13.	<i>Żebbuġ bowls.</i>	345
10.14.	<i>Żebbuġ cups, handles, lugs, bases and profiles.</i>	347
10.15.	<i>Żebbuġ jars and bowls.</i>	348
10.16.	<i>Żebbuġ inverted jars and bowls, sherds and decoration.</i>	350
10.17.	<i>Mġarr inverted bowls.</i>	353
10.18.	<i>Mġarr patterned sherds and bowls.</i>	355
10.19.	<i>Mġarr inverted and everted forms and lugs.</i>	356
10.20.	<i>Ġgantija everted tapered rim bowls and cups.</i>	360
10.21.	<i>Ġgantija everted rolled rim bowls.</i>	361
10.22.	<i>Ġgantija tapered rim bowls.</i>	362

10.23.	<i>Ġgantija inverted rolled rim jars.</i>	364
10.24.	<i>Ġgantija inverted tapered rim bowls and cups.</i>	365
10.25.	<i>Ġgantija inverted tapered rim bowls.</i>	368
10.26.	<i>Ġgantija inverted rolled rim jars (biconical forms).</i>	369
10.27.	<i>Ġgantija rolled and collared rim jars and bowls.</i>	370
10.28.	<i>Ġgantija deep and tapered rim jars.</i>	371
10.29.	<i>Ġgantija lids, bases and base decorated sherds.</i>	372
10.30.	<i>Ġgantija handles, lugs and decorated sherds.</i>	374
10.31.	<i>Saflieni vessels and sherds.</i>	375
10.32.	<i>Tarxien open carinated bowls and cups.</i>	379
10.33.	<i>Tarxien small carinated bowls and cups.</i>	380
10.34.	<i>Tarxien inverted jars and bowls.</i>	382
10.35.	<i>Tarxien textured and rusticated surface vessels.</i>	383
10.36.	<i>Tarxien rusticated coarseware and larger vessels.</i>	385
10.37.	<i>Tarxien two-sided patterned vessels, lids and bases.</i>	387
10.38.	<i>Tarxien handles and lugs.</i>	388
10.39.	<i>Thermi and Early Bronze Age pottery from Taċ-Ċawla.</i>	394
10.40.	<i>Thermi and Middle to Late Bronze Age pottery.</i>	396
11.1.	<i>Querns and worked stone.</i>	400
11.2.	<i>Querns, bowls and worked stone, mainly from Taċ-Ċawla.</i>	401
11.3.	<i>Discs, querns and grinders from Santa Verna and Kordin III.</i>	402
11.4.	<i>Sling stone and weights, loom weights, worked stone.</i>	404
11.5.	<i>Terracotta objects, snails, beads, shell objects and In-Nuffara loom weights.</i>	405
11.6.	<i>Worked bone and shell objects.</i>	407
11.7.	<i>Pie and bar charts of obsidian and chert artefacts from Taċ-Ċawla.</i>	408
11.8.	<i>Bar charts showing ratios of chert colours and chert tools/obsidian artefacts.</i>	409
11.9.	<i>Santa Verna chipped stone: chert.</i>	411
11.10.	<i>Santa Verna chipped stone: chert and obsidian.</i>	412
11.11.	<i>Ġgantija lithics.</i>	414
11.12.	<i>Taċ-Ċawla chipped stone: chert.</i>	415
11.13.	<i>Taċ-Ċawla chipped stone: obsidian.</i>	416
11.14.	<i>Skorba chipped stone.</i>	418
11.15.	<i>Kordin III chipped stone.</i>	419
11.16.	<i>Geological map of the Maltese Islands including sample locations.</i>	421
11.17.	<i>Geological map of Sicily.</i>	422
11.18.	<i>Chert outcrops on Gozo.</i>	424
11.19.	<i>Chert outcrops on Malta.</i>	425
11.20.	<i>Examples of Sicilian chert rocks: bedded Radiolarian outcrop along the Valona River.</i>	425
11.21.	<i>Examples of black and translucent cherts recorded in Sicily.</i>	426
11.22.	<i>Different angles of Radiolarian beds on the riverbed of the Valona River.</i>	426
11.23.	<i>Representative FTIR spectra of the chert samples from Malta.</i>	427
11.24.	<i>Representative FTIR spectra of the chert samples from Gozo.</i>	427
11.25.	<i>Representative FTIR spectra of the chert samples from Sicily.</i>	428
11.26.	<i>Geochemical models: ternary diagram and binary diagram.</i>	429
11.27.	<i>Normalized patterns of rare earth elements of Maltese and Sicilian chert samples.</i>	430
11.28.	<i>Cluster bar diagram presenting the total number of each assemblage.</i>	431
11.29.	<i>Pie-charts showing the ratio between the different types of rock.</i>	431
11.30.	<i>Representative samples of the first group of artefacts from Ġgantija.</i>	432
11.31.	<i>Representative samples of the second group of artefacts.</i>	433
11.32.	<i>Representative samples of the macroscopically diverse third group of artefacts.</i>	433
11.33.	<i>Comparison FTIR-ATR spectra between a representative artefact and the chert sources.</i>	434
11.34.	<i>Geochemical models cross-examining the Sicilian cherts and the artefacts of group 1.</i>	435
11.35.	<i>Comparable spider plots of REE concentrations of Sicilian chert outcrops.</i>	436
11.36.	<i>Geochemical models cross-examining the Maltese cherts and artefacts of group 2.</i>	437

11.37.	<i>Comparable spider plots of REE concentrations of local origin.</i>	437
11.38.	<i>Comparable spider plots of REE concentrations: samples from Skorba.</i>	438
11.39.	<i>Geochemical models cross-examining the Sicilian black chert sources and Group 3.</i>	439
11.40.	<i>Comparable spider plot of REE concentrations: Sicilian black chert and Group 3.</i>	439
11.41.	<i>Geochemical models cross-examining the West Sicilian chert.</i>	440
11.42.	<i>Comparable spider plot of REE concentrations: West Sicilian chert Group 3.</i>	441
11.43.	<i>Different flake types from Context 1019 of the Ġgantija assemblage.</i>	442
11.44.	<i>Example of a blade made from the Xaghra Brochtorff Circle.</i>	443
11.45.	<i>A scraper from the Xaghra Brochtorff Circle.</i>	444
11.46.	<i>Unimarginal flake of non-local chert from Santa Verna.</i>	444
11.47.	<i>Bi-marginal flake from Taċ-Ċawla that exhibits serration at its edge.</i>	444
11.48.	<i>Unhafted biface tool from Taċ-Ċawla.</i>	445
12.1.	<i>Viewshed analysis of selected prehistoric sites in Gozo.</i>	452
12.2.	<i>Viewshed analysis of selected prehistoric sites in Malta.</i>	452
12.3.	<i>Viewshed analysis of Borġ in-Nadur.</i>	453
12.4.	<i>Viewshed analysis of the Hal Saflieni Hypogeum.</i>	454
12.5.	<i>Dendrogram of sites in Malta divided into four major clades.</i>	455
13.1.	<i>Remote sensing at Ġgantija and across the landscape.</i>	459
13.2.	<i>Ta' Marziena plan and digital scan.</i>	460
13.3.	<i>Borġ in-Nadur LiDAR and digital scans.</i>	461
13.4.	<i>Dating advances – the Skorba section and its layers.</i>	462
13.5.	<i>Summed date ranges for the excavated sites in the FRAGSUS Project.</i>	463
13.6.	<i>Laser scans of Taċ-Ċawla – plan and section.</i>	464
13.7.	<i>John Meneely and Simon Stoddart scanning Taċ-Ċawla in 2014.</i>	465
13.8.	<i>The multidisciplinary FRAGSUS team meeting in Cambridge in 2016.</i>	466
13.9.	<i>The pollen team, with magnified 3-D-printed pollen grains.</i>	467
13.10.	<i>The launch meeting in 2013 and the team with the Malta High Commissioner in 2014.</i>	468
13.11.	<i>Open days at Kordin III, 2015.</i>	469
13.12.	<i>Exhibition at the National Museum of Archaeology, Valletta, March 2018.</i>	470
13.13.	<i>Conference in Fort Sant'Angelo, March 2018 – key speakers.</i>	470
13.14.	<i>Santa Verna Temple structure, partly revealed in 2015.</i>	472
13.15.	<i>David Trump attending the 2016 team meeting in Cambridge.</i>	472
13.16.	<i>Għajnsielem Road section in 1986, the first 'house' excavation.</i>	473
13.17.	<i>Temi Zammit with the reconstructed great stone bowl of Tarxien.</i>	475
A3.7.1.	<i>Taċ-Ċawla site plan.</i>	573
A3.7.2.	<i>The deep section through the karstic feature.</i>	574
A3.7.3.	<i>Excavation area showing walls, floors, the deep section and section FGH.</i>	574
A3.7.4.	<i>Deep section profile with the location of the micromorphological block samples.</i>	575
A3.7.5.	<i>Photomicrographs of the karstic deep feature and section FGH.</i>	579
A3.7.6.	<i>Section FGH, looking west.</i>	582
A3.7.7.	<i>Section FGH sample G1.</i>	582
A3.7.8.	<i>The Horton Trench and Profile 1/1.</i>	583
A3.7.9.	<i>The Horton Trench Profile 1/2.</i>	584
A3.7.10.	<i>The Horton Trench, Profile 2.</i>	584
A3.8.1.	<i>Percentage distribution of different particle sizes from the vine trench samples from Taċ-Ċawla.</i>	588
A3.8.2.	<i>Percentage distribution of different particle sizes from the shell midden deposits at Taċ-Ċawla.</i>	588
A3.8.3.	<i>Anthropogenic and biological content of the vine trench fill samples.</i>	589
A3.8.4.	<i>Anthropogenic and biological content of the shell midden deposits.</i>	589
A3.8.5.	<i>The same anthropogenic and biological contents in the shell midden deposits.</i>	590
A3.8.6.	<i>Land snails from the vine trench fills.</i>	590
A3.8.7.	<i>Land snails from the shell midden deposits.</i>	590
A3.8.8.	<i>Molluscs from the vine trench fills.</i>	591
A3.8.9.	<i>Molluscs from the shell midden deposits.</i>	591
A3.8.10.	<i>Edible land snail species found in the vine trench fills.</i>	592

