



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*

Temple places



McDONALD INSTITUTE MONOGRAPHS

Temple places

Excavating cultural sustainability
in prehistoric Malta

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

With contributions by

Stephen Armstrong, Jennifer Bates, Jeremy Bennett, Anthony Bonanno,
Sara Boyle, Catriona Brogan, Josef Caruana, Letizia Ceccerelli, Petros Chatzimpaloglou,
Nathaniel Cutajar, Michelle Farrell, Katrin Fenech, Charles French, Christopher O. Hunt,
Conor McAdams, Finbar McCormick, John Meneely, Jacob Morales Mateos,
Paula Reimer, Alastair Ruffell, Ella Samut-Tagliaferro, Katya Stroud & Sean Taylor

Illustrations by

Steven Ashley, Caroline Malone, Rowan McLaughlin, Stephen Armstrong,
Jeremy Bennett, Catriona Brogan, Petros Chatzimpaloglou, Michelle Farrell,
Katrin Fenech, Charles French, Conor McAdams, Finbar McCormick, John Meneely,
Alastair Ruffell, Georgia Vince & Nathan Wright



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



This project has received funding from the European Research Council (ERC) under the European Union's Seventh Framework Programme (FP7-2007-2013) (Grant agreement No. 323727).

Published by:

McDonald Institute for Archaeological Research
University of Cambridge
Downing Street
Cambridge, UK
CB2 3ER
(0)(1223) 339327
eaj31@cam.ac.uk
www.mcdonald.cam.ac.uk



McDonald Institute for Archaeological Research, 2020

© 2020 McDonald Institute for Archaeological Research.

Temple places is made available under a
Creative Commons Attribution-NonCommercial-
NoDerivatives 4.0 (International) Licence:
<https://creativecommons.org/licenses/by-nc-nd/4.0/>

ISBN: 978-1-913344-03-0

Cover design by Dora Kemp and Ben Plumridge.
Typesetting and layout by Ben Plumridge.

On the cover: *Digital scan of the Kordin III excavation in 2015, by John Meneely.*

Edited for the Institute by James Barrett (*Series Editor*).

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 |

CONTRIBUTORS

STEPHEN ARMSTRONG

Archaeology, College of Humanities, University of Exeter, UK

Email: sa622@exeter.ac.uk

STEPHEN ASHLEY

Norfolk Museums Service, Shirehall, Market Avenue, Norwich, UK

Email: steven.ashley@norfolk.gov.uk

DR JENNIFER BATES

Dept. of Anthropology, Penn Museum, University of Pennsylvania

Email: jenbates@sas.upenn.edu

JEREMY BENNETT

Department of Archaeology, University of Cambridge, Cambridge, UK

Email: jmb241@cam.ac.uk

PROF. ANTHONY BONANNO

Department of Classics & Archaeology, University of Malta, Msida, Malta

Email: anthony.bonanno@um.edu.mt

DR SARA BOYLE (NOW STEWART)

Ordnance Survey of Northern Ireland, Land & Property Services, Lanyon Plaza, 7 Lanyon Place, Town Parks, Belfast, Northern Ireland

DR CATRIONA BROGAN

14 Glenmanus Village, Portrush, Antrim, Northern Ireland

Email: cbrogan03@qub.ac.uk

DR JOSEF CARUANA

Head Office Heritage Malta, Ex Royal Naval Hospital, Kalkara, Malta

Email: josef.caruana@gov.mt

LETIZIA CECCARELLI

Department of Chemistry, Materials and Chemical Engineering 'G. Natta', Politecnico di Milano, P.zza Leonardo da Vinci, 32, 20133 Milano, Italy

Email: letizia.ceccarelli@polimi.it

DR PETROS CHATZIMPALOGLOU

Department of Archaeology, University of Cambridge, Cambridge, UK

Email: pc529@cam.ac.uk

NATHANIEL CUTAJAR

Head Office Heritage Malta, Ex Royal Naval Hospital, Kalkara, Malta

Email: nathaniel.cutajar@gov.mt

DR MICHELLE FARRELL

Centre for Agroecology, Water and Resilience, School of Energy, Construction and Environment, Coventry University, Coventry, UK

Email: ac5086@coventry.ac.uk

DR KATRIN FENECH

Department of Classics & Archaeology, University of Malta, Msida, Malta

Email: katrin.fenech@um.edu.mt

PROF. CHARLES FRENCH

Department of Archaeology, University of Cambridge, Cambridge, UK

Email: caif2@cam.ac.uk

DR REUBEN GRIMA

Department of Conservation and Built Heritage, University of Malta, Msida, Malta

Email: reuben.grima@um.edu.mt

SHEILA HAMILTON DYER

Department of Archaeology and Anthropology, Bournemouth University, Bournemouth, UK

Email: shamiltondyer@bournemouth.ac.uk

PROF. CHRISTOPHER O. HUNT

Faculty of Science, Liverpool John Moores University, Liverpool, UK

Email: c.o.hunt@ljmu.ac.uk

PROF. CAROLINE MALONE

School of Natural and Built Environment, Queen's University, Belfast, Northern Ireland

Email: c.malone@qub.ac.uk

CONOR McADAMS

Centre for Archaeological Science School of Earth and Environmental Sciences, University of Wollongong, New South Wales, Australia

Email: cm065@uowmail.edu.au

DR FINBAR McCORMICK

Emeritus, School of Natural and Built Environment, Queen's University, Belfast, Northern Ireland

Email: f.mccormick@qub.ac.uk

DR ROWAN McLAUGHLIN
School of Natural and Built Environment, Queen's
University, Belfast, Northern Ireland
Email: r.mclaughlin@qub.ac.uk

JOHN MENEELY
School of Natural and Built Environment, Queen's
University, Belfast, Northern Ireland
Email: j.meneely@qub.ac.uk

DR JACOB MORALES MATEOS
Departamento de ciencias historicas, Universidad de
Las Palmas de Gran Canaria, Spain
Email: jacobmoralesmateos@gmail.com

DR ANTHONY PACE
UNESCO Cultural Heritage, Valletta, Malta
Email: anthonypace@cantab.net

DR EÓIN PARKINSON
Department of Classics & Archaeology, University
of Malta, Msida, Malta
Email: ewparkinson24@gmail.com

PROF. PAULA REIMER
School of Natural and Built Environment, Queen's
University, University Road, Belfast, Northern
Ireland
Email: p.j.reimer@qub.ac.uk

DR ALISTAIR RUFFELL
School of Natural and Built Environment, Queen's
University, University Road, Belfast, Northern
Ireland
Email: a.ruffell@qub.ac.uk

ELLA SAMUT-TAGLIAFERRO
Formerly of the Superintendence of Cultural
Heritage, Malta

PROF. PATRICK J. SCHEMBRI
Department of Biology, University of Malta, Msida,
Malta
Email: patrick.j.schembri@um.edu.mt

DR SIMON STODDART
Department of Archaeology, University of
Cambridge, Cambridge, UK
Email: ss16@cam.ac.uk

KATYA STROUD
Head Office Heritage Malta, Ex Royal Naval
Hospital, Kalkara, Malta
Email: katya.stroud@gov.mt

DR SEAN TAYLOR
Department of Archaeology, University of
Cambridge, Cambridge, UK
Email: st435@cam.ac.uk

PROF. NICHOLAS C. VELLA
Faculty of Arts, University of Malta, Msida, Malta
Email: nicholas.vella@um.edu.mt

DR NATHAN WRIGHT
School of Social Science, The University of
Queensland, Brisbane, Australia
Email: n.wright@uq.edu.au

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 Mğarr 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).*

Acknowledgements

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

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

Tač-Ċawla

The Tač-Ċawla excavations were directed by Prof. Caroline Malone, and the crew consisted primarily of students and staff from UoC, UM and QUB, supervised by Stephen Armstrong, Jeremy Bennett and Conor McAdams, with additional supervision from Dr Simon Stoddart, Dr Sara Boyle and Dr Emily Murray. We are also very grateful for Dr George Azzopardi who sought out accommodation for the project, assisted on

site, and with his colleagues in HM enabled access to space for storage, environmental sampling and finds processing in Rabat. John Cremona and his colleagues in the Ministry for Gozo also played an important role in enabling site clearance and facilities at Tač-Ċawla, and in securing the site following our work, with the long-promised surrounding wall. We also acknowledge a great number of local Gozitan businesses, hardware stockists, JCB drivers and cafe and restaurant owners, who supported our work in so many ways.

Santa Verna

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

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

Ġgantija

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

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

Kordin III

The excavations were directed jointly by Prof. Caroline Malone and Prof. Nicholas Vella, assisted by Dr Reuben Grima, Dr Rowan McLaughlin, Ella Samut-Tagliaferro and Dr Simon Stoddart. The crew consisted mainly of students from UM, who participated as part of their annual training excavation. They were supervised by Jeremy Bennett, Dr Catriona Brogan, Rebecca Farrugia, Dr Reuben Grima, Tore Lumsdalen and Eóin Parkinson. Flotation of soil samples was undertaken by Dr

Evan Hill. Digital laser scanning was undertaken by John Meneely and Jeremy Bennett. We also acknowledge the kind assistance of Fondazzjoni Wirt Artna, the Malta Heritage Trust, who granted access to the site.

Skorba

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

In-Nuffara

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

Post-excavation

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

Rowan McLaughlin, Eóin Parkinson and Dr Simon Stoddart. We thank Prof. Nicki Whitehouse for her enthusiastic support and advice on environmental matters. Thin section slides were produced by Dr Tonko Rajkovača of the McBurney Laboratory, Department of Archaeology, University of Cambridge. We are very grateful to Sharon Sultana (Curator) of the Museum of Archaeology for not only housing the study material but also providing access to it in 2017. Stephen Ashley and Prof. Caroline Malone illustrated the pottery and small finds. Dr Catriona Brogan assisted in the production and editing of this volume. We also wish to thank Ben Plumridge, Production Editor, for seeing this and the two companion volumes through the arduous process of publication. Thanks too, to Jason Hawkes (copy editing), Olivia Shelton (references) and Emma Hannah (indexing) for their careful work on the volume.