A3.8.11.	<i>Edible land snail species found in the shell midden deposits.</i>	592
A3.8.12.	<i>Number of juvenile and adult edible and non-edible land snails in the vine trench fill samples.</i>	593
A3.8.13.	<i>Number of juvenile and adult edible and non-edible land snails in the shell midden deposits.</i>	593
A3.8.14.	<i>Number of the burrower Cecilioides acicula found in the vine trench fill samples.</i>	594
A3.8.15.	<i>Number of the burrower Cecilioides acicula found in the shell midden deposits.</i>	594
A3.8.16.	<i>TCC14/95 before excavation.</i>	595
A3.8.17.	<i>TCC14/95 after excavation, revealing a pit.</i>	595
A3.8.18.	<i>TCC14/100 before excavation. Scale in 10 cm.</i>	596
A3.9.1.	<i>Bowls: open forms.</i>	599
A3.9.2.	<i>Bowls: open forms 2.</i>	600
A3.9.3.	<i>Bowls: open forms 3.</i>	601
A3.9.4.	<i>Plates: open forms 4.</i>	603
A3.9.5.	<i>Lids.</i>	605
A3.9.6.	<i>Jars and jugs.</i>	606
A3.9.7.	<i>Flasks and amphorae.</i>	607
A3.9.8.	<i>North African imports.</i>	608
A4.5.1.	<i>General plan of Santa Verna excavations.</i>	623
A4.5.2.	<i>Section drawings of Trench E, Trump Cut 55 and the Ashby Sondage.</i>	623
A5.5.1.	<i>Ġgantija trench locations and excavation trenches.</i>	637
A5.5.2.	<i>WC trench profile and sample loci.</i>	638
A5.5.3.	<i>Photomicrographs of the Ġgantija WC Tr 1 section profile.</i>	639
A5.6.1.	<i>Harris Matrix diagram of stratigraphic sequence of Test Pit 1.</i>	640
A6.4.1.	<i>Bayesian model multiplot for the AMS dates from Kordin III.</i>	656
A6.7.1.	<i>Marine shell distribution by species at Kordin III.</i>	663
A7.7.1.	<i>Locations of OSL dating samples.</i>	670
A7.7.2.	<i>Harris Matrix of the 2016 excavation trench.</i>	671
A7.7.3.	<i>Skorba thin section photomicrographs.</i>	672
A8.3.1.	<i>Percentage pollen diagram from the silo at In-Nuffara.</i>	680
A8.6.1.	<i>In-Nuffara thin section photomicrographs.</i>	688
A9.1.1.	<i>Bar charts representing the division of Taċ-Ċawla crops between cereal and pulses, and by species.</i>	709
A9.1.2.	<i>Pie charts showing the division of crop groups and the percentage of crops from Taċ-Ċawla.</i>	710
A10.1.1.	<i>Pot drawing frequency diagram.</i>	741
A10.2.1.	<i>Samples 2, 6, 59.</i>	745
A10.2.2.	<i>Samples 13, 14, 15.</i>	746
A10.2.3.	<i>Samples 17, 22, 23.1.</i>	747
A10.2.4.	<i>Sample 23.2, 24, 28.</i>	748
A10.2.5.	<i>Sample 29, Odd 2, Odd 3.</i>	749
A10.3.1.	<i>Evans' (1971) typological scheme.</i>	750
A10.3.2.	<i>Trump's (1989) pottery recognition scheme, as used at the Xaghra Brochtorff Circle excavations.</i>	756
A10.3.3.	<i>Phase sequence and forms after Evans and Trump – forms arranged chronologically.</i>	757
A10.3.4.	<i>Phase sequence and forms after Evans and Trump – bowls.</i>	758
A10.3.5.	<i>Phase sequence and forms after Evans and Trump – jars and flasks.</i>	759
A10.3.6.	<i>Phase sequence and forms after Evans and Trump – cups.</i>	759
A10.3.7.	<i>Phase sequence and forms after Evans and Trump – carinated forms.</i>	760
A10.3.8.	<i>Phase sequence and forms after Evans and Trump – platter and lid forms.</i>	760
A10.3.9.	<i>Phase sequence and forms after Evans and Trump – pedestal forms.</i>	761

Tables

1.1.	<i>Research potential for island study and Malta.</i>	3
1.2.	<i>Timetable of fieldwork.</i>	12
1.3.	<i>Chronological range of FRAGSUS sites and their contribution to the project questions</i>	14
1.4.	<i>Summary table of the archaeological discoveries made by FRAGSUS.</i>	23

1.5.	<i>Chronological range of the FRAGSUS sites.</i>	24
2.1.	<i>Radiocarbon dates obtained by the FRAGSUS Project.</i>	30
2.2.	<i>95% confidence intervals for the modelled dates of phase boundaries.</i>	35
2.3.	<i>Simplified cultural phases.</i>	38
3.1.	<i>Layers recorded within the stone structure.</i>	56
3.2.	<i>Extramural deposits around the stone structure.</i>	82
3.3.	<i>Post- and stake hole dimensions.</i>	85
3.4.	<i>Radiocarbon dates from Pit 268.</i>	89
3.5.	<i>Contexts containing Roman pottery.</i>	104
3.6.	<i>Agricultural channel fills.</i>	104
3.7.	<i>Vine channel fill and cut contexts.</i>	113
3.8.	<i>Taċ-Ċawla and the FRAGSUS questions.</i>	122
4.1.	<i>Radiocarbon dates from Santa Verna Context (90).</i>	146
4.2.	<i>Sample contexts for micromorphological, physical and multi-element analyses.</i>	151
4.3.	<i>pH, magnetic and selected multi-element results from Ġgantija and Santa Verna.</i>	153
4.4.	<i>Santa Verna and the FRAGSUS questions.</i>	167
5.1.	<i>AMS dates from Ġgantija.</i>	187
5.2.	<i>Ġgantija and the FRAGSUS questions.</i>	190
6.1.	<i>Kordin III and the FRAGSUS questions.</i>	225
7.1.	<i>OSL and AMS dates from Skorba.</i>	238
7.2.	<i>Skorba and the FRAGSUS questions.</i>	242
8.1.	<i>AMS dates from In-Nuffara.</i>	256
8.2.	<i>In-Nuffara and the FRAGSUS questions.</i>	259
9.1.	<i>Charcoal identification of timber from the FRAGSUS sites and cores.</i>	290
9.2.	<i>Number of seeds recovered relative to the number of samples taken and their volume.</i>	292
9.3.	<i>Ubiquity of cereal and pulse use at the FRAGSUS Project excavation sites.</i>	292
9.4.	<i>MNI percentage distribution.</i>	295
9.5.	<i>NISP percentage distributions.</i>	295
9.6.	<i>Bird and fish bone.</i>	303
10.1.	<i>Evans' 1953 scheme of pottery phasing.</i>	311
10.2.	<i>Trump's 1966 chronology scheme.</i>	312
10.3.	<i>Trump's 2002 revised chronology scheme.</i>	312
10.4.	<i>New chronological sequence.</i>	312
10.5.	<i>Total number of pottery sherds from Neolithic sites.</i>	313
10.6.	<i>Total number of pottery sherds from Temple Period sites.</i>	313
10.7.	<i>Total number of pottery sherds from Bronze Age sites.</i>	313
10.8.	<i>Total sherds recovered by the FRAGSUS Project for each phase.</i>	313
10.9.	<i>Recognized sherd numbers as recorded in Evans (1971).</i>	315
10.10.	<i>Frequency, relative frequency and fragmentation of pottery by phase.</i>	324
10.11.	<i>Phase 1. Ghar Dalam style characteristics.</i>	325
10.12.	<i>Pattern organization of Calabrian Stentinello pottery.</i>	331
10.13.	<i>Phase 2. Grey Skorba, Grey to Red Skorba Transitional, and Red Skorba style characteristics.</i>	332
10.14.	<i>Phase 3. Żebbuġ style characteristics.</i>	341
10.15.	<i>Phase 4. Mġarr style characteristics.</i>	352
10.16.	<i>Phase 5. Ġgantija style characteristics.</i>	358
10.17.	<i>Phase 6. Saflieni style characteristics.</i>	375
10.18.	<i>Phase 7. Tarxien style characteristics.</i>	377
10.19.	<i>Phase 8a. Thermi style characteristics; and Phase 8b. Tarxien Cemetery style characteristics.</i>	390
10.20.	<i>Phase 9. Borġ in-Nadur style characteristics.</i>	392
10.21.	<i>Phase 10. Bahrija style characteristics.</i>	393
11.1.	<i>Chert and obsidian from FRAGSUS sites.</i>	406
11.2.	<i>Santa Verna lithic assemblage totals.</i>	410
11.3.	<i>Counts of raw material type from Santa Verna.</i>	410
11.4.	<i>Chert and obsidian tool categories from Taċ-Ċawla.</i>	413

11.5.	<i>Taċ-Ċawla chert colours and flake/tool ratios.</i>	413
11.6.	<i>Lithics from Skorba.</i>	417
11.7.	<i>Chert colours from Skorba.</i>	417
11.8.	<i>Kordin III obsidian sources.</i>	417
11.9.	<i>Chert artefact types from Kordin III.</i>	417
12.1.	<i>Sites included in the GIS study, visibility and attributes.</i>	449
12.2.	<i>Pearson correlation matrix for all sites in the study.</i>	451
12.3.	<i>Pearson correlation matrix for sites in Malta.</i>	453
13.1.	<i>Dating implications and changing time range.</i>	458
13.2.	<i>The updated chronology of Maltese prehistory that emerges from the FRAGSUS Project work.</i>	476
13.3.	<i>The FRAGSUS questions and themes.</i>	480
A2.1.1.	<i>AMS radiocarbon dates.</i>	513
A3.1.1.	<i>Taċ-Ċawla context register.</i>	518
A3.2.1.	<i>Small find register.</i>	546
A3.3.1.	<i>Taċ-Ċawla soil samples.</i>	557
A3.4.1.	<i>Pottery numbers and frequency by context and phase.</i>	559
A3.5.1.	<i>Pottery weights.</i>	566
A3.6.1.	<i>AMS dates.</i>	572
A3.7.1.	<i>Soil samples from Horton Trench 2014 and 2015.</i>	576
A3.7.2.	<i>Field descriptions from deep section.</i>	576
A3.7.3.	<i>pH, magnetic susceptibility and multi-element analysis.</i>	577
A3.7.4.	<i>Results of principal components analysis.</i>	577
A3.7.5.	<i>Summary of micromorphological features of karstic feature.</i>	578
A3.7.6.	<i>Field descriptions of excavated contexts.</i>	578
A3.7.7.	<i>Summary of micromorphological features.</i>	578
A3.7.8.	<i>Field descriptions of floor deposits.</i>	579
A3.7.9.	<i>Summary of micromorphological features in floor deposits.</i>	580
A3.8.1.	<i>Handpicked shells from Taċ-Ċawla.</i>	595
A3.8.2.	<i>Details of environmental samples taken and analysed.</i>	596
A4.1.1.	<i>Santa Verna context register.</i>	611
A4.2.1.	<i>Small find register.</i>	614
A4.3.1.	<i>Pottery counts and frequency by context and phase.</i>	618
A4.4.1.	<i>AMS dates.</i>	622
A4.5.1.	<i>Summary of micromorphological features in torba floors and pit fills.</i>	624
A4.5.2.	<i>AMS dates for micromorphological samples.</i>	624
A4.5.3.	<i>Field descriptions of floor samples.</i>	624
A4.5.4.	<i>pH, magnetic susceptibility and multi-element analysis.</i>	624
A4.5.5.	<i>Soil analysis.</i>	625
A4.5.6.	<i>LOI test table.</i>	626
A4.5.7.	<i>Rock fractions.</i>	627
A4.6.1.	<i>Physical properties of the Santa Verna megaliths.</i>	628
A5.1.1.	<i>Ġgantija context register.</i>	631
A5.2.1.	<i>Finds register 2014 WC Section.</i>	632
A5.3.1.	<i>Pottery counts and frequency by context and phase.</i>	633
A5.4.1.	<i>AMS dates.</i>	635
A5.4.2.	<i>Soil sample list.</i>	635
A5.5.1.	<i>Sample contexts for micromorphology.</i>	636
A5.5.2.	<i>pH, magnetic susceptibility and multi-element analysis.</i>	636
A5.5.3.	<i>Summary of micromorphological features.</i>	638
A6.1.1.	<i>Kordin III context register.</i>	641
A6.2.1.	<i>Small find register.</i>	647
A6.3.1.	<i>Pottery register by number in context and phase.</i>	652
A6.4.1.	<i>AMS dates.</i>	656
A6.5.1.	<i>Kordin III soil sample register.</i>	657

A6.6.1.	<i>SV, LOI, RF Loss of Ignition, etc., soil samples.</i>	660
A6.7.1.	<i>Kordin marine shell register.</i>	661
A6.7.2.	<i>Marine shell distribution by grid reference and species.</i>	662
A7.1.1.	<i>Skorba context register.</i>	665
A7.2.2.	<i>Small find register.</i>	666
A7.3.1.	<i>Pottery database.</i>	667
A7.4.1.	<i>AMS dates.</i>	668
A7.5.1.	<i>Skorba soil samples.</i>	668
A7.6.1.	<i>OSL sample list.</i>	669
A7.7.1.	<i>Sample list and contexts in Section 2, Profile D-E, Trench A, Skorba.</i>	670
A7.7.2.	<i>pH, magnetic susceptibility and selected multi-element results.</i>	671
A7.7.3.	<i>Loss-on-ignition organic/carbon/calcium carbonate components and particle size analysis.</i>	672
A7.7.4.	<i>Summary soil micromorphology descriptions for the floor and plaster deposits.</i>	672
A8.1.1.	<i>In-Nuffara context register.</i>	676
A8.2.1.	<i>Small find register.</i>	677
A8.3.1.	<i>Summary pollen data and results of preservation tests.</i>	679
A8.3.2.	<i>Summary pollen data and results of preservation tests.</i>	679
A8.4.1.	<i>AMS dates.</i>	685
A8.5.1.	<i>Soil sample register.</i>	686
A8.6.1.	<i>Sample contexts in two storage pits at In-Nuffara.</i>	687
A9.1.1a.	<i>Macrobotanical raw seed counts from Tač-Ċawla.</i>	692
A9.1.1b.	<i>Macrobotanical raw chaff and non-seed counts from Tač-Ċawla.</i>	704
A9.1.1c.	<i>Tač-Ċawla soil sample numbers, macrobotanical litres analysed, and phytolith sample.</i>	705
A9.1.2a.	<i>Macrobotanical Minimum Number of Seeds from Tač-Ċawla.</i>	707
A9.1.2b.	<i>Ubiquity of crops at Tač-Ċawla and Ġgantija.</i>	709
A9.1.2c.	<i>Density of crops at Tač-Ċawla and Ġgantija.</i>	709
A9.1.2d.	<i>Proportion of crops at Tač-Ċawla.</i>	710
A9.1.3.	<i>Macrobotanical raw counts from Santa Verna.</i>	711
A9.1.4a.	<i>Macrobotanical raw counts from Ġgantija.</i>	711
A9.1.4b.	<i>Macrobotanical raw counts from Ġgantija compared by context.</i>	712
A9.1.5.	<i>Macrobotanical raw counts from Kordin III.</i>	712
A9.1.6.	<i>Macrobotanical raw counts from Skorba.</i>	713
A9.1.7.	<i>Macrobotanical raw counts from In-Nuffara.</i>	713
A9.2.1.	<i>Tač-Ċawla. Fragments and MNI distribution.</i>	714
A9.2.2.	<i>Tač-Ċawla. Distribution of identifiable sheep and goat bones.</i>	714
A9.2.3.	<i>Tač-Ċawla. Cattle fusion data.</i>	714
A9.2.4.	<i>Tač-Ċawla. Pig fusion data.</i>	714
A9.2.5.	<i>Tač-Ċawla. Sheep/goat fusion data.</i>	714
A9.2.6.	<i>Tač-Ċawla. Sheep/Goat age-slaughter data based on tooth eruption and wear.</i>	715
A9.2.7.	<i>Tač-Ċawla. Cattle age-slaughter data based on tooth eruption and wear.</i>	715
A9.2.8.	<i>Tač-Ċawla. Pig age-slaughter data based on tooth eruption and wear.</i>	715
A9.2.9.	<i>Tač-Ċawla. Cattle measurements.</i>	715
A9.2.10.	<i>Tač-Ċawla. Pig measurements.</i>	715
A9.2.11.	<i>Tač-Ċawla. Sheep and Goat astragalus measure.</i>	716
A9.2.12.	<i>Tač-Ċawla. Sheep and goat astragalus measurements.</i>	716
A9.2.13.	<i>Tač-Ċawla. Sheep femur measurements.</i>	716
A9.2.14.	<i>Tač-Ċawla. Sheep and goat humerus measurements.</i>	716
A9.2.15.	<i>Tač-Ċawla. Sheep and goat metacarpal measurements.</i>	717
A9.2.16.	<i>Tač-Ċawla. Sheep and goat metatarsal measurements.</i>	717
A9.2.17.	<i>Santa Verna. Fragments and MNI distribution.</i>	717
A9.2.18.	<i>Santa Verna. Cattle fusion data.</i>	717
A9.2.19.	<i>Santa Verna. Pig fusion data.</i>	717
A9.2.20.	<i>Santa Verna. Sheep/goat fusion data.</i>	718
A9.2.21.	<i>Santa Verna Sheep astragalus measurements.</i>	718

A9.2.22.	<i>Santa Verna. Sheep humerus measurements.</i>	718
A9.2.23.	<i>Santa Verna. Sheep and Goat metacarpal measurements.</i>	718
A9.2.24.	<i>Santa Verna. Cattle measurements.</i>	718
A9.2.25.	<i>Kordin III. Fragments and MNI distribution.</i>	718
A9.2.26.	<i>Kordin III. Sheep/goat fusion data.</i>	718
A9.2.27.	<i>Kordin III. Cattle fusion data.</i>	718
A9.2.28.	<i>Kordin III. Pig fusion data.</i>	719
A9.2.29.	<i>Kordin III. Cattle measurements.</i>	719
A9.2.30.	<i>Kordin. Sheep measurements.</i>	719
A9.2.31.	<i>Kordin. Pig measurements.</i>	719
A9.2.32.	<i>Skorba. Fragments and MNI distribution.</i>	719
A9.2.33.	<i>Skorba. Cattle fusion data.</i>	719
A9.2.34.	<i>Skorba. Sheep/goat fusion data.</i>	719
A9.2.35.	<i>Skorba. Pig fusion data.</i>	720
A9.2.36.	<i>Skorba. Sheep/Goat age-slaughter data based on tooth eruption and wear.</i>	720
A9.2.37.	<i>Skorba. Bone measurements.</i>	720
A9.2.38.	<i>Ġgantija. Fragments and MNI distribution.</i>	720
A9.2.39.	<i>Ġgantija. Sheep/goat fusion data.</i>	720
A9.2.40.	<i>Ġgantija. Bone measurements.</i>	720
A9.2.41.	<i>In-Nuffara. Fragments and MNI distribution.</i>	720
A9.2.42.	<i>In Nuffara. Sheep/goat fusion data.</i>	721
A9.2.43.	<i>In Nuffara. Cattle fusion data.</i>	721
A9.2.44.	<i>In Nuffara. Bone measurements (astragalus only).</i>	721
A9.2.45.	<i>In Nuffara. Sheep/goat age-slaughter data based on tooth eruption and wear.</i>	721
A9.2.46.	<i>Dog measurements.</i>	721
A10.1.1a.	<i>Drawn ceramics.</i>	724
A10.1.1b.	<i>Counts of sherds from the FRAGSUS sites by phase.</i>	741
A10.2.1.	<i>Thin sections of Maltese prehistoric pottery.</i>	742
A10.2.2.	<i>Catalogue of thin section samples.</i>	743
A11.1.1.	<i>Worked stone artefacts.</i>	763
A11.2.1.	<i>Terracotta and shell artefacts.</i>	765
A11.3.1.	<i>Worked bone objects and tools.</i>	765
A11.4.1.	<i>Taċ-Ċawla obsidian length and source data.</i>	766
A11.5.1.	<i>Lithic counts from all sites.</i>	769
A11.5.2.	<i>Santa Verna assemblage totals – chert colours and obsidian.</i>	769
A11.5.3.	<i>Santa Verna obsidian object categories.</i>	769
A11.5.4.	<i>Kordin III chert and obsidian artefact types.</i>	769
A11.5.5.	<i>Skorba lithic categories.</i>	769
A11.5.6.	<i>Skorba chert colours.</i>	769
A11.5.7.	<i>Taċ-Ċawla artefact types obsidian and chert.</i>	769
A11.5.8.	<i>Taċ-Ċawla Chert and Obsidian flake types.</i>	769
A11.5.9.	<i>Taċ-Ċawla chert colours.</i>	769
A11.5.10.	<i>Lithics catalogue.</i>	770
A11.6.1.	<i>Description of the geological samples from the Maltese Islands.</i>	775
A11.6.2.	<i>Description of the geological samples from Sicily.</i>	776
A11.6.3.	<i>Explicatory table of the coding system for the Neolithic Maltese sites.</i>	777
A11.6.4.	<i>Macroscopic description of the chert samples collected from Malta.</i>	778
A11.6.5.	<i>Macroscopic description of the chert samples collected from Sicily.</i>	779
A11.6.6.	<i>The LA-ICP-MS analyses results of the Maltese rock samples.</i>	780
A11.6.7.	<i>Second group of the LA-ICP-MS analyses results of the Maltese rock samples.</i>	781
A11.6.8.	<i>The LA-ICP-MS analyses results of the Sicilian chert samples.</i>	782
A11.6.9.	<i>Second group of the LA-ICP-MS analyses results of the Sicilian chert samples.</i>	782
A11.6.10.	<i>Table recording the total amount of lithics found on sites.</i>	783
A11.6.11.	<i>The macroscopic description of the chert artefacts investigated from assemblages.</i>	784

A11.6.12.	<i>The macroscopic description of the chert artefacts from Skorba assemblage.</i>	797
A11.6.13.	<i>Typology and craft techniques.</i>	800
A11.6.14.	<i>The main and minor peaks of the minerals recorded with the FTIR.</i>	806
A11.6.15.	<i>The main and minor peaks of the minerals recorded with the ATR.</i>	806
A11.6.16.	<i>The LA-ICP-MS analyses results of the Xaghra Brochtorff Circle samples (BR).</i>	807
A11.6.17.	<i>The LA-ICP-MS analyses results of the Kordin samples.</i>	808
A11.6.18.	<i>The LA-ICP-MS analyses results of the Tač-Ċawla samples.</i>	809
A11.6.19.	<i>Second group of the LA-ICP-MS analyses results of the Tač-Ċawla samples.</i>	809
A11.6.20.	<i>The LA-ICP-MS analyses results of the Santa Verna samples.</i>	810
A11.6.21.	<i>The LA-ICP-MS analyses results of the Ġgantija samples.</i>	811
A11.6.22.	<i>The LA-ICP-MS analyses results of the Skorba samples.</i>	812
A11.6.23.	<i>Second group of the LA-ICP-MS analyses results of the Skorba.</i>	813

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 com-

plex 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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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

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Santa Verna

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Kordin III

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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:

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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 Xaghra 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

Chapter 2

Dating Maltese prehistory

Rowan McLaughlin, Eóin W. Parkinson,
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2.1. Introduction: chronology building in the Maltese islands

Radiocarbon dating and the prehistoric chronology of the Maltese Islands have been pivotal in the history of European prehistoric research. The importance of the islands in the first attempts to chart European prehistory in the early twentieth century has had an enduring impact on their place within modern studies on prehistoric Europe. Even within their regional setting, the well-defined chronological sequence for prehistoric Malta has been an important yardstick for chrono-cultural sequences in neighbouring Sicily and southern Italy, where the application of radiocarbon dating has been limited. Ironically, Malta's own prehistoric sequence was founded on relatively few radiocarbon dates and has received little critical re-evaluation in the five decades since it was established. A central objective of the *FRAGSUS Project* has been to establish a robust multi-proxy chronology that combines environmental landscape dating with archaeological sites and the human, animal and plant remains from those sites. The *Project's* dating programme achieved a total of 155 new radiocarbon determinations on archaeological deposits for the Maltese Islands. This work has achieved a much more refined chronology and thus enabled a thorough reassessment of Malta's prehistory and its phasing in relation to wider events and changes.