Permits and access

The *FRAGSUS* team is very grateful to the heritage bodies of Malta, namely HM and the SCH and their officers, who enabled access to sites and provided the

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

Spring and Summer 2014, Gozo – Tač-Ċawla, In-Nuffara, Ta’ Marziena, Ġgantija, Gozo landscapes

| | | |
|------------|-------------------------|------------------------|
| UoC | Dr Simon Stoddart | CI/Direction |
| UoC | Prof. Charles French | Geoarchaeology |
| UoC | Dr Sean Taylor | Geoarchaeology |
| UoC | Jennifer Bates (MRes) | Soil sieving |
| UoC | David Redhouse | Technical staff |
| UoC | Hettie Hill | Field assistant |
| UoC | Angus Knight | Field assistant |
| UoC | Theo Arnold Foster | Field assistant |
| UoC | Rosanna O’Keefe | Field assistant |
| UoC | Kate Wilson | Field assistant |
| UoC | Louise Green | Field assistant |
| UoC | Emma Brownlee | Field assistant |
| UoC | Dr Letizia Ceccarelli | Pottery study |
| HM | Dr George Azzopardi | Landscape archaeology |
| HM | Katya Stroud (MA) | Field/survey assistant |
| HM | Joanne Mallia (MA) | Archaeology/archives |
| HM | Iona Muscat (MA) | Archaeology/archives |
| HM | Marie Elena Zammit (MA) | Archaeology/archives |
| Norfolk CC | Steven Ashley | Illustration |
| Indep | Phil Wright | Field assistant |
| Indep | Dr Rebecca Enlander | Field assistant |
| Indep | Lottie Stoddart | Catering/illustration |
| QUB | Prof. Caroline Malone | PI/Direction |

| | | |
|------|-----------------------|------------------------|
| QUB | Conor McAdams | Field assistant |
| QUB | Stephen Armstrong | Field assistant |
| QUB | Lorraine Barry (MSc.) | Survey/technical |
| QUB | Dr Sara Boyle | Research coordination |
| QUB | Jeremy Bennett | Field/survey assistant |
| QUB | Dr Alastair Ruffell | GPR survey |
| QUB | Alix Baxter | Field assistant |
| QUB | Eóin Parkinson | Field assistant |
| QUB | Dr Emily Murray | Staff supervisor |
| QUB | Anastasia Boomsma | MSc. training |
| QUB | Deborah Schroeter | MSc. training |
| QUB | Claire Privilege | MSc. training |
| QUB | Laura Patrick | MSc. training |
| QUB | Joel Goodchild | MSc. training |
| QUB | Michael Lavery | MSc. training |
| QUB | Naomi Finn | Catering |
| QUB | Tiomoid Foley | Field assistant |
| QUB | Jake Morris | Field assistant |
| QUB | Jonny Small | Field assistant |
| QUB | Dr Michelle Farrell | Environmental PDRA |
| QUB | John Meneely | Digital scanning |
| QUB | Conor Graham | Survey/technical |
| QUB | Michael Armstrong | Field assistant |
| Rome | Mariele Valci | Field assistant |

Acknowledgements

| | | |
|---------|------------------------|-------------------------|
| Swansea | Lucy Stoddart | Ecology assistant |
| UM | Dr Reuben Grima | Fieldwork direction |
| UM | Dr Nick Vella | CI/Direction |
| UM | Dr Katrin Fenech | Environmental analysis |
| UM | Prof. Patrick Schembri | Environmental direction |
| UM | Nicole Micaleff | Field assistant |
| UM | Jessica Scicluna | Field assistant |
| UM | Luke Brightwell | Field assistant |

| | | |
|----|------------------------|-----------------|
| UM | Tamsin Kingman | Field assistant |
| UM | Kay Mallia | Field assistant |
| UM | Karl Cachia | Field assistant |
| UM | Cecilia Zammit Endrich | Field assistant |
| UM | Annalise Agius | Field assistant |
| UM | Joseph Grima | Field assistant |
| UM | Dean Galea | Field assistant |

April 2015, Gozo – Santa Verna, Ġgantija, In-Nuffara

| | | |
|-----------|------------------------|--------------------|
| UoC | Dr Simon Stoddart | CI/Direction |
| UoC | Jeremy Bennett (MSc.) | Survey supervisor |
| UoC | Dr Letizia Ceccarelli | Ceramics and finds |
| UoC | Prof. Charles French | Geoarchaeology |
| UoC | Dr Sean Taylor | Geoarchaeology |
| UoC | David Redhouse | Survey supervisor |
| UoC | Robert Barratt | Digital recording |
| UoC (CAU) | Donald Horne | Site supervisor |
| UoC (CAU) | Katie Hutton | Site supervisor |
| UoC | Laura James | Site supervisor |
| UoC | Dr Paola Filippucci | Student training |
| UoC | Dr Bela Dimova | Student training |
| UoC | Charles Barker | Student training |
| UoC | Tansy Branscombe | Student training |
| UoC | Imogen Coulson | Student training |
| UoC | Olivia Crawford | Student training |
| UoC | Louise Green | Student training |
| UoC | Josie Howl | Student training |
| UoC | Isaac Lawton | Student training |
| UoC | Jodie Manners | Student training |
| UoC | Aran McMahon | Student training |
| UoC | Susanne Navara | Student training |
| UoC | Jacob Pockney | Student training |
| UoC | Lily Rice | Student training |
| UoC | Alisa Santikam | Student training |
| UoC | Rebecca Seakins | Student training |
| UoC | Finnoula Taylor | Student training |
| UoC | Katherine Wilson | Student training |
| UoC | Conor McAdams (M.Phil) | Geoarchaeology |
| UoC | Dr Ronika Power | Human osteology |
| UoC | Dr Letizia Ceccarelli | Pottery study |
| INDEP | Rupert Barker | Filmmaker |

| | | |
|------------|---------------------------------|--------------------------|
| Norfolk CC | Steven Ashley | Illustration/planning |
| QUB | Prof. Caroline Malone | PI/Direction |
| QUB | Dr Rowan McLaughlin | Senior site supervisor |
| QUB | Eóin Parkinson (MSc.) | Site supervisor |
| QUB | Dr Catriona Brogan | Site supervisor |
| QUB | Stephen Armstrong (M.Arch.Sci.) | Site supervisor |
| QUB | John Meneely (MSc.) | Digital survey/technical |
| QUB | Dr Sean Pyne O'Donnell | Coring |
| LJMU | Dr Chris Hunt | Coring |
| QUB | Dr Rory Flood | Coring |
| QUB | Dr Michelle Farrell | Coring |
| QUB | Dr Finbar McCormick | Zooarchaeology |
| QUB | Tiomoid Foley (M.Arch.Sci.) | Survey assistant |
| QUB | Rory Sutton (M.Arch.Sci.) | Field assistant |
| QUB | Claire Holmes (M.Arch.Sci.) | Field assistant |
| QUB | Dr Evan Hill | Environmental |
| IAC Ltd. | Christina O'Regan (MSc.) | Field assistant |
| RDS | Charlotte Stoddart (MA) | Field assistant |
| Indep. | Rupert Barker | Film maker |
| ROME | Mariele Valci | Field assistant |
| SCH | Ella Samut-Tagliaferro (MA) | Site supervisor |
| SCH | Bernardette Mercieca (MSc.) | Human osteology |
| UM | Gillian Asciak | Student training |
| UM | Stephanie Parisi | Student training |
| UM | Maja Sausmekat | Student training |
| UM | Leslie Torwie | Student training |
| UM | Dr Reuben Grima | Landscape |

Acknowledgements

June–July 2015 – Kordin Temple

| | | |
|---------|---------------------------|----------------------|
| UoC | Dr Simon Stoddart | CI/Direction |
| UoC | Jeremy Bennett (MSc.) | Survey |
| UoC | Dr Letizia Ceccarelli | Ceramics |
| UoC | Matthew Greenhill | Field assistant |
| UoC | Beth Whitlock (MPhil) | Field assistant |
| MEPA | Tony Zammit (MSc.) | MEPA |
| MEPA | Joseph Magro Conti (MSc.) | MEPA |
| QUB | Prof. Caroline Malone | PI/Direction |
| QUB | John Meneely (MSc.) | Survey |
| QUB | Dr Rowan McLaughlin | Principal supervisor |
| QUB | Eóin Parkinson (MSc.) | Site supervisor |
| QUB | Dr Catriona Brogan | Site supervisor |
| QUB | Dr Finbar McCormick | Zooarchaeology |
| QUB | Dr Evan Hill | Molluscs/sieving |
| SCH | Ella Samut-Tagliaferro | SCH |
| Swansea | Lucy Stoddart | Field assistant |
| UM | Chris Gemmell | Logistics |
| UM | Rebecca Farrugia | Site supervisor |
| UM | Dr Sean Taylor | Geoarchaeology |
| UM | Prof. Anthony Bonanno | Ceramics |
| UM | Dr Nicholas Vella | CI/Direction |
| UM | Dr Reuben Grima | CI/Direction |
| UM | Adrian Camilleri | Field assistant |
| UM | Aidan Lehane | Field assistant |

| | | |
|----|---------------------|------------------------|
| UM | Anne Marie Schembri | Field assistant |
| UM | Gavin Borg | Field assistant |
| UM | Gillian Asciak | Field assistant |
| UM | Prof. John Betts | Survey |
| UM | Leanne Azzopardi | Field assistant |
| UM | Luke Briitghtwell | Field assistant |
| UM | Maja Sausmekat | Field assistant |
| UM | Daniela Formosa | Field assistant |
| UM | Mara de Richter | Field assistant |
| UM | Maria Serpina | Field assistant |
| UM | Melanie Debono | Field assistant |
| UM | Nico Muscat | Field assistant |
| UM | Nicole Micalfeff | Field assistant |
| UM | Nidia Lisic | Field assistant |
| UM | Rachel Grillo | Field assistant |
| UM | Sefora Borg | Field assistant |
| UM | Tamsin Kingwell | Field assistant |
| UM | Tore Lomsdalen | Field/survey assistant |
| UM | Sandy Pirani | Field assistant |
| UM | Tamsin Cauchi | Field assistant |
| UM | Ryan Grech | Field assistant |
| UM | Gabriel Farrugia | Field assistant |
| UM | Dwayne Haber | Field assistant |
| UM | Dean Galea | Field assistant |

April 2016 – Skorba excavation

| | | |
|-----|-----------------------|---------------------|
| UoC | Dr Simon Stoddart | CI/Co-Direction |
| UoC | Jeremy Bennett (MSc.) | Field assistant |
| UoC | Eóin Parkinson (MSc.) | Field assistant |
| HM | Dr Josef Caruana | Heritage assistant |
| QUB | Prof. Caroline Malone | PI/Direction |
| QUB | Dr Rowan McLaughlin | Assistant direction |

| | | |
|------------------|---------------------------------|-------------------|
| QUB | Dr Catriona Brogan | Field assistant |
| QUB | Stephen Armstrong (M.Arch.Sci.) | Field assistant |
| QUB | Emma Hannah (MPhil) | Field assistant |
| SCH | Ella Samut-Tagliaferro | Field manager |
| Univ. St Andrews | Dr Timothy Kinniard | OSL/geomorphology |

Summer 2016 – Pottery and finds analysis (University of Malta)

| | |
|------------|-----------------------|
| UoC | Dr Simon Stoddart |
| Norfolk CC | Steven Ashley |
| QUB | Prof. Caroline Malone |

| | |
|-----|---------------------|
| QUB | Dr Rowan McLaughlin |
| QUB | Stephen Armstrong |
| QUB | Dr Catriona Brogan |

June 2017 – Pottery analysis (University of Malta and National Museum of Archaeology)

| | |
|-----|-----------------------|
| UoC | Eóin Parkinson (MSc.) |
| QUB | Dr Rowan McLaughlin |
| QUB | Prof. Caroline Malone |

| | |
|-----|-----------------------|
| QUB | Dr Catriona Brogan |
| QUB | Dr Lisa Coyle McClung |

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 1

Archaeological studies of Maltese prehistory for the *FRAGSUS Project* 2013–18

Caroline Malone, Simon Stoddart,
Rowan McLaughlin & Nicholas Vella

1.1. Introduction

The *FRAGSUS Project* ('Fragility and Sustainability in small island environments: adaptation, cultural change and collapse in prehistory') was devised to explore issues of prehistoric island sustainability set against the background of environmental change and instability. The Project set out with four explicit objectives. These aimed to establish the factors that led to the growth, sustainability and apparent demise of the Neolithic Temple Culture civilization of Malta. The scenario set by previous research (Malone & Stoddart 2013; Trump 1976) identified that the collapse of this long-lived civilization was caused perhaps by isolation and a deteriorating unstable ecosystem amongst other possible factors. The objectives designed to explore the socio-economic changes that took place were to:

- 1) Reconstruct the past environment to investigate the environmental context of and human impact on ancient Malta. This would be achieved through an assessment of vegetation and landscape stability before, during and after the establishment, maintenance and collapse of the Neolithic civilization; and gathering data for comparisons with the later protohistoric and historical periods.
- 2) Improve the existing chronological framework by developing a reliable, precise and accurate time frame that would integrate events and trends determined from environmental, landscape and human-archaeological records. The chronology was to be achieved through the implementation of Accelerator Mass Spectrometry (AMS) radio-carbon, isotopic and Optically Stimulated Luminescence (OSL) dating methods (tephra analysis was undertaken in order to enable cross-dating with the AMS-dated pollen sequence, within which sparse tephra shards were found). The resulting determinations would give precision to the already

unusually detailed artefactual framework, and all results would then be assessed using a Bayesian approach.

- 3) Establish the population history of early Malta by applying multi-disciplinary approaches to the study of the ancient population using previously excavated human remains from Xagħra. These remains were to be sampled to establish population structure, chronology, diet, stress, activity, disease, taphonomy and external origins.
- 4) Reconstruct the settlement, subsistence and landscape history of early Malta through study of the changing socio-economic patterns of early settlement, landuse and resource exploitation in prehistory. This would be combined with understanding the impact of deforestation, soil erosion and climate instability on early farming societies by sampling 'time capsules' of settlement and palaeoeconomic activity.

These four themes underpin the work of *FRAGSUS*, and the outcomes are recorded in three monographs of which this is the second. The first volume deals with the first two objectives, namely the environmental aspects and the chronology associated with soil, cores, pollen and climate. The third volume deals with the third objective, the human population and its physical remains, making reference to the other objects. Finally, this volume deals with the fourth objective, in particular settlement and archaeological evidence, but is closely linked throughout with the other objectives.

A principal goal for the *FRAGSUS Project* has been to detect and sample environmental data, which when combined with archaeological evidence, can inform on the impact of human activity on the natural environment. In the Maltese context we specifically wanted to identify how humans managed to cope when the natural world began to fail their needs, a failure that appears to have occurred at intervals over the long time frame of

later prehistory. The *FRAGSUS Project* was designed to explore and record this long human sequence, one that had defined cultural identity throughout its evolution, and that had human subjects at its heart. By incorporating many datasets, the goal was to establish theories and interpretations about how we, the human species, both controlled, and were controlled by the natural environment we chose to exploit. The outcomes are recorded in three *FRAGSUS* volumes, of which this is the second (see also French *et al.* 2020; Stoddart *et al.* in press).

In Volume 1, we discuss at length the importance of islands as units for study. In this volume we focus on the archaeology and ecological aspects of islands. An island represents a conveniently circumscribed landscape of a known size, surrounded by water, and thus remote from larger landmasses and their biological and cultural stimuli. From the seminal ecological studies of Charles Darwin (Jones 2009) and Alfred Wallace (1892) in the nineteenth century, to the rich theoretical literature on biogeography and equilibrium theory in islands first initiated by MacArthur and Wilson (1963, 1967), an entire sub-discipline of island studies has developed. The studies range from Simberloff's equilibrium theory (1974), the ecology models of Gorman (1979), the ecological anthropology of Vayda & Rappaport (1963) to current ideas of evolution and equilibrium (Lomolino *et al.* 2010), and colonization (Cox *et al.* 2016). Generally, the bulk of research has been focused on non-human subjects, with issues of extinctions and conservation foremost. But nevertheless, a number of important theories and models from these island studies are relevant to archaeology.

1.1.1. Island studies

In the *FRAGSUS Project* we have sought to examine the particular impact made by humans on an environment and its natural resources in the prehistoric island context, and in this case, the archipelago of Malta and Gozo. There have been a number of useful studies on island colonization patterns and case studies of the Mediterranean and the Caribbean in particular, that extract some key ideas from the ecological models and apply them to the anthropic context. Evans (1973) was amongst the first to present the 'island' as the laboratory case study of an ancient society, and in particular in the Mediterranean context. Cherry (1981, 1990) further demonstrated the more quantitative outcomes of these ideas. Such work has generated a succession of useful, relevant studies and some focus specifically on Malta (Broodbank 2013; Dawson 2014; Kirsch 1986, 1996; Kolb 2005; Malone 1997–8; Patton 1996; Rainbird 2007; Renfrew 1973; Stoddart 1997–8). Collectively, these have worked to develop theory and demonstrate the archaeological relevance of the application of island ecology

models. As time has progressed, increasingly detailed complementary information has been added, especially chronology. Now with fifty years or so of growing ^{14}C dating estimations, the tempo of island colonization, consolidation and desertion can be interrogated and the archaeological record better understood. We can now present an understanding of chronology as human time, rather than speculate about when and which groups of humans arrived on particular islands. This scientifically determined chronology, combined with traditional culture sequence studies allows discussion of when distinctive socio-cultural evidence appeared and disappeared in the sequence of social and environmental evolution. When Cherry (1981, 1990, 2004) was estimating island colonization patterns in the Mediterranean, far fewer, uncalibrated dates were available. Whilst he and Patton (1996) identified the sixth millennium BC as the first major episode of Mediterranean colonization associated with the spread of farming, there was little chance then to break the key 'sixth' millennium down into detailed episodes that might enable us to trace the dynamics of what was an extended process across the Mediterranean and Europe. Dawson, in a number of papers (Dawson 2004–6, 2008, 2010, 2014), identified Malta and Gozo as an archipelago likely to have been colonized just once, on the basis of data available. This notion was largely supported by Trump (1995–6) who had pioneered understanding of Malta's Neolithic. Even though there were insufficient date estimations available during his studies, he did speculate about possible breaks in the sequence of settlement and cultural evolution. But, without detailed chronology, the momentary episodes of cultural activity are impossible to pin down in a time sequence extending over millennia, often without much apparent cultural change. Accurate time measurement is also fundamental in measuring the relationship of human activity against episodes of environmental change and climate fluctuation.

1.1.2. Chronology and new scientific studies

The growing field of palaeoecology, combined with increased knowledge of past climates and catastrophic events demands chronological precision that can tally with human timescales. Increasingly accurate chronologies measure the small fluctuations of change and currently we are fortunate to have AMS dating that enables individual lifetimes to be identified, not simply great swathes of 'time'. Indeed, the increasing accuracy allows current archaeo-environmental studies to identify distinct events in the past, signalled by data that demonstrate downturns, climaxes, catastrophes (Baillie 1999). These events are not always clear cut or easy to distinguish, but nevertheless had an impact on the natural environment and, in turn, the world in

which prehistoric communities lived. *FRAGSUS*'s work has, therefore, focused on trying to identify trends in the environmental and economic data for early Malta that may highlight instances of variation in the past and be investigated to address the research questions below (§1.5).

Shortcomings of all previous work on the prehistory of Malta (and indeed, in much of the southern Mediterranean) have been the lack of coordinated scientific fieldwork and data collection. All too often, 'research' has been content to simply identify sites and pottery, with little broader work on 'landscape' and 'monuments'. All too rarely have soils and the environment been considered as archaeological components, other than in the general sense of a covering over buried sites. Never had a soil history been undertaken of Malta that investigated the changing nature of soil over time (Volume 1). Geographers had undertaken some excellent work in preparation for independence (Bowen-Jones *et al.* 1961) and observed a much more accessible and visible landscape than is possible today. That work, however, was centred on the present and not aimed at environmental reconstruction. Consequently, environmental work was not attempted until the Xagħra Brochtorff Circle study of the late 1980s and early 1990s. Yet, that site had limited potential for soil study, as it was a particular cave environment. Samples from buried cave soils found no pollen preserved, whilst the funerary context was, by definition, some distance from the sites of the living. Instead, landsnails became the main focus of environmental study as they were well preserved (Schembri *et al.* 2009, 19–22). The question of landscape reconstruction, nevertheless remained. Over the next two decades, one member of the original Xagħra team (Hunt) continued in the quest to obtain suitable environmental material. He obtained meaningful pollen samples, but considerations of cost and experience limited the scope of their sampling and dating (Hunt 2015; Hunt & Vella 2004–5). The initial history of vegetation change was indicative (Carroll *et al.* 2012; Fenech 2007; Hunt *et al.* 1995), but inconclusive, with substantial gaps in the sequence for Malta at the crucial time of later prehistory. Similarly, other environmental work over the decades had not investigated animal bone and the settlement and economy of prehistoric Malta in early sites in detail (Fiorentino *et al.* 2012; Stoddart *et al.* 2009a).