2.1.1. Malta and megalithism

The Maltese Islands were central to the development of the first systematic attempts to understand Europe's prehistory and chronology. These relied on diffusionist models that envisioned the spread of civilization from east to west. Early in the twentieth century, pioneering archaeologists had begun to acknowledge that the Maltese monuments were prehistoric and dated to the Neolithic (Ashby *et al.* 1913; Mayr 1908; Zammit

1910). These same archaeologists also challenged the chronological position of the diffusionist paradigm of the times and instead sought to explain Malta's individual island culture. Similarly, the chronology of the end of the Temple Period and beginning of the Bronze Age in Malta was present in the mind of Themistocles Zammit during his excavations at Tarxien (Zammit 1930; §2.3.9). As noted above (§1.2, 1.3, 2.1.2), the retrieval of dateable materials from David Trump's 1960s excavation of Skorba coincided with a moment of reflection and vigorous debate within archaeology. At the heart of this debate was the questioning of culture-historical models that had dominated the discipline since the nineteenth century (Elliot Smith 1915; Fergusson 1872; Perry 1923).

The subsequent work of Colin Renfrew (1973) challenged these traditional interpretations of European prehistory, specifically those of the origin and diffusion of megalithic monuments. Gordon Childe (1925, 1930) had employed the general notion of civilization spreading westwards and northwards. Although he included the recent Maltese discoveries in his wide scope, he was still inclined to argue for a Mycenaean origin for Europe's megalithic monuments. Renfrew, fresh from research in the early Aegean area (Renfrew 1972) and armed with scientific understanding of the relatively novel approach of radiocarbon dating, immediately identified the power and potential of the early dates emerging from Neolithic Malta. Renfrew's (1973) calibrated radiocarbon dates became a lynch pin to his argument against diffusion. Instead, the chronology supported his argument for independent innovations across the Mediterranean and west European region. The emerging absolute dates for both the Maltese Temple Culture and megaliths firmly showed them to be almost two millennia earlier than the megaliths at Mycenae. This excluded any possibility that Mycenae could have influenced the building of megaliths on Malta or, indeed, elsewhere in western Europe.

2.1.2. *Malta and the Mediterranean: the development of absolute chronologies*

Trump's (1966) excavations at Skorba and his application of radiocarbon dating were a watershed moment that helped refine the Maltese prehistoric sequence. The chrono-cultural sequence developed by Evans (1953, 1959) remained tied to the culture-historical model and placed emphasis on influences from the eastern Mediterranean and Aegean. A lively debate on Malta's cultural sequence ensued between Bernabò Brea (1960) and Evans (1960). This debate centred on the end of the Temple Period and whether Malta had a Neolithic culture parallel to the Sicilian Diana-Bellavista culture. These issues are still as relevant today as they were 60 years ago. The first field seasons at Skorba supported Bernabò Brea's (1960) position on the latter point, with Trump (1961) announcing the discovery of a parallel Diana ware and thus tying the Maltese Islands into a regional chronological framework. As such, one of the most important questions for the Maltese prehistoric chrono-cultural sequence is establishing the absolute dating of the Għar Dalam and Skorba phases of the pre-Temple Period early Neolithic, and their relationship to parallel traditions in Sicily and southern Italy (Chapter 10, §10.3.1, §10.4.1). Initially, Trump (1966) achieved eight conventional radiocarbon dates for Skorba, Mgarr and Tarxien phases in the first programme of dating. Later, two dates were added for the Għar Dalam layers from Skorba (Evans 1971) and a further three by Renfrew (1972) for the early Bronze Age Tarxien Cemetery phase at Tarxien. The result was a chronological framework that has remained largely intact ever since (see Malone *et al.* 2009, 1; Trump 2002). This work was fundamental in reorganizing Evans' (1959) sequence. It added new terminologies for the individual phases based on type-sites, two new phases represented by 'Grey Skorba' and 'Red Skorba' ceramics, and established the priority of the Żebbuġ phase over the Mgarr phase (see Chapter 10). Perhaps the greatest outcome of Trump's work was his identification of a break in the sequence between the Temple Period and succeeding Bronze Age between 2500–2000 BC (Trump 2002). This built on Zammit's discovery of a sterile layer between the late Neolithic Temple and Bronze Age cemetery layers at Tarxien, which had originally been interpreted by him as representing an abandonment phase (Zammit 1930; §2.3.9).

No new radiocarbon dates were added to the original suite until the Cambridge Gozo Project commenced in 1987 (§1.3; Volume 3, Chapters 1 & 3). That project focused on the dating of episodes of the emerging Temple Culture as represented in the burial site of the Xagħra Brochtorff Circle. It also added nineteen AMS radiocarbon dates (one of which was intrusive Byzantine material redistributed from the upper Northern

part of the site) derived from human and animal bone to the chronological database (Malone *et al.* 2009). This initiative also produced viable determinations of stable carbon and nitrogen isotopes, adding the potential to examine diet and environment (Stoddart *et al.* 2009a). Two AMS radiocarbon dates from human bones were also acquired for the Bur Mgheż and Hal Saflieni Temple Period burial sites (Mifsud 1999). The publication of the Xagħra Brochtorff Circle (Malone *et al.* 2009) was significant in adding greater resolution to the Temple Period, specifically closing the gap between the end of the Temple Period and Bronze Age to approximately 2400–2000 BC (Malone *et al.* 2009). Key questions, however, still remained, namely the dating of the elusive Mgarr and Saflieni phases of the fourth millennium BC, and the resolution of Malta's pre-Temple Period early Neolithic and its initial occupation.

Since the work at Xagħra took place, an important development for the chronology of later prehistoric Malta has been the increasing identification of Thermi ware. This is a new ceramic style and associated phase positioned between the Tarxien and Tarxien Cemetery phases that holds stylistic similarities with third millennium BC Aegean wares (Lamb 1936). The presence of Thermi ware on the Maltese Islands was acknowledged throughout much of the later twentieth century (Evans 1953, 68; Malone *et al.* 2009, 238–9; Trump 1966, 46). Yet, discussions about this ceramic style have gained considerable momentum in the last decade following the analyses of the excavated materials from Tas-Silġ. These analyses have identified the occurrence of Thermi-style wares in association with Tarxien phase ceramics (Cazzella & Recchia 2012; Copat *et al.* 2012; Recchia & Cazzella 2011). The recent work at Tas-Silġ, whilst not yet accompanied by published absolute dates, has the potential to add much nuance to our understanding of the end of the Temple Period and to tackle the issue of contemporaneity or distinct phasing.

In the years since the publication of the Cambridge Gozo Project (Malone *et al.* 2009), the need for greater clarity of the phases on either side of the Temple Period has become more pressing. Equally as pressing has been a growing awareness of the need to interrogate an understanding of human time with the tempo of the changing environment. A potential linkage between the two was demonstrated through the increasing use of pollen studies and other palaeoecological approaches that highlighted phases of significant change within the prehistoric timescale (see Volume 1). With these opportunities emerging, coupled with the questions posed by FRAGSUS, the current programme of research focused on: establishing the early occupation of Malta; improving the dating of the succession of cultural evolution and eventual decline of the megalithic Temple Culture; and

understanding the relationship between that decline and the succeeding early Bronze Age.

2.2. Methodology

2.2.1. Sources of data

Chronology building begins at the trowel's edge. The *FRAGSUS Project* excavations were performed with the express aim of refining the cultural sequence of the Maltese islands. So, at each site, the excavation and sampling strategies that we adopted were influenced by the need to obtain good samples for radiocarbon dating and the meaningful Bayesian analysis of their results. Indeed, an entire excavation season (Chapter 7) was devoted to testing the hypothesis that the chronology uncovered at Santa Verna (Chapter 4) could be verified at another site. In Bayesian analysis of radiocarbon data, as in any form of archaeological analysis, we are constrained by what survives and the field sampling strategy that is used. Despite best efforts, this is often a matter of luck. Samples from each archaeological layer, ranging in volume from 1 to 60 litres, were subjected to flotation and wet-sieved. The resulting flots were then sorted for plant remains, charcoal and other dateable items. Although the organic content of many samples was relatively low, suitable material for AMS dating was present in virtually every soil sample. Here, we benefited from the fact that AMS dates can be obtained from very small objects such as individual cereal grains. Once identified by a specialist, charred seeds were the first preference for AMS dating, followed by small fragments of charcoal. Charcoal, although susceptible to an 'old wood effect', is a very reliable material. Animal bones, once identified as a certain species, were also used to obtain radiocarbon dates. It should be noted, however, that the failure rate of these samples was very high due to taphonomic processes and, perhaps, the nature of ancient Maltese butchery and cuisine (see Chapter 9).

In addition to dating material from sites that were excavated by the *FRAGSUS Project*, we attempted 88 new AMS radiocarbon dates from the Xaghra Brochtorff Circle, and collaborated with colleagues on the ERC-funded *Time of Their Lives* (ToTL) project to include the results of 29 successfully dated samples from ToTL in our models (Malone *et al.* 2019; Volume 3, Chapter 3). We also obtained two new AMS radiocarbon dates from seeds held in the National Museum of Archaeology from Zammit's Tarxien Cemetery deposits, and five from human tooth samples from the Xemxija tombs. In the case of Xemxija, the bones had become divorced from their original stratigraphic context. As such, the dates, although valuable in themselves (see Chapter 12, Volume 3), were not useful in refining the cultural sequence at that site.

Legacy radiocarbon data for Malta were obtained from Malone *et al.* (2009b), Malone *et al.* (2019) and Tycot (2020), and were recorded in a database. Comparative data from elsewhere in the central Mediterranean were sourced from a paper by Parkinson *et al.* (under review).