The rise and florescence of the extraordinary Maltese Temple Culture lies at the centre of prehistoric study in Malta. But it could not be explained in socio-economic terms with any level of reliability. Consequently, predictions of population levels and density in prehistory remained speculative (Stoddart & Malone 2015). Neither was it possible to measure changes in socioeconomic conditions in prehistory without better

data and a more extensive chronology. Thus, without a deeper understanding of the environmental or economic base, Malta's Neolithic World Heritage Sites remained 'mysterious' and sometimes liable to excessive interpretation based more on a fantasy goddess culture than on archaeological facts.

In the absence of new scientific study, useful work took place over the last two decades that advanced knowledge and interest in phenomenological and landscape approaches to the monuments (Barrowclough & Malone 2007; Grima 2004, 2005, 2007; Malone & Stoddart 2009; Pace 2000, 2004a, 2004b, 2004c; Skeates 2010; Stoddart & Malone 2010, 2013; Tilley 2004,). There was, nevertheless, a solid case for new research on the environment which the ERC assessors generously recognized. We consider their trust to have been well founded.

1.1.3. Island criteria

Small islands can make excellent subjects against which to challenge ideas about social resilience and isolation. But they also have drawbacks for archaeological study because of limited sample scope, lack of comparators

Table 1.1. Research potential for island study and Malta.

| Characteristics | The Malta opportunities |
|---|---|
| 1. A relatively isolated island group of small size (<i>i.e.</i> less than 500 km ²) | Malta has a maximum size of 316 km ² , and is over 80 km from Sicily |
| 2. Surviving settlement, ceremonial and funerary sites of prehistoric date available for sampling and gathering chronological and environmental materials | Numerous ceremonial megalithic sites (temples), knowledge of tombs, hypogea and some settlements. The extensive Xagħra Brochtorff Circle population |
| 3. Environmental data (pollen, soil, human/animal/plant remains) to reconstruct vegetation, soils, climate and dietary/climatic isotopic information | Coastal valley inlets and valleys with deep sedimentation and good soil formations. Preservation of environmental materials in limestone environment and within prehistoric site stratigraphies |
| 4. Samples of ancient human, animal and molluscan remains to enable dietary, isotopic and genetic investigation | Huge human remains archive (Xagħra) that has been partly studied and dated. The potential to sample new animal bone and plant rich deposits on habitation sites |
| 5. A distinctive, dynamic and dated archaeological sequence of human activity and material culture | A rich ceramic and artefact tradition from a reasonably dated sequence, with preliminary typological and material study in place |
| 6. Access to sites, museum collections and opportunities for collaborative research | Well established collaboration between Malta and the Cambridge-Belfast teams since 1987 |

and eroded environments with sparse potential to yield suitable materials. In the case of Malta and Gozo, the positive island characteristics we identified for study are listed in Table 1.1.

1.2. Background to *FRAGSUS* as an archaeological project

The richness of Maltese prehistoric archaeology has attracted a range of key figures who have explored its unusual qualities. Before the twentieth century, Maltese antiquities were a curiosity noted by travellers and administrators, but this work lacked much coherent scholarship. Later nineteenth century scholars sought to identify and protect sites (e.g. Antonio Annetto Caruana; Fig. 1.15) and a significant number were described and partly published (although these were always interpreted as Punic in date). It was only from the first decade of the twentieth century that the outstanding partnership of Themistocles Zammit (an established scientist and archaeologist; Fig. 1.15) and Thomas Ashby (a stratigraphic excavator whose skills were honed on the Roman monuments of Caerwent; Fig. 1.15), projected the riches of prehistoric Malta onto the world stage. This followed the detailed published study of the German scholar Albert Mayr (Mayr 1901; Fig. 1.15), who likewise had recognized the extraordinary prehistory of the Maltese Temple culture. Ashby contributed to knowledge of Santa Verna, Kordin, Mnajdra and Ħaġar Qim (Ashby *et al.* 1913). While independently and more dramatically, the work of Zammit led to the completion of work at Ħal Saflieni and the discovery of Tarxien (Zammit 1930), collectively demonstrated the creativity of the inhabitants of the Maltese Islands from an antiquity that had not previously been accepted. Together with scholars and excavators Napoleon Tagliaferro (Fig. 1.15) and Giuseppe Despott, Zammit also developed a powerful understanding of the structure and diversity of the elaborate material culture that came from the impressive monuments he examined. Above all, he realized the importance of reconstructions *in situ*, coupled with rapid publication and dissemination of information in written and museological form. A less well-known figure until recently is Luigi Maria Ugolini (Ugolini 1934; Pessina & Vella 2005) who was one of the first scholars to appreciate the significance of these earlier discoveries. He stressed their importance, over and above the Roman-inspired wisdom of the time (Ceschi 1939). His work (Ugolini 1934) was amongst the first to try to interpret the discoveries in terms of the living people who created the monuments. As a synthesis, it is probably fair to state that these pioneers developed a broad understanding of the major monuments, most notably of the so-called temples, but also

of the underground burial chambers of Ħal Saflieni. However, other potential questions (principally those concerned with landscapes, environment and subsistence) were still under-investigated.

After WWII, two archaeologists, John Evans and David Trump (Fig. 1.15), built on the achievements of these pioneers. John Evans, like many significant figures of his generation honed his forensic skills at Bletchley Park (WWII intelligence) and applied them through his training in Archaeology and Anthropology at Cambridge to the early archaeology of the Mediterranean. In 1952, he was appointed by a committee headed by the Royal University of Malta to systematize the unpublished and outstanding discoveries of the pioneers in a survey of the state of knowledge of the Maltese islands. He combined this systematization with a series of surgical strikes on key monuments to attempt a chronological resolution to the rich material culture. Evans focused on sites where stratigraphy was clearly preserved by the sealed packed limestone (*torba*) floors, and where uncontroversial sequence could be extracted. In the tradition of Zammit, he also developed an early synthesis of these results (Evans 1953, 1956, 1959). Even if publication of the full dataset took time (Evans 1971), this delay allowed for the inclusion of new and significant information, notably from David Trump's work (see below). At the same time, Evans paralleled the footsteps of Ugolini by developing an interpretative framework, albeit in a rather different direction and tradition; he both posited the ideas of island archaeology (Evans 1973a; 1977) and considered the role of key actors, such as the 'priest' in some of the monuments that he was synthesizing (Evans 1973b). David Trump accompanied Evans on his exploratory fieldwork and, following his appointment as Curator of the Museum of Archaeology in 1958, developed the subtleties of the prehistoric timetable much further. Most significantly, he excavated the site of Skorba, uncovering new phases in the Maltese sequence, named by him after the same site, and provided the radiocarbon dates that, at last, were available to archaeologists to accompany this material (Trump 1961; 1966). The results were that the chronology was no longer relative, but increasingly precise, even if based on remarkably few samples. Trump was also instrumental with Charles Zammit, the museum director and the son of Themistocles, in displaying these achievements in the newly established National Museum of Archaeology in the centre of Valletta. In fact, David Trump developed a natural, albeit idiosyncratic, talent and strong following in the popularization of the importance of the Maltese islands in prehistory (Trump 1972; 2002; 2010). The reward was a celebration of his achievements by the Maltese nation to a level never recognized in his country

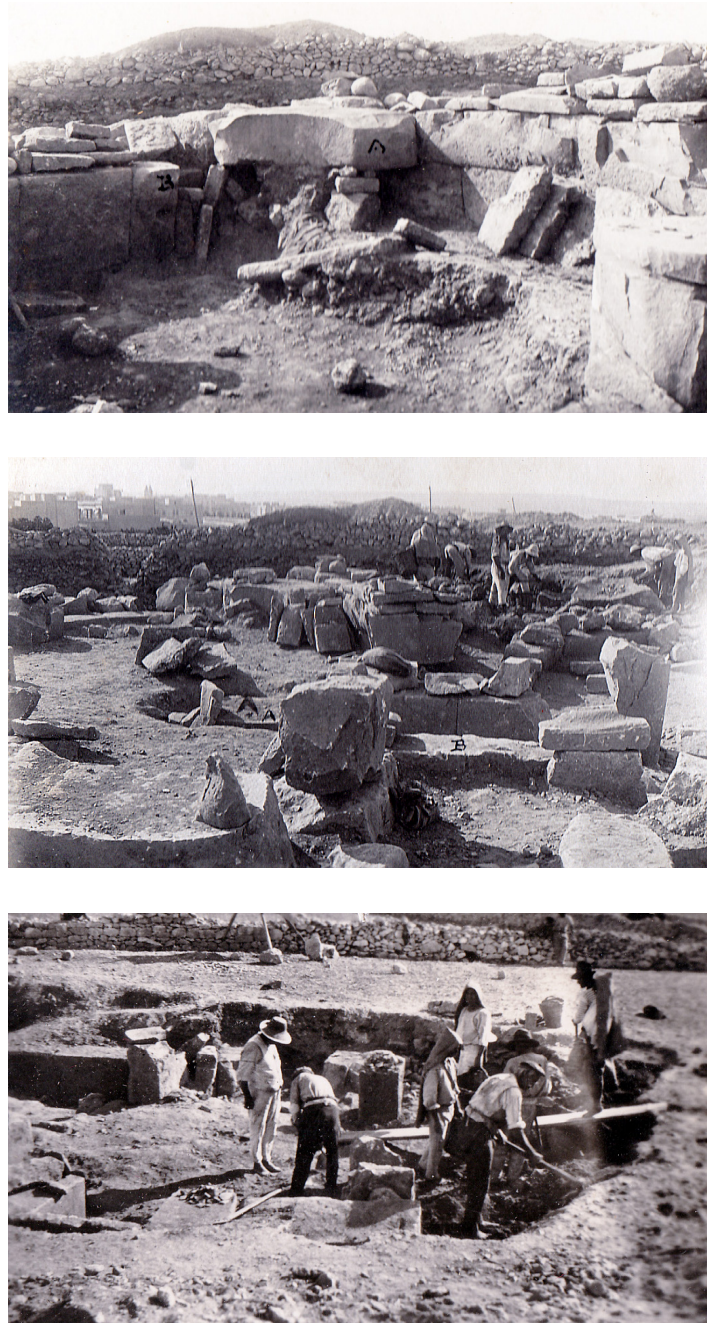


Figure 1.1. Early excavation images of Tarxien in 1915 during the superficial clearance of masonry and deposit (Zammit) courtesy of the National Museum of Archaeology, Malta.

of birth – an honorary degree from the University of Malta and the Order of Merit of Malta.

Two further figures are connected to the *FRAGSUS Project*. Colin Renfrew (1973) advanced the implications of the new radiocarbon dates that had been produced largely by David Trump, but also supplemented by himself. He highlighted the broader setting of calibration, and thus firmly established the claim that

these monuments were the oldest free-standing stone monuments in the world. This is a claim that still stands today for roofed stone monuments, in spite of the relatively recent discovery of the much older, but open air, stone monuments of Gobekli Tëpe (Schmidt 2007). At the same time, Renfrew took their theoretical understanding forward by proposing theories of societies and their territories in an island setting, and

how they might have developed over time (Renfrew 1973; Renfrew & Level 1979). Anthony Bonanno, the long-standing head of the Department of Classics and Archaeology that he founded at the University of Malta, also made his own very real contribution to the debate. He synthesized the available information (Bonanno 1986a) and, with Colin Renfrew, jointly proposed an Anglo-Maltese collaboration during a seminal conference that he organized in 1985 (Bonanno 1986b).

1.3. The Cambridge Gozo Project 1987–95

The collaboration that followed (1987–95) between the Universities of Malta and Cambridge and the then Museums Department took stock of the current state of knowledge based on Anthony Bonanno's 1986 synthesis. It was clear that study of the so-called 'temples', mainly on the island of Malta, had dominated previous research. Questions of death, domestic life, economy, the human and physical landscape had been under-researched. The Cambridge Gozo project under the direction of Anthony Bonanno, Tancred Gouder, David Trump, Caroline Malone and Simon Stoddart sought to investigate these remaining gaps. A single phase Temple Period settlement structure at Ghajnsielem on Gozo was investigated in the first 1987 season (Malone *et al.* 1988, 2009, Ch 4.). The Xaghra Brochtorff Circle was researched over all seven field seasons, and a field survey was undertaken in those moments when the great investment of work on the Circle permitted. The most successful feature of the project was a deeper understanding of Maltese death ritual (Malone *et al.* 2009). Some major strides were made towards appreciating principal changes in settlement distributions between the ceramic phases of Ghar Dalam to Bahrija in the central part of Gozo through a systematic site and off-site landscape survey (Boyle 2013, 2014; Malone *et al.* 2009; Volume 1, Chapter 6). Some new data were gleaned as proxies for domestic life and several likely settlement sites were located, although the one excavated Ghajnsielem Road structure was largely devoid of refuse (Malone *et al.* 1988, 2009). Very few advances were made in understanding the changes in the physical and natural landscape. Several specialist scholars, however, were invited and they attempted to identify the means to extract knowledge from a challenging environment at a time before many of the current methods used in the current project became available. The most successful work came indirectly from the study of land snails from the Xaghra Brochtorff Circle (Schembri *et al.* 2009). The scientific goals of the Cambridge Gozo Project (1987–95) were significant on a number of fronts. In particular, it achieved knowledge of prehistoric

funerary ritual and an initial study of the prehistoric population, and accompanying animal remains. Inadequate funding meant that the osteological study was preliminary. Nevertheless, that work revolutionized approaches to the bioanthropology of the prehistoric population. It represented only the second discovery of a Temple Period funerary complex (rather than individual tombs) in Malta, and the only example of a fully recorded burial assemblage. Chronological progress included a suite of AMS radiocarbon dates on human bone, which fixed the episodes of burial for the first time. Other major achievements included the systematic study of molluscan evidence in environmental reconstruction, the identification of hard stone sources from outside Malta, and preliminary work on diet and the exploitation of animals. The post-excavation research (between 1996 and 2009) also identified a number of directions for future research. In particular, we (Malone *et al.* 2009, 383–4) specified the need for: more scientific analysis of the human remains; a better understanding of diet, disease and changing life patterns; more AMS dating; and the application of (the then) new and promising aDNA methods on the enormous assemblage of human bones (c. 220,000 individual parts). As with many burial sites, it is vital to establish the composition of the buried community, both social and biological; aDNA can offer new insights into the latter and by implication the former. In conjunction with excavated materials, we also suggested that sedimentological and environmental research might interrogate the question of climatic downturns to address an overriding question, 'why did the Temple Culture collapse and disappear'? The work of the late Frank Carroll at Huddersfield University (Carroll 2007; Carroll *et al.* 2012) showed that these methods were viable in the Maltese contexts.

In the years immediately following the 2009 publication, while other fieldwork was developed in Etruria, these various issues became a discussion point for some of us (especially Hunt and Malone in the palaeoecology labs of Queen's University Belfast – QUB, colleagues in the Universities of Malta and Cambridge – UM and UoC, and the newly established bodies of Heritage Malta – HM – and the Superintendence of Cultural Heritage – SCH), to develop a project that was resolutely designed to solve these remaining questions, and extend research activity towards Malta as well as the smaller island of Gozo. Pollen, soils and sediment thus became central concerns for the new project together with investigation of food, subsistence and domestic life in prehistoric times. It was also realized that the chronology of the Maltese islands, although established in its broad outlines, was based on all too few samples, too much on pottery, and, where available,



Figure 1.2. *Xaghra Brochtorff Circle excavations from 1987–94 (Malone and Stoddart, the Cambridge Gozo Project).*

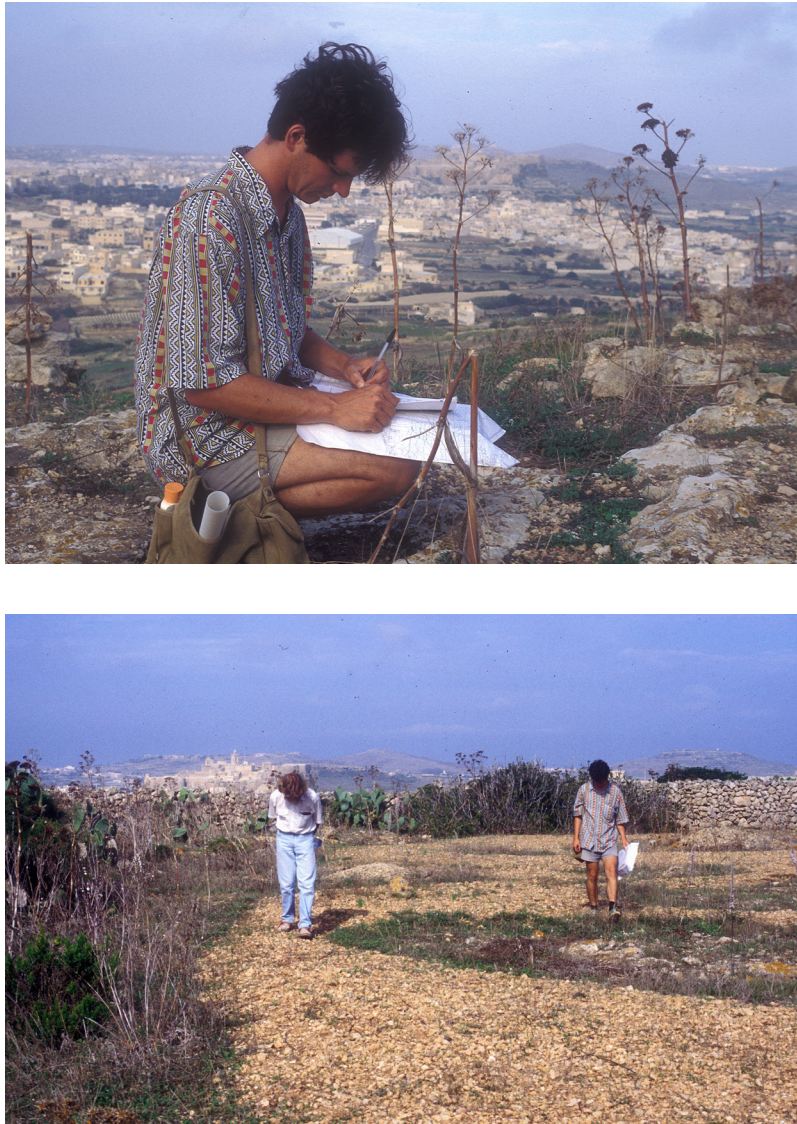


Figure 1.3. *The Cambridge Gozo Survey 1987–95, recording landscape features and surface scatters: Duncan Brown (above), Barry Kemp and Duncan Brown (below). (Simon Stoddart).*

had used older methodologies that paid less attention to socio-economic and environmental evidence. If the understanding of the tempo of island life from prehistory to more recent times was to be established, it was considered vital to invest heavily in cutting edge chronometric techniques that included AMS as well as OSL dating. It was evident that only a major, very well-funded, project could apply the necessary levels of interdisciplinary scientific analysis to test these questions, and potentially make an advance in understanding. A period of collaborative discussion in 2011–12 led to the application, headed by Malone, for funding from the European Research Council, and ‘FRAGSUS’ as a project was developed. The application

was submitted in April 2012, and the team were notified in November 2012 of its success, enabling the five-year programme of research to commence on 1 May 2013. A large team was assembled comprising nineteen scholars (see Acknowledgements), spread between Britain and Malta, and initially from QUB, UoC, UM, HM and the SCH. Later some colleagues moved to the Universities of Plymouth and Liverpool John Moores. In addition, new research staff attached to the main partner institutions were engaged to undertake specific sub-programmes of specialist work, and over the years a number of post-graduate students also joined the project to undertake Ph.D. and Masters dissertations based around the project’s work.

1.4. The *FRAGSUS Project* 2013–18

The *FRAGSUS Project* attempts to address the many issues identified above in the broader framework of resilience theory within a restricted island community. It necessarily draws on the work of our predecessors, Zammit, Ugolini, Evans, Trump and Renfrew, who had in their various ways laid the foundations for this continuing study. The *FRAGSUS Project* was born out of the combination of previous archaeological fieldwork undertaken between 1987–94 (the Cambridge Gozo Project – excavations at the Xagħra Brochtorff Circle), and the complementary studies in environmental change (Carroll *et al.* 2012; Fenech 2007; Hunt & Schembri 1999; Schembri *et al.* 2009) coupled with the many questions that still remained to be addressed. New studies demanded the investment of modern scientific infrastructure and expensive specialist analyses, and *FRAGSUS* could never have been achieved without the availability of substantial funds from the European Research Council, provided through the award of an Advanced Researchers Grant. We are very grateful for the support provided and trust that this, and its partner volumes, provide a suitable acknowledgement as well as justification for an investment that has implications for understanding both the past and the present (see Volume 1 Conclusions and this volume).