2.2.2. AMS radiocarbon dating

All radiocarbon dating work (excepting paired bone samples in the ToTL project, which was undertaken at Oxford, see above) was performed using AMS in the ¹⁴Chrono Centre, Queen's University Belfast. The samples that comprised charcoal, charred seeds and human or animal bone were all from terrestrial sources and from species with a known carbon ecology. The samples were prepared as described by Reimer *et al.* (2015). No input from marine carbon sources was detected in any of the samples, so the radiocarbon ages were calibrated using the terrestrial northern hemisphere IntCal20 database (Reimer *et al.* 2020). A total of 193 samples from archaeological contexts were submitted. Of these, 36 were bone samples that failed to produce enough collagen for a reliable date, and two were modern cases of charred seeds that had intruded into prehistoric layers. Thus, the number of 'useful' archaeological dates was 155 (Table 2.1). As discussed below and in the chapters that follow, many of these were from 'residual' material that had become reworked through the stratigraphy by taphonomic processes. Nevertheless, all carry useful information about Malta's past.

Also completed as part of the *FRAGSUS Project*, but not reported here, is a sequence of 21 radiocarbon measurements taken from modern and Roman period land snail shells (Hill *et al.* forthcoming) and 121 dates from sediment cores (see McLaughlin *et al.*, Volume 1, Chapter 2).

2.2.3. Bayesian phase modelling

Bayesian analysis combines data and 'prior' hypotheses, calculating 'posterior' beliefs that are informed by both. In the context of radiocarbon dating, the data consist of the calibrated radiocarbon dates, or rather their probability distribution functions; and the 'priors' are information about their relative chronological order (identified through analyses of stratigraphy in the field) or the cultural phase they are associated with (gleaned through analysis of associated material culture). The advantages of the Bayesian approach to archaeological chronology are manifold. Of particular relevance here is that 'empty' phases, whose existence might be inferred archaeologically, but not directly associated with any dates, can be modelled and their start and end points guessed through the analysis of the patterning of data from preceding and succeeding phases.

Table 2.1. Number of archaeological radiocarbon dates from various contexts and materials obtained by the FRAGSUS Project.

Site	Charred seeds	Charcoal	Animal bone	Human bone	Total useful dates
Tač-Cawla	19	1	9 (+7 failed)		29
Santa Verna	18 (+1 modern)	2	1 (+2 failed)	1	22
Ġgantija	1	1	0 (+9 failed)		2
Xagħra Brochtorff Circle				74 (+ 14 failed)	74
In-Nuffara	4	1			5
Xemxija				5	5
Skorba	4	1	0 (+1 failed)		5
Kordin III	5 (+1 modern)	4	2 (+3 failed)		11
Tarxien	2				2
Total useful	53	10	12	80	155

For the *FRAGSUS Project*, the prior information was formally defined using OxCal 4.3 (Bronk Ramsey 2009) and used in a number of Bayesian chronological models, each of which made different assumptions about what the archaeological data *actually* mean. These models did not differ significantly when data or underlying assumptions were changed slightly, indicating that they are reasonably robust. The ‘preferred model’, elaborated upon below, is our best-guess at how the data can be most meaningfully represented. The chronology of each excavation site is also discussed separately in Chapters 3–8. Dates derived from Bayesian phase models are quoted here in *italics* at 95% probability. Further Bayesian modelling and analysis of these dates was done on a context-by-context basis where relevant, to answer specific questions about each site (see Chapters 3–8).

2.2.4. Density modelling

Much archaeological research involves counting things – animal bones, pot sherds, cereal grains and so on. Often, these counts are developed diachronically or in a time series, and are interpreted as proxies of economy or settlement intensity. The same can be done with radiocarbon dates, although this is only successful with two important provisos. First, because of their expense and norms of archaeological practice, radiocarbon samples tend to be much fewer in number than other types of find, and are not necessarily gathered without bias towards certain types of context. Therefore, any statistical approach to their distribution in time must account for this, or at least not over-interpret the results. Second, the posterior probabilities of radiocarbon ages have rather complex mathematical properties and cannot, for example, be assigned to a certain century using a point estimate (such as the weighted mean or mode, see Telford *et al.* 2004) without committing an unacceptable number of mistakes. Despite these issues, the modelling of radiocarbon data as a time series can reveal valid trends in settlement or population

intensity in a defined research area. This is because the models are derived ultimately from objective scientific measurements, rather than from subjective assessment and expert interpretation, as is the case for traditional forms of archaeological typochronology. Density models, whether or not they are interpreted as population proxies, are also very useful in comparing datasets between different regions. This is because hundreds or thousands of separate radiocarbon measurements can be combined into models that allow for the identification of relative change in archaeological activity that are averaged over the myriad methodological and taphonomic constraints of individual sites, landscapes and archaeological excavations.

For this study, we used custom radiocarbon calibration and Monte Carlo simulation (*rowcal*, McLaughlin 2019) to develop radiocarbon measurements into a time series using Kernel Density Estimation (KDE). A KDE is similar to the more familiar summed probability distribution (SPD) of radiocarbon dates. Yet, rather than summing each calibrated age probability, the KDE method sums a set of Gaussian ‘kernels’ whose means are points in time randomly drawn from the calibrated age probabilities. In doing so, we follow the prior belief that human activity identified at one point in time is also indicative of a degree of activity before and after the thing that was dated, since all things are part of a continuum of cause and consequence. The strength of this belief is expressed by the standard deviation of the kernel, also known as the ‘bandwidth’ of the KDE. This can be set at a defined value (for example, 30 years, to model inter-generational change), calculated using heuristics, or optimized using a search algorithm. The uncertainty in radiocarbon determinations caused by laboratory errors and the calibration process is expressed in the KDE by ‘bootstrapping’ a confidence interval for the KDE. This averages thousands of individual runs of the Monte Carlo process until a stable pattern emerges that conveys the maximum amount of information.

To ensure that well-sampled sites such as the Xagħra Brochtorff Circle did not cause errant artefacts in the KDE, we used hierarchical cluster analysis to identify unique site phases, and selected only one date per phase using the algorithm provided by McLaughlin *et al.* (in press). Computer scripts for replicating the analyses presented in this chapter are available upon request.

2.3. Results¹

2.3.1. Early Neolithic Ghar Dalam and Skorba phases

The earliest identified form of material culture found on the Maltese Islands is Ghar Dalam pottery. This is named after a cave in southern Malta that contained a richness of this impressed pottery type, and was identified as representative of the earliest Neolithic phase in Malta by Trump during his excavations at Skorba (Trump 1966). Unlike Trump, however, we did not encounter any strata containing only this ceramic type unmixed with later types at our own excavations at Skorba, Santa Verna (which also had a substantial early Neolithic settlement), or Tač-Ċawla (where deposits were too mixed). Our preferred Bayesian model of the cultural sequence therefore begins at the so-called ‘Skorba’ phase, which we have determined began at some point between 5510 and 5240 cal. bc. For the preceding Ghar Dalam phase in the late sixth millennium bc, we can turn to other lines of evidence, namely: comparison with adjacent regions in the central Mediterranean; and palaeoecological signals of agricultural disturbance that pre-date the earliest strata uncovered during our archaeological excavations (Volume 1).

The Ghar Dalam pottery style (and presumably also the people who first brought it to the Maltese Islands), can be related broadly to the Stentinello wares of Sicily and Calabria, which are considered as a developed form of other early Neolithic impressed wares or ‘Cardial’ cultures. This cultural grouping was associated with the rapid western expansion of Neolithic agriculture from the Balkan peninsula, which, as discussed below (§2.3.13), reached Southern Italy, Sicily and Sardinia at around or slightly before 6000 bc (Natali & Forgia 2018; Volume 1, Chapter 6). By 5500 bc, the culture had reached the shores of Iberia, indicating that its spread was rapid. Indeed, it appears to have spread more rapidly than the contemporary northern expansions of the Linear Pottery culture (LBK) and related cultural groups that were also occurring over the course of the sixth millennium bc (see Bocquet-Appel *et al.* 2012). It is likely that this was because of the Mediterranean Sea itself, which enabled sea-faring agriculturists to open up new horizons for colonization and settlement more quickly than their contemporaries in continental terrestrial contexts. Given this situation, we should expect

to find the earliest indicators of Neolithic settlement in Malta within a century or so of the Neolithic settlement of Southern Italy and Sicily. Our radiocarbon data from archaeological contexts in Malta are, unfortunately, not related to this phase. Interesting dates, however, are provided by palaeoenvironmental evidence gathered by our project and discussed at length by Hunt and Farrell (e.g. Volume 1, Chapter 11). Fungal spores, indicating livestock dung, and cereal pollen indicating the cultivation of wheat and barley, both occurred at around 6000 cal. bc. This date has been estimated robustly through Bayesian modelling of the accumulation rates of deposits found in sediment cores, and is consistent with the expansion of Neolithic settlement elsewhere in the central Mediterranean, as discussed below (§2.3.13; Volume 1, Chapter 6).

As for the Skorba phase, which is defined by the occurrence of monochrome pottery with a distinctive speckled fabric (§10.4), there is copious archaeological and palaeoenvironmental evidence for a significant amount of settlement, farming, land clearance, soil erosion and fire episodes occurring all over the landscape (Volume 1, Chapter 3; Marriner *et al.* 2019). Twelve dates from *FRAGSUS Project* excavations at Santa Verna and Skorba, incorporated in a Bayesian phase model, estimate the start of this phase at 5510–5240 cal. bc and its end at 4980–4690 cal. bc. We found a mixture of both Red and Grey Skorba wares in our excavations, and so we have not attempted to separate Skorba into two distinct phases.

Unrelatable to any archaeological deposit, but indicative of the overall scale of activity during this phase, is a charred cereal grain dating to 5020–4845 cal. bc (UBA-37861, 6041±34 BP) that was retrieved from the Salina Deep Core.

2.3.2. Fifth millennium hiatus

What came next is something of a mystery. At the time of writing, there are no well-dated archaeological finds from the islands between the Skorba and Żebbuġ phases, i.e. until around 3800 bc. The only radiocarbon date from our excavations that can tentatively be assigned to this phase is a piece of unidentified charcoal from Skorba, found in a later context, that dated to 4700–4500 cal. bc (UBA-35590, 5756±35 BP). The palaeoenvironmental record indicates patchy cereal cultivation and a continuation of grazing throughout the period (Volume 1, Chapter 3). As such, it is possible that rather than abandonment, the human population was reduced to small numbers; or, as some of our colleagues argue (see Volume 1), the landscape was completely reorganized. The long-term settlements of Skorba, Tač-Ċawla and Santa Verna, however, were abandoned and not occupied again until the Żebbuġ phase. Radiocarbon

evidence from before and after this hiatus can be used to estimate its duration. An ‘empty’ phase is defined in our Bayesian model as one that forms part of a sequence but is not associated with any radiocarbon dates. In our preferred model this ‘empty’ phase begins between 4980–4690 cal. BC and ends between 4150–3640 cal. BC.

2.3.3. *Żebbuġ phase*

The *Żebbuġ* phase is very well represented in the pottery from across the islands. Yet, strata containing this material in its primary depositional contexts are few and far between. In our model, the *Żebbuġ* phase is dated by three radiocarbon determinations from Santa Verna, and constrained by the timing of the subsequent *Mġarr* phase. The earliest date, UBA-33706 (4945±87 BP) was from a charred cereal in a pit under the temple floor and likely to be from a pre-monument settlement (see Chapter 4); the modelled date for this sample is 3910–3640 cal. BC. Overlying this, a charred cereal from the foundation of the earliest Temple floor, a layer associated with *Żebbuġ* pottery exclusively, was dated to 3730–3640 cal. BC (UBA-31041, 4908±37 BP). This sequence, and one other determination from elsewhere on the Santa Verna site, constituted the *Żebbuġ* phase. In our preferred model, the phase begins at 4060–3640 cal. BC and ends at 3695–3540 cal. BC.