1.4.1. *Archaeological concerns in Maltese prehistory and the FRAGSUS Project*

The summary above highlights the main strands of intellectual development of the project. This section adds detail to some archaeological themes that are central to the *FRAGSUS* study, which we aim to address through the field research undertaken during the project.

1.4.2. *Time and artefacts*

From Zammit onwards, the megalithic structures and the remarkable ‘art’ and artefacts of the Neolithic ‘Temple’ culture provoked an ongoing interest in Mediterranean prehistory and the relationship between that area and the better known west European megalithic sites (Piggott 1965; Daniel 1963). By the mid-twentieth century, it was generally agreed that the cultures of Malta were of Neolithic and ‘Copper’ Age date, but beyond that notion, chronology was vague. The synthesis and record of the prehistory of Malta by Evans in the mid-1950s represented the first stage of a full evaluation of the material culture and sites of Malta’s prehistory. That project was a major step forward in organizing the cultural sequence and assigning the rich archaeological assemblages stored in the National Museum of Archaeology to separate phases. Evans’ small exploratory excavations were designed to

demonstrate the chronological-archaeological sequence, and he presented his ideas in a number of publications that remain relevant today (Evans 1953, 1956, 1971). In 1958, David Trump, from his position as curator of the Museum, followed in Evans’ path and organized further excavations to test the archaeological sequence, which spanned from the earlier Neolithic to the Bronze Age. Now armed with the powerful new tool of radiocarbon dating, Trump obtained a modest selection of samples tied to ceramic types that collectively demonstrated the very long archaeological occupation of Malta. The key site of Skorba Temple (Mġarr) formed the core of the dating programme, but it was supplemented by key-hole excavations at Santa Verna, Kordin III, Ġgantija, Tarxien and Haġar Qim that extracted distinctive ceramics often in defined stratigraphic layers. Linked to the few dated pottery levels, Trump was able to assert a new and unexpectedly ancient sequence. The achievement of the work was published in 1966 (Trump 1966), and its impact was deftly identified by Colin Renfrew in a chapter in *Before Civilization* (1973). There, Renfrew argued for the independent development of the Maltese island culture and their early dates, long before later Mycenaean or Egyptian influence, which had, hitherto, been the chronological reference point in the Mediterranean and west European Megalith debate.

The Skorba sequence revolutionized both theoretical thinking and chronological understanding. It was, therefore, unfortunate that after the declaration of the independence of Malta in 1964, international collaboration or any ongoing scientific research in prehistoric archaeology all but ceased for many years. For over two decades, the sequence and the interpretations proposed by Evans and Trump were unchallenged, with no new fieldwork of significance being reported. In that time, theoretical studies filled the gap; for example, the modelling proposed by Renfrew that tested ideas on territories (Renfrew & Level 1979), or work that attempted to integrate and synthesize Maltese sites with other megalith building societies (Joussaume 1985). The period also saw the rise of Mother Goddess studies and other weird, wonderful and entirely unsupported proposals to interpret the Temple Culture (Gimbutas 1991). The need to provide counter evidence for these theories of a Greater Balkan Civilization, also drove the demand for new field research forward. The most recent studies (Tas-Silġ – Bonanno & Vella 2015; Cazzella & Recchia 2012; the Cambridge Gozo Project – Malone *et al.* 2009, and work by the emerging government agencies HM/SCH – Grima 2011; Pace 2000) have been constrained by the legacy of an earlier history of rather rigid material culture designations and typological systems. Given the effectiveness of Evans’ and Trump’s work in describing the archaeological sequence in material terms, almost

no attempt has been made to revise the system. In contrast, later periods have benefitted from work that necessarily takes account of broader Mediterranean systems (Anastasi 2013, 2016; Bonanno 2005; Quinn & Vella 2014; Sagona 2002), whilst the ceramic chronology of prehistoric Malta has largely remained a silo in its own insular world. In this volume, we assemble a large new collection of excavated material and subject it to detailed analysis (Chapter 10) with the intention of clarifying the present scheme and shaping it into one that is current and linked to a new chronology and science.

1.4.3. Architecture

The *FRAGSUS Project* also addresses the issue of temple architectural development. This theme commenced, in some respects, with the work of David Trump, who sought to identify an evolutionary scheme for the structural development of Maltese temples (Trump 1972; 2000, 2002). The opportunity to excavate beneath and around early temple structures has enabled us to examine architectural development in a limited way. In particular, the work at Santa Verna (Chapter 4 this volume) provides an important insight into early temple development supported by detailed dating. Likewise, the exploration at Kordin III (Chapter 6 this volume) has revealed details of construction at another early site. Architecture, however, is only dealt with briefly here, and forms the subject, we hope, of future studies.

1.5. Five research questions

The *Project*, as summarized above, was devised to tackle the all of outstanding issues highlighted above by posing five specific questions that attacked the central problem of the end of the Maltese Temple Culture. These interlinked questions focused on the fragility and resilience of island life. As is so often the case in such an intensive project, not only have many questions been answered, but the answers demonstrate enormous complexity and themselves raise new questions. A central feature of the project was to bring to bear multiple techniques in addressing the same questions, thus strengthening the validity of many of the conclusions.

1. *What was the impact of human settlement on Malta, and how rapid was the process of deforestation, erosion and degradation? When did technical mechanisms to manage the environment develop – such as terracing, water and food storage? Were such mechanisms in place before or after the Temple Culture collapsed?*

Enormous advances have been made by interlinking proxy samples from seven new pollen locations (with a corresponding sevenfold increase in catchment) and

six new archaeological stratigraphies. As both this and Volume 1 show, a highly complex and fragile turbid-itic landscape has been uncovered. Questions about early terracing, water and food storage have been less effectively addressed and remain issues to be solved by the next generation of archaeologists.

2. *How did a very small island community in prehistoric times manage to sustain dense, complex life over millennia, and what specific social, economic and ritual controls emerged to enable this? Were the monumental temples instrumental in the process of sustaining cultural life?*

For the answer to this question, we necessarily draw on the information provided by Zammit, Evans and Trump. It was these scholars who investigated the temples when they were best preserved. However, the *FRAGSUS Project* has supplemented this work by investigating parts of four temples (Ġgantija, Santa Verna, Skorba and Kordin III). In addition, the evidence from the settlement area of Taċ-Ċawla, despite being a complex multi-period site, has permitted the elucidation of some of the essential differences between the communal activities of the temples and the smaller scale activities of the living sites.

3. *What sort of agriculture was used, and what did people eat, especially as the landscape became increasingly degraded and the environment more unpredictable? Were there failures in the food supply? What impact did diet, disease and stress have on the population?*

A three-pronged approach has been delivered successfully, drawing on the refuse of the living, the remains of the dead and palynological evidence. The settlement site of Taċ-Ċawla has, for the first time, delivered a series of refuse samples that give a measured development of the food resources (carbonized seed and bone) from the Maltese islands. These can now be compared with the evidence from the bodily remains of their near neighbours and contemporaries interred in the Xagħra Brochtorff Circle. The latter have provided samples for both isotopic and dental analyses, which have revealed invaluable information on dietary trends in the fourth and third millennia BC (see Volume 3). The presence of livestock and domesticated plants, while shifting in locational focus, were shown to be uninterrupted from their inception at the beginning of the sixth millennium BC until their major decline in the final stages of the Temple Period.

4. *What was the size and nature of the early Maltese population and what role had demographic connectivity (immigration) in maintaining island sustainability?*

Our insights into the changing demography of the Maltese islands remain indirect. The Cambridge Gozo survey (undertaken in the late 80s and early 90s, but presented in these volumes) has given some sense of the relative and changing density of a small part of the landscape. The pollen record has provided an important idea of the impact of these populations on the islands at a date even earlier than the settlement record. aDNA, isotopes and the physical anthropology have given different degrees of understanding of the connectivity of humans with the outside world and their genetic variation. These can be measured against the import and circulation of non-organic materials, as well as crops, trees, animals and other resources. A deeper understanding of demography remains a substantial challenge, and one that future generations can continue to tackle.

5. *Was there social, economic or environmental failure at the end of the Temple Culture, and what may have caused society to collapse or change so drastically? Was there a hiatus between the Temple Culture and later Bronze Age settlers? Can a hiatus be identified during the earlier settlement of Malta, between c. 5000 and 3800 BC?*

A number of proxies have been combined to investigate the situation at the end of the Temple Period: pollen, sediments, human remains and the distribution of radiocarbon dates. These do support the evidence for important changes at about 2340 BC, but similar analyses have also detected a similar downturn in the fifth millennium BC, which extended over a longer period. The focus on dating has revealed a long and apparently culturally empty episode between the Skorba Neolithic and the Zebbug. The definition and narrowing of these windows of change is one of the exciting results of the current work, and presents stimulating prospects for further analysis by future generations of archaeologists.

These questions were designed to provoke interdisciplinary approaches that employed fieldwork, fresh data collection, various analyses and a range of new scientific approaches. Some questions were simple, provoked and supported by the outcomes of previous study, and they had superficially obvious answers. Yet, when tackled through new and demanding methodologies, these same questions invariably opened doors to entirely new territories. Other questions were more speculative and designed to test new methodologies such as isotopic science and aDNA. It was the intention of the project to explore and tackle the unknown, to take risks and move the fields of study forward. As the reviewers of the grant application commented, the

Project aspirations were admirable, but although many might not fully succeed, the journey was worthwhile in itself. It was thus that the team set out in May 2013 to start a demanding programme of research into past climate, landscapes, people and their cultures and to explore what enabled or hindered human sustainability in small islands in the past. Our focus was the Maltese islands, of which we had previous knowledge, but that were also chosen because their size and scale presented opportunities to examine the ‘rise and fall’ of a distinct civilization. In other parts of the Mediterranean or Aegean, it might have proven harder to distinguish such distinctiveness, but Malta – with its remarkable ‘Temple’ Culture – presented the greatest potential to test our questions. Malta was also chosen because of the long-standing collaborative relationship between the team members extending over decades, and our shared sense of affinity with a remarkable ancient people whose world we had begun to observe at ever closer quarters.

The outcome of the *FRAGSUS* research was always envisaged as being complex, incomplete and difficult to interpret. Nevertheless, the goal has been to go beyond simply gathering data about time, plants, soils, pots and people. We aimed to model aspects of how the ancient communities of Malta lived and died, how they organized their existence on a small and crowded island, and how they managed to maintain apparently placid social relations between the islands and their communities. One intriguing aspect of the Temple Culture and its remarkable architecture is that it appears to have emerged as a response to the local conditions of intense competition. The team have long debated the problem of how to interpret the temple evolution and its role in society, just as preceding scholars have for the last century and more. Now, with the benefit of detailed time control, set against a much deeper understanding of economic variability and the physical impact of that productivity on the human skeleton, we can begin to see how the early Maltese coped with their world (see Volume 3). At times it was a productive place, whilst at others, life probably hung in the balance between dry seasons, disease and economic failure. The temples seem to have been the places where the action of daily, seasonal and ceremonial life took place, but just what were the ‘temples’ in the minds of their makers? We have found evidence for ceremonial activity, fires, pots, animal bones, grinding feasting, grain processing, storage, display, sacrifice, theatre and aesthetics. The structures were large enough to live in, but evidence is not apparent that anyone did inhabit these places. This question of the function of the temples will be revisited in the Conclusions, Chapter 13.

1.6. The field research programme, 2014–16: the selection of sites for excavation and sampling and the goals for each site

The *FRAGSUS* research programme in archaeology was enabled by close collaboration between the team members, in particular those working in HM and the SCH, who were able to identify suitable and accessible sites for analysis. Although Malta is extraordinarily rich in prehistoric sites, most of them are inaccessible for excavation for one reason or another. Some are public ‘heritage’ sites, others are on private land, and there is a clear understanding that disturbance of sites should be avoided unless there are overwhelming reasons to intervene. Research archaeology has to make a strong case, and *FRAGSUS* was able to do this, since it brought new, and rather urgent opportunities to undertake diagnostic work that had potential to improve understanding and conservation. Most of the ‘Temple’ sites are inscribed as World Heritage Sites on the UNESCO list, and protected by national legislation. But that protection is only as good as planning, environmental pressures and erosion allow. The protective legislation covering Heritage and Antiquities has been greatly enhanced in recent years, and there is a general discouragement of any excavation or intervention that could cause damage or destruction. The team is therefore very grateful to the SCH and to HM (the two agencies responsible for protection of archaeological sites in Malta), for allowing and enabling *FRAGSUS* to work on the sites reported

on in this volume. Two sites formed quite large excavation trenches (Taċ-Ċawla and Santa Verna) and both had the advantage of earlier archaeological work, with the *FRAGSUS* trenches comprising in part, interventions in areas of earlier backfill. The other sites were examined by small sondages (Skorba, Ġgantija), with larger slot trenches at Kordin III and two rock-cut silos at In-Nuffara. These excavations were precisely located, on the instruction of the authorities, and could not be expanded, regardless of the emerging deposits found. Future opportunities may arise for other scholars to expand these small sondages to explore and interpret the often limited evidence that was uncovered.

Over recent years, efforts have been made by HM to research the management and stone erosion of the monuments (Cassar *et al.* 2018; Grima 2011; Stroud 2003, 2004–5, 2007; Zammit & Mallia 2008). The issue, however, of the eroding surrounding landscape had not been included in this work, although it is the subject of several other conservation and heritage programmes (Gigli *et al.* 2012). Areas of bare rock caused by erosion of covering soil and vegetation are encountered while visiting any one of the ‘temple’ sites, and this erosion is seen across the entire landscape. As Volume 1 describes, the erosion process has been ongoing for millennia, and was exacerbated by human activity, agricultural regimes, heavy rainfall and the very nature of the landscape itself. Short of covering over entire sites, there is little chance of preserving them in an intact form. Although conservation issues were prominent in

Table 1.2. *Timetable of fieldwork.*

| | | | |
|---|--------------|--------------------------|--|
| Taċ-Ċawla | 2014 | March–July | Neolithic settlement open area excavation Post-excavation processing and recording of material culture Environmental sample processing |
| Ġgantija | 2014 2015 | May–July March–April | Survey and recording of WC Section Excavation of sample sondages and large trench over ramp area |
| In-Nuffara | 2014 2015 | May March–April | Digital survey of plateau Silo Excavation Environmental sample processing |
| Santa Verna | 2014 2015 | March–April April–May | Digital and surface survey Large trench excavation of Temple site Environmental sample processing |
| Kordin III | 2015 | June–July | Trench excavation of Temple site Post-excavation environmental processing and recording of material culture |
| Skorba | 2016 | March–April | Sondage excavation of Temple site Environmental sample processing Lithic survey and analysis |
| In-Nuffara, Santa Verna | 2015 | June–July | Post-excavation processing and recording of material culture |
| Santa Verna, Ġgantija, Kordin III, In-Nuffara | 2016 | June | Post-excavation processing and recording of material culture |
| Taċ-Ċawla, Ġgantija | 2017 | June | Post-excavation processing/recording of material culture |

the selection of sites studied by *FRAGSUS*, they were not the only concerns. As the research questions above specify, the goals were to obtain samples from periods of prehistory that might inform on particular aspects of the environment, the economy, the diet, and the general lifestyle and development of prehistoric communities. Such samples needed to be of sufficient quantity and quality and be subjected to rigorous quantitative and scientific scrutiny. They mostly had to be freshly obtained through new excavation and coring, since little suitable sampling had been done in the past. Samples needed intact stratigraphic levels in reliable and meaningful locations containing undisturbed deposits. Careful prior research identified likely spots for sample collection. Only reconnaissance and subsequent investigation could reveal the detail of time and environment, and given the level of previous intervention and erosion, such places are difficult to locate or even recognize. When found, they offered spectacular windows (e.g. Santa Verna and Skorba) into the hidden. This was a parallel experience to that encountered by the same team in much larger island contexts such Sicily (Malone & Stoddart 2000), where pockets of deposition could be readily accessed. The *Project* was correspondingly ambitious regarding the number of sites it investigated, and only pursued those deemed to have appropriate intact windows into the past that covered the necessarily extensive time range. The chosen sites, described below, had particular attributes capable of contributing new knowledge that could justify intervention in the UNESCO World Heritage Sites and the expenditure of time and resources required.

By the end of the *Project*, the excavations resulted in one settlement zone around a probable water hole (Taċ-Ċawla), four temple sites (Ġgantija and Kordin III, where only one phase was examined; and Santa Verna and Skorba, which had deeper stratigraphies) and a Bronze Age settlement (In-Nuffara). Already collected samples were analysed from a further two prehistoric sites (Xagħra Brochtorff Circle and Tarxien) and one medieval site (Mdina). The sites of Taċ-Ċawla, Santa Verna and Skorba provided the most chronologically wide-ranging information; whereas Taċ-Ċawla, Santa Verna and Kordin III provided the most spatially informative data over the area of a single site.

The programme of work engaged substantial field teams at Taċ-Ċawla, Santa Verna and Kordin III. The main personnel at each of these sites were recruited from Queen's University Belfast, the University of Cambridge and the University of Malta respectively (see Acknowledgements for staff list).

The choice of site was designed to map on the *FRAGSUS* questions by contributing to understanding of the:

- 1a. Impact of human settlement on Malta
- 1b. Rate of deforestation, erosion, degradation
- 1c. Technical management of environment
- 2a. Socio-economic sustainability
- 2b. Role of temples in sustaining cultural-economic life
- 3a. Nature of agriculture
- 3b. Failure of agriculture
- 3c. Impact of diet, disease and stress on population
- 4a. Size and nature of the prehistoric population
- 4b. Role of demographic connectivity in maintaining sustainable life
- 5a. Socio-economic failure at the end of the Temple Culture
- 5b. Evidence for a hiatus between the Temple Culture and the Bronze Age, or at other times

As Table 1.3 shows, the sites each spanned slightly different time ranges, enabling the project to sample materials covering almost 5000 years which could address the five main questions and their sub-questions. (This table and the questions is revisited in the Conclusions, Chapter 14). Linking all of these questions and sites is the programme of AMS radiocarbon dating that was applied to all suitable material from the excavations. Table 1.3 also includes the previously excavated Xagħra Brochtorff Circle, the remains from which form the focus of Volume 3, and the manner by which those materials contribute to the *FRAGSUS* questions.

A number of other sites were considered for investigation, but were not included on the grounds of time, scope, access and uncertainty of their contribution to the *FRAGSUS* questions. These sites, nevertheless, continue to offer the potential for study by future generations of archaeologists. Ta' Marziena (Fig. 12.1), a probable temple site with a reasonable stratigraphy, was laser scanned, but its access would have required separate negotiation with a private land-owner. The main Bronze Age fortifications of Borġ in-Nadur on Malta were scanned (Fig. 12.2), but some work had already recently been undertaken (Tanasi & Vella 2011; 2015) and further work was logistically difficult. Xrobb l-Għagin, a temple site on Malta that is threatened by cliff collapse, was considered too dangerous to investigate. But this site has been scanned subsequently by members of the *FRAGSUS* team using drone facilitated technology. Għar ta' Ghejzu on Gozo was scanned, but had already been badly damaged and contained no deposits. The Xemxija burial chambers were scanned (Volume 3) and the skeletal remains recovered by Evans

Table 1.3. *Chronological range of FRAGSUS sites and their contribution to the project questions.*

| | Early Neolithic | Temple Period | Bronze Age | Later contexts | Q 1 | | | Q2 | | Q3 | | | Q4 | | Q5 | |
|--------------------------|-----------------|---------------|--------------|----------------|-----|---|---|----|---|----|---|---|----|---|----|---|
| | | | | | a | b | c | a | b | a | b | c | a | b | a | b |
| Taċ-Ċawla | 5400–5000 BC | 3700–2400 BC | 2400–2300 BC | Punic, Roman | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Ġgantija | | 2600–2500 BC | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ | | ✓ |
| Santa Verna | 5400–5100 BC | 3800–3100 BC | | Medieval | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ |
| In-Nuffara | | | 1100–1000 BC | | ✓ | ✓ | ✓ | | | ✓ | ✓ | | | ✓ | | |
| Kordin | | 3600–3100 BC | | | | ✓ | | ✓ | ✓ | ✓ | | ✓ | | ✓ | | |
| Skorba | 5400–4800 BC | 3600–3300 BC | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | ✓ |
| Xagħra Brochtorff Circle | | 3800–2350 BC | 2000–1600 BC | | | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

are considered by Jess Thompson in Volume 3, Chapter 13. Għar Dalam was scanned, but the deposits were considered too precious for further excavation. The south temple of Ġgantija was scanned but not considered for excavation, except on its margins, where excavation was undertaken as part of the project. The current state of the Xagħra Brochtorff Circle was scanned, but permission was not received for further limited excavation and conservation assessment. Finally, the Skorba phase site of Ta' Kuljat detected through the original Cambridge Gozo survey was identified for excavation, but considered logistically too problematic because of its relative inaccessibility and private ownership.