Several dates from *Project* excavations at Taċ-Ċawla fall within this range, but came from contexts that also contained significant quantities of later pottery styles (see Chapter 3) and so were not included in the model of this phase. Also excluded were the dates of human bone samples from the rock-cut tomb (previously interpreted as a ‘*Żebbuġ*’ tomb) at the Xagħra Brochtorff Circle complex. These fall too late in time to be associated with the *Żebbuġ* cultural phase (see Chapter 3, Volume 3). All of these determinations, however, were used in the radiocarbon density model discussed below.

2.3.4. *Mġarr / transitional Ġgantija phase*

From the perspective of material culture, following the *Żebbuġ* phase, there was a degree of variation in the pottery types used at the ‘temple’ sites excavated by the *FRAGSUS Project*. On Gozo, layers yielding *Ġgantija* phase pottery (see Chapter 10) occur immediately above *Żebbuġ* layers. At Kordin III however there were several contexts that contained a relative wealth of the distinctive *Mġarr* style sherds. Three dates from the site were used in our Bayesian model of the cultural sequence. One of these dates was not associated directly with *Mġarr* pottery, but was sealed beneath a *Ġgantija*-phase floor and was broadly contemporary with the other two. The model suggests that the phase began at 3695–3540 cal. BC and ended at 3600–3200 cal. BC. Alternative models can constrain this phase better, but these rely on early

Ġgantija phase material from Santa Verna. This clearly overlaps with the transitional *Mġarr* phase and may represent an early development of this pottery form on Gozo, which later became more widely adopted throughout the Maltese Islands.

2.3.5. *Ġgantija phase*

Our excavations at the megalithic complex at Kordin III (Chapter 6), where surviving extant structures date to the *Ġgantija* phase, and at Santa Verna (Chapter 4) where several successive *Ġgantija*-phase structures were examined, unearthed a wealth of *Ġgantija* pottery. Our excavations at the eponymous site of *Ġgantija* (Chapter 5) also produced significant amounts of this pottery, although none in direct association with material that could be radiocarbon dated. Therefore, seven dates from layers containing material directly associated with a fully developed *Ġgantija* material culture at Kordin III and Santa Verna were used to model the date of this cultural phase. The results suggest that the *Ġgantija* phase began at 3600–3200 cal. BC, and ended at 3080–2760 cal. BC. The relatively imprecise dating of these phase boundaries is due to the lower visibility of *Mġarr* and *Saflieni* phases in our excavations. Though here we note that some individual contexts and structures at Kordin III, Santa Verna and Taċ-Ċawla are very precisely dated (Chapters 3, 4 and 6), as are the burials of this phase at the Xagħra Brochtorff Circle rock-cut tomb.

2.3.6. *Saflieni phase*

Much like the earlier *Mġarr* phase, strata definitively belonging to the *Saflieni* phase eluded us during fieldwork. As such, there are no radiocarbon dates associated unequivocally with this phase. The chronology of the *Saflieni* phase was thus estimated in the Bayesian model by defining an empty phase between *Ġgantija* and *Tarxien*. The results indicate a chronology that starts at 3080–2760 cal. BC and ends at 2850–2660 cal. BC. Early *Tarxien* dates from the Xagħra Brochtorff Circle are identifiable as outliers on the basis of their agreement score in the preferred Bayesian model, and can be considered part of this cultural phase, as could the dated burial from Ħal *Saflieni* Temple itself (Mifsud 1999). Either way, the cultural and chronological boundary between the *Saflieni* and *Tarxien* phases is not particularly distinct, as previously noted (Malone *et al.* 2009; Chapter 11).

2.3.7. *Tarxien phase*

The *Tarxien* phase is well represented in data from both the Xagħra Brochtorff Circle and *FRAGSUS Project* excavations at the site of *Ġgantija*. Two dates from *Ġgantija*, five from Taċ-Ċawla, and a random selection of 24 dates (selected for computational expedience) from the Xagħra

Brochtorff Circle were used to model the timing and duration of this phase. The results indicate the phase began at 2850–2660 cal. bc and ended at 2445–2340 cal. bc. The start of this phase is somewhat later than has been suggested previously, and in this model the phase is not of a particularly long duration. Although here, and as we note above, the origins of this phase may have been indistinct from what came previously.

2.3.8. *Thermi phase*

As discussed by Malone *et al.* in this volume (Chapter 10), an assemblage of early Bronze Age pottery from Taċ-Ċawla represents an intermediate phase between the Temple Period and the Bronze Age. Four radiocarbon dates from contexts (163) and (241) at Taċ-Ċawla can be associated with this cultural phase (with the caveat that none of the material from that site was particularly stratigraphically secure) and be defined as indicative of a separate phase in our Bayesian model. On the basis of their work at Tas-Silġ, Cazzella & Recchia (2012, 2015) argue persuasively that the Thermi phase occurs in the final Temple Culture levels of the Neolithic temple on the site. The dates cited appear to align closely with the AMS chronology achieved on Gozo at both the Xagħra Brochtorff Circle and at Taċ-Ċawla. The phase is represented by distinctive geometrically decorated grey-black pottery (Chapter 10; Figs. 3.33 & 3.34), not by the equally distinctive Tarxien Cemetery style of pottery that seems to occur some centuries later. In our model, the date range of this phase is from 2445–2340 cal. bc to 2475–1980 cal. bc. Significantly, this overlaps with the latest human burials that occurred at Xagħra Brochtorff Circle (Volume 3, Chapter 3), which were associated with a scatter of Thermi style pottery sherds (Trump *et al.* 2009, 239).

There is an apparent hiatus before the Tarxien Cemetery phase gets underway. Similar signals of archaeological discontinuity have emerged from several dated prehistoric sites in Malta. For instance, Taċ-Ċawla was abandoned at this time; burial at the Xagħra Brochtorff Circle complex ended (although the site was reoccupied after 1800 bc); and Tas-Silġ may have a discontinuous occupation (Cazzella & Recchia 2012, 2015).

We have, therefore, included another empty phase in our model, which we have estimated to have begun at some point between 2475 and 1980 cal. bc. This spans the well-known climate anomaly that occurred at around 2200 bc, although it is still unclear how the central Mediterranean was affected by this global event (Bini *et al.* 2019). This model re-opens the case for a phase of abandonment in Malta in the late third millennium, but not one that occurred at exactly the same time as the transition to the Bronze Age.

2.3.9. *Tarxien Cemetery phase*

Better dating of the Tarxien Cemetery phase has long been a priority for archaeological research in Malta, but the requisite samples are few and far between. Our project was fortunate to obtain permission to date two charred faba beans from Zammit's original excavations at Tarxien. These results have been incorporated into a phase model also including a date for the Tarxien Cemetery deposits at Xagħra Brochtorff Circle, which were obtained during earlier work (Malone *et al.* 2009).

The archaeological context of the Tarxien seeds is fascinating. These were from an irregular layer of dark, ashy soil found by Zammit in the south temple at Tarxien. The layer was approximately 30 cm thick and buried 1.2 m below the pre-excavation ground level. Aside from the seeds and other charred plant remains, the deposit contained human bones with varying degrees of cremation, axes, daggers and awls of copper, beads and other small items of jewellery, figurine fragments, smashed pottery and charred textiles (Evans 1971, 149–66). It is possible that the deposit was formed of material derived from a pyre, when human bodies were cremated together with their grave goods, although it is debatable whether the burning occurred *in situ* or not. Zammit (1930) noted traces of burning on adjacent megaliths, but this did not seem to be from fires of the intensity expected for cremation. In any case, this context has been central to many debates in Maltese archaeology ever since its discovery. Sandwiched between the cremation deposit and the floor of the temple lay a relatively sterile layer of soil. Zammit (1930) was of the impression that this layer had formed naturally, with the soil having been washed in by wind and rain, thus being indicative of a period of abandonment. Evans, however, pointed out that this layer was not present elsewhere on the site and could equally have been a floor or surface of sorts, deposited deliberately in advance of the funerary activities and covering the uneven ruins of the temple.

Two dates from these beans, one from previous work at the Xagħra Brochtorff Circle complex, and one from a cattle bone associated with Tarxien Cemetery pottery at Borġ in-Nadur (Tanasi & Tykot 2020), enable us to estimate that this phase began at 2170–1830 cal. bc and ended at 1920–1670 cal. bc.

2.3.10. *Borġ in-Nadur phase*

FRAGSUS Project excavations at In-Nuffara (Chapter 8) resulted in five radiocarbon dates from the basal fills of a large rock-cut pit, or 'silo'. To our knowledge, these are the first radiocarbon dates to be obtained from the classic stage of this cultural phase, which place it, as expected, around 1100–900 cal. bc. As the data for the Bronze Age are sparse, this part of our

model is poorly constrained, with large amounts of time remaining open to accommodate this phase. It is possible that the Tarxien Cemetery phase lasted until as late as 1375 cal. bc, or that it finished as early as 1920 cal. bc and another hiatus ensued. The latter scenario is the approach we have taken with our preferred model, which estimates the Borg in-Nadur phase to have begun at some point between 1880 and 1375 cal. bc and ended at 1090–720 cal. bc. This time frame is consistent with the traditional eighth-century date for the arrival of Phoenician colonists. Two radiocarbon dates from the final Borg in-Nadur / early Bahrija contexts at Qlejgha tal-Bahrija and Borg in-Nadur itself have recently been published by Tanasi & Tykot (2020). These have been incorporated into our model of this phase but are equally consistent with Bahrija-like pottery representing a slightly later style than the material we found at our excavations at In-Nuffara.

2.3.11. Preferred model summary (95% confidence limits)
The overall indices of agreement of our model were $A_{\text{model}}=88.3$ and $A_{\text{overall}}=85.5$.

The CQL2 model specification used by OxCal is provided in Appendix A2.2. The 95% confidence intervals of the cultural phases are provided in Table 2.2 and visualized in Figure 2.1.

2.3.12. Kernel density model

Using KDE, a model of overall data density and dynamic growth is produced (Fig. 2.2). Rather than dividing prehistory into defined phases, this analysis treats the whole interval as a continuum; which, of course, is how each generation of people originally experienced it. The KDE evinces a similar ‘boom-bust’ dynamic of the early Neolithic, similar to what is known from elsewhere in Europe (Shennan *et al.* 2013). This analysis reveals statistically significant

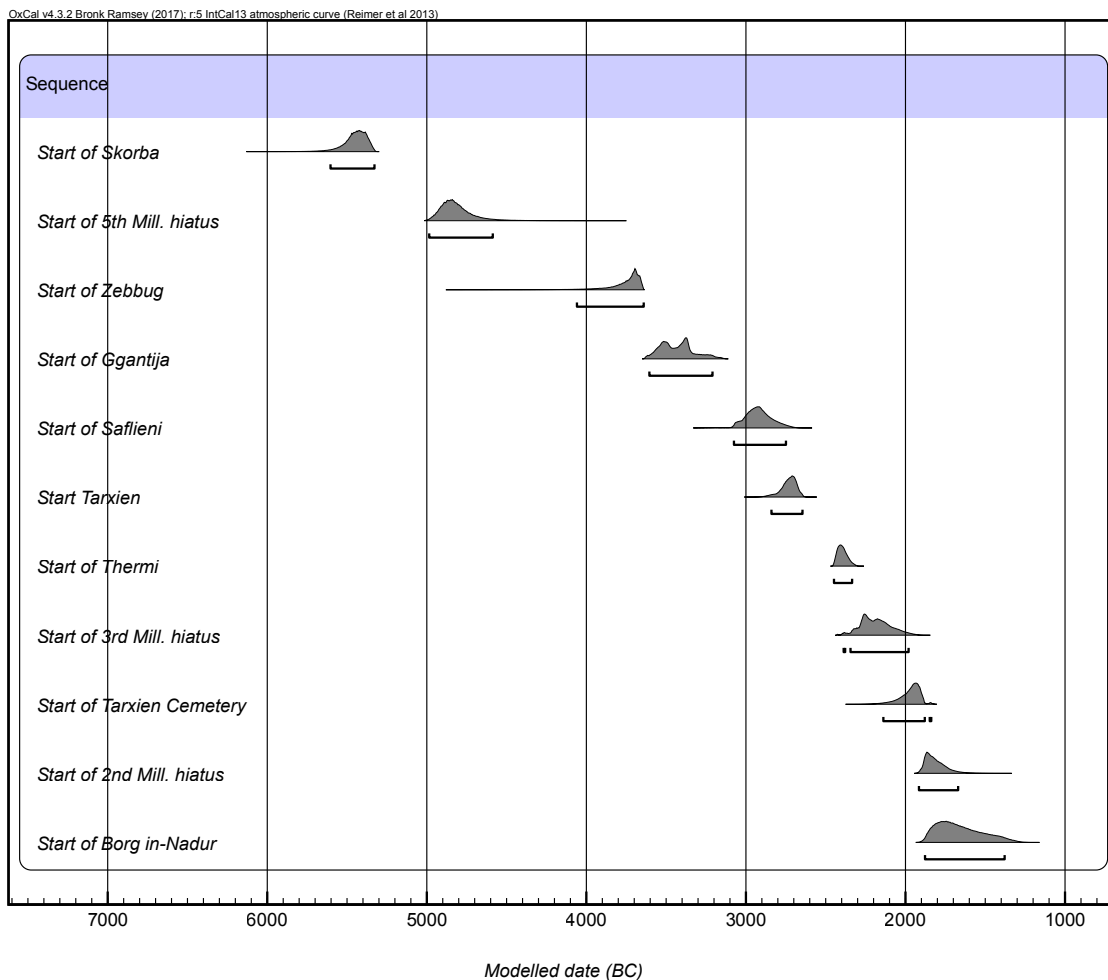


Figure 2.1. OxCal plot of the posterior probability distribution of the boundaries between the various phases of Maltese prehistory.

annual growth of $0.8 \pm 0.3\%$ in the Skorba phase, and $0.6 \pm 0.2\%$ in the Żebbuġ phase. The rate of decline at the end of the Skorba phase was $-0.4 \pm 0.2\%$ and a rather drastic $-0.7 \pm 0.1\%$ at the end of the Tarxien phase. Overall activity levels fluctuated between the Żebbuġ and Tarxien phases, with a slight downturn between 3500 and 3000 cal. bc, although this observation is not statistically significant according to the algorithm described by McLaughlin *et al.* (2021).

Another relevant use of the KDE is to compare the density of dated archaeological phases and the frequency of charcoal in sediment cores. The latter are not necessarily anthropogenic, but charcoal in sediment cores does indicate both burning and a degree of instability in the landscape (see Volume 1, Chapter 2). The comparison (Fig. 2.3) reveals two peaks in sediment charcoal, the first coinciding with the flurry

Table 2.2. 95% confidence intervals for the modelled dates of phase boundaries.

	Start (cal. bc)		Duration (years)	
	Lower	Upper	Lower	Upper
Early Neolithic	5570	5340	405	853
Fifth millennium hiatus	4975	4645	712	1294
Żebbuġ	4060	3640	0	472
Mġarr	3695	3540	0	432
Ġgantija	3600	3200	0	756
Saflieni	3080	2760	0	355
Tarxien	2850	2660	240	470
Thermi	2445	2340	0	394
Third millennium hiatus	2390	1990	0	419
Tarxien Cemetery	2170	1830	0	384
Second millennium hiatus	1920	1670	0	418
Borġ in-Nadur	1675	1225	199	844
End of Borġ in-Nadur	900	660		

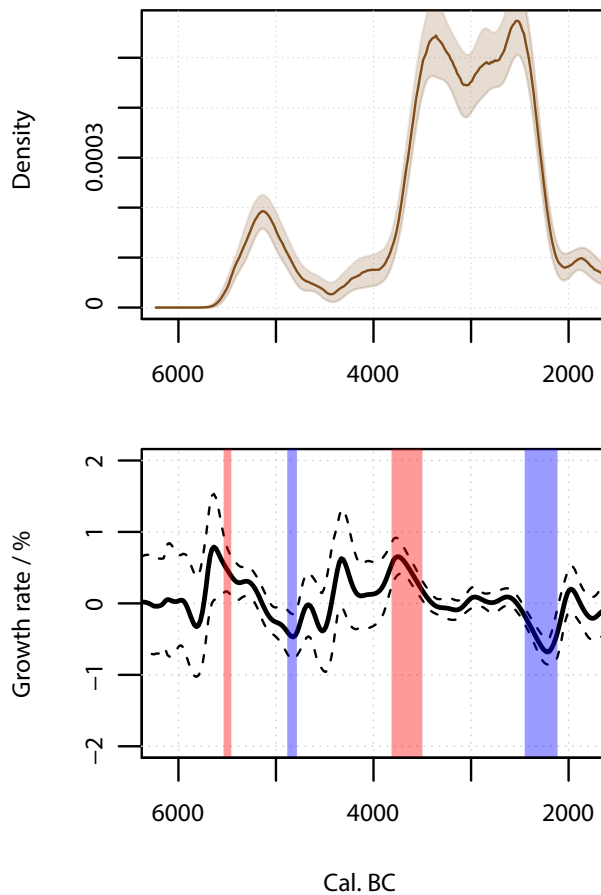


Figure 2.2. Kernel density estimates (100-year bandwidth) for radiocarbon-dated phases of Maltese prehistoric sites. The top panel is the total density, the bottom panel is its derivative annualized growth rate, with statistically significant (at 95% confidence) phases of growth and decline highlighted.

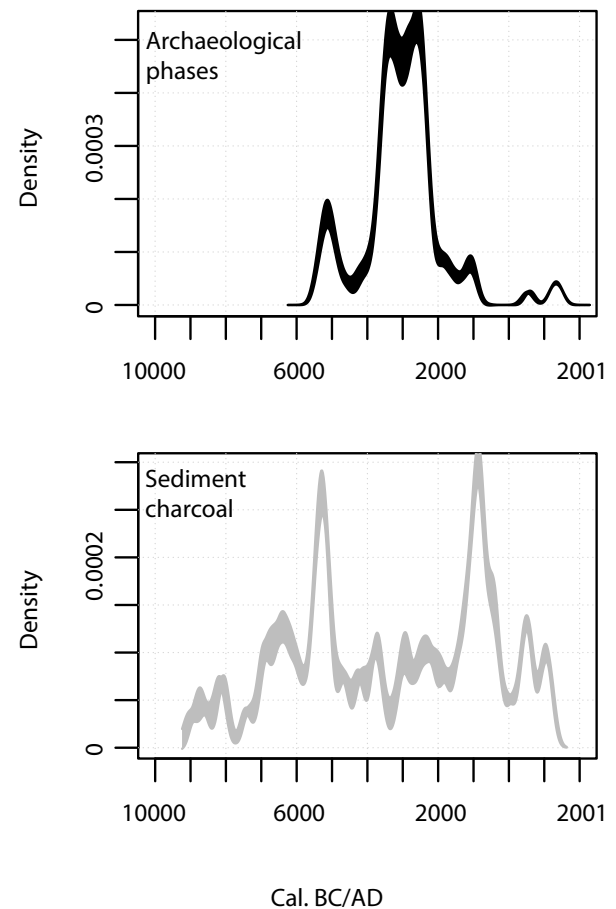


Figure 2.3. KDE models (150-year bandwidth) of archaeological phases and the density of dated charcoal from FRAGSUS Project sediment cores.

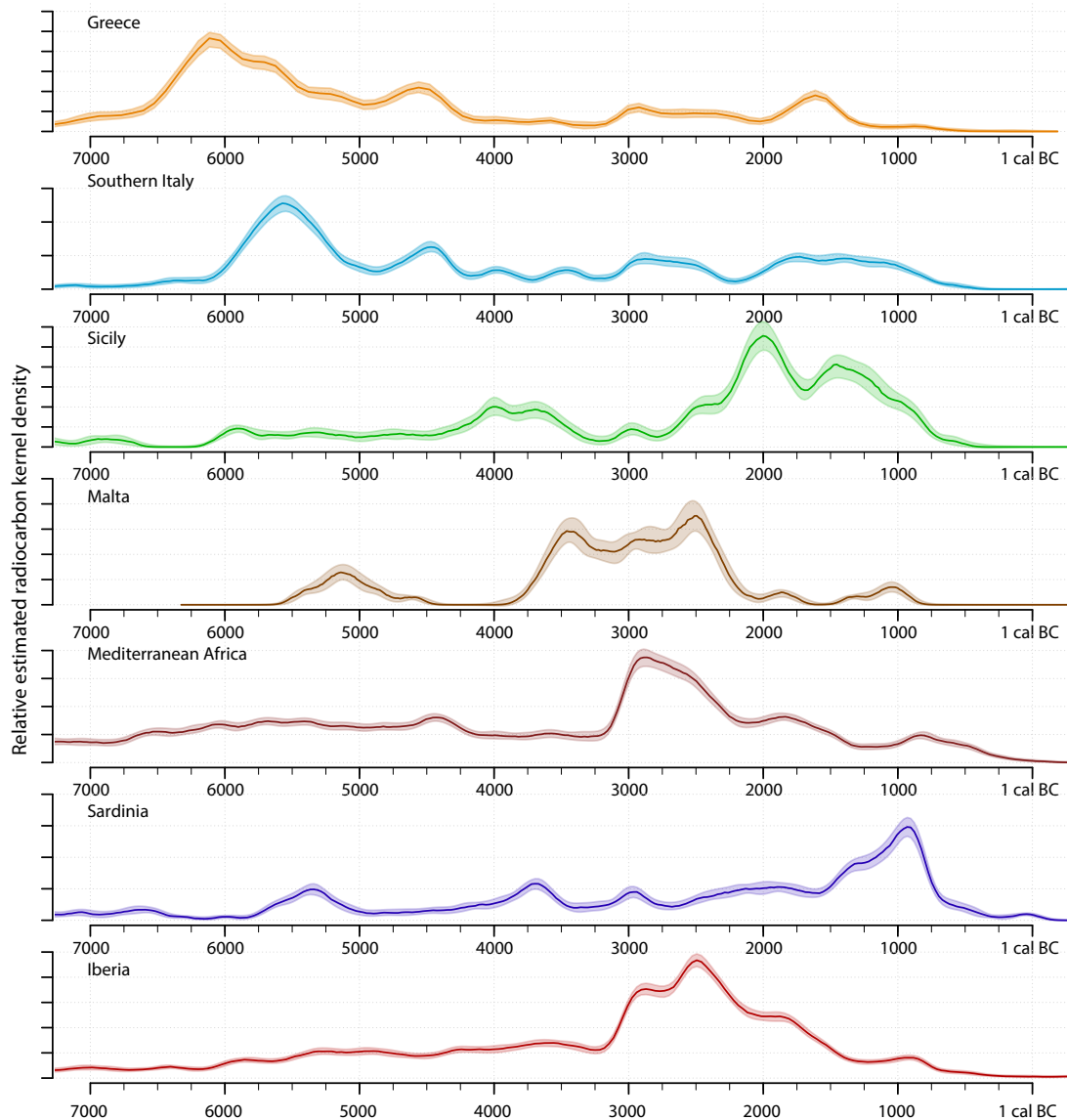


Figure 2.4. KDEs (75-year bandwidth) of the temporal distribution of 216 radiocarbon dates from Malta compared with 6128 dates from other regions (R. McLaughlin).

of Skorba-phase activity centred on 5200 BC; and the latter occurring at around 1000 BC, at the height of the Borg in-Nadur phase. The Temple Period is relatively quiet, presumably because of the careful management of the landscape (McLaughlin *et al.* 2018).

2.3.13. Comparison with other regions

Using ensembles of radiocarbon dates from other Mediterranean regions (Parkinson *et al.* under review) we can compare the overall dynamics of the Maltese islands with other places. Interpretation of the results of this kind of analyses addresses factors common to the prehistoric cultures of the various regions, such as

shared origins, similar patterns of cultural evolution, and economies influenced by the same changes to climate and environment. Also entangled in these data are biases of visibility and research tradition. Full consideration of these factors would require discussion, although there are some striking patterns apparent in the data at face value that require some initial comment. In Figure 2.4, KDE plots summarizing 216 dates from archaeological contexts in Malta are compared to 632 dates from Greece (Hinz *et al.* 2012), 425 from Southern Italy (Parkinson *et al.* under review), 246 from Sicily (Parkinson *et al.* under review), 1588 from North Africa (Lucarini *et al.* 2020), 257 from Sardinia

(Parkinson *et al.* under review), and 2980 from Iberia (Hinz *et al.* 2012; Kneisel *et al.* 2013).

These models clearly demonstrate that the 5100 cal. BC ‘boom’ in Neolithic activity in Malta is relatively late compared with those of Greece (peaking at 6200 cal. BC), Southern Italy (5700 cal. BC), Sicily (c. 5900 cal. BC, although this region is poorly powered with radiocarbon dates in comparison with others) and Sardinia (5300 cal. BC). The slight upturn in activity in Malta from 3000 cal. BC, reversing a decline during the Saflieni phase, is also mirrored in all of the other regions. This is especially the case in Iberia and Mediterranean Africa, which, among other developments, reflects the development of early dynastic Egypt. Following this crucial moment in world history, the acme of activity during the Tarxien phase on Malta was synchronous with a similar peak of activity in Chalcolithic Iberia, and its decline occurred during a coeval phase of rapid growth in neighbouring Early Bronze Age Sicily. The end of the Bronze Age saw the Maltese Islands incorporated into a cosmos of Phoenician growth (Broodbank & Lucarini 2020), which was unprecedented in the context of the northwest African settlement history, and strongly contrasted with declining activity throughout continental Europe around 800 cal. BC (Parkinson *et al.* under review). Assessing the significance of these observations will make for interesting multidisciplinary work in the future. The models also express the prominence of the archaeological cultures that various regions of the Mediterranean are famous for – the early Neolithic settlement of the Tavoliere in Southern Italy, the extraordinary expansion of Chalcolithic settlement and burial across Iberia and the Balearics, the temples of Malta, the *Castelluccio* funerary traditions of Sicily, the dawn of Egyptian civilization and the *nuraghi* of Sardinia. In a sense, the archaeological survival of these cultures is, in part, a result of their individual extraordinariness. Prehistory was the *longue durée* of slow cultural, economic and demographic growth, punctuated with localized phases of great intensity and cultural fluorescence, such as we find in Malta between 3800 and 2300 cal. BC.

2.4. Non-prehistoric dates

As discussed in Chapter 4, we radiocarbon dated a medieval human tooth found in backfill at Santa Verna to exclude the possibility that it was prehistoric in date. There were also medieval and modern charred seed grains from Santa Verna that had somehow worked themselves into prehistoric contexts. Similarly, a grain of modern charred rice was found buried in a prehistoric stratum at Kordin III and dated in the hope it may be ancient. A grape seed from the Marsa 2 sediment

core was dated to the Phoenician period (UBA-29444, 2584±28 BP, 810–600 cal. BC).

2.5. Discussion

One priority for future work would be the archaeological dating of an Għar Dalam phase settlement. Coastal settlements of this period are now under several metres of water, which is a potential problem. Yet, Trump’s excavations at Skorba and the wealth of material of this phase found at Santa Verna indicate that there is a likelihood that such deposits survive (albeit in protected places) in the Maltese landscape, and await future research.

The hiatuses have been included in our Bayesian models following a subjective assessment of the archaeological record, changes in ceramic style, and initial assessment of the chronological patterning of the dates. The results indicate that the data are consistent with this model, but it is important to note that this does not constitute independent evidence of the correctness of the model. Bayesian analysis cannot prove that a model is correct, only that it is wrong. Readers are encouraged to develop their own models of Maltese prehistory and use tools such as OxCal to explore whether our data are consistent with them.

The gap, or hiatus, between the Skorba and Żebbuġ phases will likely remain a point of debate. This is because tentative signals of continuous occupation can be read from the pollen which also suggests significant landscape reorganization and a move on to the Globigerina Limestone plateau landscape around the Grand Harbour (Volume 1, Chapter 11). The maxim ‘absence of evidence is not evidence of absence’ certainly applies here. The lack, however, of any identifiable ceramic culture at sites continuously occupied before and after this gap (at Skorba, Chapter 7; Santa Verna, Chapter 4; and Taċ-Ċawla, Chapter 3) must somehow be explained. The AMS dating programme has identified residual material from Skorba-phase occupation at the first two sites within Żebbuġ- and Ġgantija-phase strata. Yet, nothing from the fifth millennium BC was found at either site. Taċ-Ċawla, despite being noted for its early material in the past, produced no dates earlier than Ġgantija. This discontinuous pattern is consistent with a phase of abandonment, or at the very least a much-reduced population. This population may have been confined to settlements near the shore where they would be more likely to leave palynological traces of their existence in the sediment cores that have been studied. Other evidence for discontinuity can be inferred from the marked stylistic contrast between Skorba and Żebbuġ pottery (Chapter 10); and, indeed, in the very DNA

of the Temple Period people, whose lineage appears to have closer affinities with continental Neolithic populations than they do with ‘Cardial’ ones (Volume 3, Chapter 11). This suggests a second wave of colonization, separate from the initial Neolithic. From the cultural sequence we can infer this most likely occurred at the start of the Żebbuġ phase. Future archaeological, palaeoenvironmental and palaeogenomic work will have the opportunity to test this hypothesis.

The KDE models demonstrate the overall intensity of the Temple Period, and only a slight oscillation in activity over the 1500 years of its span. The growth rates of 0.6% and 0.8% derived from the KDE for both the Skorba and Żebbuġ phase expansions are consistent with natural population growth for pre-industrial agrarian societies (see Parkinson *et al.* under review). This, however, does not exclude the possibility of continuous immigration to Malta, which would have bolstered population growth still further.

As a final note, failure rates for the dating of animal bones were very high (Table 2.1), varying between 43% and 100%. As noted by McCormick (§9.4.2) animal bones from Maltese sites are highly fragmented and may have been boiled prior to being discarded. This activity, and the harsh semi-arid environment, are not conducive to the survival of collagen. We can however recommend charcoal and especially charred seeds (which unlike charcoal are always short-lived and hence have no built-in age) as reliable samples for radiocarbon dating, especially if the context from which they derive is well sealed.

2.6. Conclusion

It is, perhaps, inevitable that many questions remain about the details of the cultural sequence of the Maltese Islands. Yet despite this, there can be little doubt that the *Project’s* programme of research has brought the chronology of Maltese prehistory into sharper focus, and has enabled us to provide an updated table of the sequence of chronological phases (Table 2.3). The islands now contain several of the best-dated prehistoric sites in the central Mediterranean. We stress, however, that although the various distinctive cultural phases have been highly refined, it is imperative that future work considers radiocarbon dating of materials found on sites as matter of top priority. Placing finds on an absolute timescale is the only way to make sense of them, even if they can be readily ascribed to a distinctive typochronological phase. For example, a Tarxien-phase pot may date to 2800 BC or 2400 BC, the former a time of artistic and cultural elaboration, the latter a period of acute social and environmental stress. Individual archaeological discoveries, if they

Table 2.3. *Simplified cultural phases. The uncertainty still associated with the Mġarr and Saflieni phases results in a sequence open to revision and alternative versions have been proposed elsewhere in FRAGSUS Project publications. Compare with Tables 13.1 and 13.2, as well as with Volume 1.*

Period	Phase	Start	End
Neolithic	Għar Dalam	6000 BC	5400 BC
	Skorba	5400 BC	4800 BC
	Fifth millennium hiatus	4800 BC	3800 BC
Temple Period	Żebbuġ	3800 BC	3600 BC
	Mġarr / transitional phase	3600 BC	3400 BC
	Ġgantija	3400 BC	3100 BC
	Saflieni	3100 BC	2800 BC
	Tarxien	2800 BC	2400 BC
Bronze Age	Thermi	2400 BC	2200 BC
	Third millennium hiatus	2200 BC	2000 BC
	Tarxien Cemetery	2000 BC	1700 BC
	Second millennium hiatus	1700 BC	1500 BC
	Borg in-Nadur / Bahrja	1500 BC	750 BC
Historic	Phoenician / Punic	750 BC	218 BC
	Roman / Byzantine	218 BC	AD 870
	Arab / Norman	AD 870	AD 1530
	Knights	AD 1530	AD 1798
	Modern	AD 1798	Present

are to mean anything, must be mapped onto the dynamic of the cultural and environmental context from whence they came. Also, part of this process is a wider contextualization. Through comparison with data from neighbouring regions and some further afield we can see how ‘Temple Period’ developments on Malta occurred against a background of similar dynamics playing out in Iberia and Egypt. This could reflect the influence of climate change, such as the end of the African Humid Period, or could indicate a shared trajectory of cultural evolution and demographic expansion. Similarly, the third millennium hiatus in settlement on Malta and Gozo can now be associated more closely with the ‘4.2kya event’ at around 2200 BC and, importantly, not coupled with the disappearance of the Temple Culture. This paradigm of synergistic work between archaeological and palaeoecological research channels has been fundamental to the work of the *FRAGSUS Project* and we hope to have provided a research agenda that can be followed and enabled thorough ever-refined chronological understanding.

Note

1. A full list of the radiocarbon dates obtained by the project from archaeological contexts is given in Appendix A2.1.

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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