1.6.1. Taċ-Ċawla

The site of Taċ-Ċawla (Fig. 1.4) was selected because it was the only extensive known settlement site of the Neolithic that was accessible for study. Initial assessment in the 1990s had shown that structures were present, and that quantities of pottery and artefacts had been recorded that spanned from the earlier Neolithic to the Bronze Age. The land was in government ownership and the site was readily accessible by vehicles and available for new study, and importantly, it had demonstrated deep stratigraphy over parts of the site. The site was a remarkable survival within an urban area and could also be readily protected by the constant observation of local people. Its topographic position was interesting, overlooking a valley and a small temple (Ta' Marżiena) on a nearby ridge. Excavation trenches were permitted over areas previously exposed in the 1990s, and where backfill covered known archaeological levels. The extent of the site was expanded to limits agreed with the SCH.

1.6.2. Santa Verna

Santa Verna (Fig. 1.5) was selected because it is one of the few ruined 'temple' sites that is not a World Heritage Site, is not much visited by the public, and is located on accessible and undeveloped church land. The landscape surveys undertaken in the 1980s, 1990s and in 2014

demonstrated the existence of extensive archaeological material far beyond the few visible megalithic stones. This indicated a large and important complex of archaeological potential. Trump's work in the 1960s and the earlier study by Ashby and Bradley in 1911 (Ashby *et al.* 1913) offered promising insights to a long duration of Neolithic activity on the site, mirroring the discoveries by Trump at Skorba on Malta. Its topographic position at one of the highest points of the Xagħra plateau also pointed to its importance. The excavation trenches were permitted because areas external to the temple site had produced significant densities of surface pottery, or were located in the area previously excavated in the 1900s.

1.6.3. Kordin III

Kordin III (Fig. 1.6) was selected because it too had not received inscribed World Heritage Site status (although the status is now under review), was not much visited by the public (Borg 2007) and had considerable areas within the enclosed precinct that had not been excavated in the past. Early work at the site by Ashby had been promising (Vella 2004), but no work had been undertaken at the site since the 1950s, and no absolute dating had been done at all. Its tantalizing early 'temple' phases (identified by pottery at the site and its relatively simple architecture) indicated that a key-hole investigation could advance knowledge and demonstrate the site's value, date and history. In particular, work at this site was deemed to have the potential to fill in the elusive Mgarr phase. Excavation trenches were permitted only as determined by the SCH, and did not necessarily enable exposure of the logical extents of the temple structure.

1.6.4. Skorba

The temple site of Skorba (Fig. 1.7) was selected because it was the original chronological control site for absolute dating on Malta. With the massive advances in calibration and AMS methods of dating that have since taken place, it was felt that the chronology of the site should be tested, and the entire Maltese prehistoric



Figure 1.4. a) General view of Taċ-Ċawla in 2014, at the end of excavation, looking north-northeast; b) members of the 2014 team (McAdams, Malone, Hannah, Armstrong, Parkinson (all QUB) and Kay Mallia (UM)).



Figure 1.5. *a, b) General views of work at Santa Verna, 2015; c) Trump sondage, reopened in 2015; d) threshold slab within destroyed temple structure; e) Structure from Motion model of the south lobe of the temple under excavation.*



Figure 1.6. General views of work at Kordin III, 2015: a) excavation in Trench 1; b) Trenches 1 and 2 under excavation; c) some of the QUB/Cambridge Kordin III team preparing for work.



Figure 1.7. *General views of work at Skorba, 2016, and some of the team: a) the deep trench under excavation; b) the southern trench with the team at work; c) view over the 2016 trench with the enclosed Skorba temple monument beyond and the two early walls visible in the excavation trench.*

sequence calibrated accordingly. A very small trench, outside the fenced and protected World Heritage Site, was identified as the most suitable location to test the many early phases that Trump had identified in his work (1966). This work was permitted as it reopened previously studied areas and was external to the fenced area of the protected site (see Fig. 1.7). The opportunity to test three forms of chronological control were adopted. These were: ceramics from stratified deposits, AMS radiocarbon dates and a geoarchaeological OSL

sequence from the same stratigraphy that promised to allow important comparison.

1.6.5. Ġgantija

The area surrounding Ġgantija (Fig. 1.8) had already shown its promise not only during excavations by Evans and Trump, but also during the 1980s surveys of the Cambridge Gozo project, which showed the presence of several ceramic phases. The detection of a faultline, a spring line and intact well-formed soils during the



Figure 1.8. General views of work at Ġgantija, 2015: a) view of the terrace walls below Ġgantija and the site of the spring (visible at left, below palm trees); b) sondage at south end of the temple facade; c) section exposed beneath former office and WC under recording; d) commencement of excavation in 2015, temple facade in background; e) the trench at the end of investigation.



Figure 1.9. *a) General view of In-Nuffara, 2015; b) initial exposure and excavation of the silo pits; c) Bronze Age pottery under study from the In-Nuffara silo; d) the excavation team at the completion of work at In-Nuffara; e) pot washing of the Bronze Age pottery.*

FRAGSUS Project added considerable interest to the location. Four areas were targeted for small stratigraphic sondages at the edge of the megalithic terrace-forecourt. One test hole was placed to assess the depth of the twentieth century garden forecourt and terrace of the monument when it was planned to move a decorative palm tree from the monumental garden. A second

sondage was placed where intact soils had been detected by augering. The third sondage arose from additional opportunities provided by the removal of the block-built custodian's office and public conveniences, which had both been erected around 1960. This exposed an extent of stratified deposit, over a metre in depth with significant stratified levels extending below modern

material. Additional work included a geo-radar survey of the forecourt and the adjacent olive grove, where the excavation of a fourth small test trench was permitted. The interventions by *FRAGSUS* are extensively reported in Chapter 5, but it is important to note that the exposed deposits presented a serendipitous opportunity to test a number of hypotheses. These hypotheses included the age of Ġgantija, which was always supposed to be one of the ‘earliest’ temples because of its massive and crude stones and diagnostic pottery; the nature and age of the constructed forecourt; and the lost entrance ramp and megalithic entry to the site from downslope. Additional questions included the nature of the buried deposits, ancient soils and their contents. Permits for excavation were granted since either the trenches were in areas that had already been disturbed or reopened through management interventions, or they were particularly small (i.e. the deep sondage).

1.6.6. In-Nuffara

The selection of In-Nuffara (Fig. 1.9) the Middle Bronze Age fortified plateau site immediately south of Ġgantija, enabled the project to extend the study to the Middle and Later Bronze Age. This location was abandoned agricultural land, which was not difficult to access, provided that the bird hunting and trapping season was avoided. This work enabled assessment of environmental and economic change after the ‘Temple Period’, and also offered the opportunity to obtain absolute dating samples that would place those changes in a reliable chronology. No radiocarbon dates had ever been obtained for the Borġ in-Nadur phase before. As such, it was unknown when the Tarxien Cemetery phase ended or for how long the Bronze Age persisted in Malta. Such questions are valid, given the quite large number of Bronze Age sites across the islands, some of which have only come to light during the period of the *FRAGSUS Project*, such as the silos on the Citadella of Gozo that were found during conservation works. The permit was given to examine just two visible silos and their immediate surrounding area.

1.7. Additional studies

Maltese prehistory cannot be complete without a thorough and increasingly scientific assessment of its distinctive material culture. Pottery (Fig. 1.10), lithic tools and waste, stone objects such as querns and weights, personal ornaments, worked animal bone and shell occur on most prehistoric sites, and it was the aim of the *FRAGSUS Project* to integrate cultural materials with the contexts from which they came. Not only was there potential to use material culture in interpreting its function, but also of identifying and interpreting

chronology, style, external interactions, and possibly notions of value, aesthetic and ritual. Previous studies (e.g. Bonanno 1986a; Grima 2007; Malone 2007, 2008; Malone *et al.* 2009; Vella 2007) have long sought to make sense of the material record of Malta. But unless this material is linked to secure archaeological contexts, such work is inevitably of less value than when the original context is fully understood. It was the aim of *FRAGSUS* to undertake detailed scientific analysis of material culture (technology, style, raw material, connectivity, chronology and function) to explore links between the environment of the sites, time and natural resources. This approach has the potential to advance understanding of how an island culture responded to changes in the wider environment. The study of interaction through sourcing materials can reflect connectivity, which in turn may reflect on a society and its cultural practices and tastes. Such studies could dominate the project, and there is much ongoing potential for far more research in the future. Yet, here material culture is but a small element of the research. Our main focus falls on ceramics and the development of the existing typological scheme and on lithics and their materials. Other artefacts are recorded and reviewed more briefly. The main goal was to improve and advance chronological understanding between absolute dating estimates and material things. Nevertheless, these monograph reports aspire to advance our knowledge, to add to the collected archives of the past, and add a small step on the long route to better understanding of ancient Malta and its changing worlds.

1.8. Environmental and economic archaeology

A principal goal of the project was to extract economic data from the excavated sites. It is almost impossible to locate reliable samples of animal bones or plant remains without breaking the surface of the ground, and thus excavation was targeted towards locations that had potential to yield economic material in stratified ancient rubbish. The ideal location would be a pit full of organic remains that painted the complete picture of Maltese economic life over millennia. Unfortunately, such contexts only occur in the Bronze Age, hence the work at In-Nuffara to extract one such sample. Earlier prehistoric sites are far more challenging, because, although there are remarkable plaster floors and sealed deposits, Temple Period people were too tidy and too clean! They removed their rubbish, swept their floors, and seem to have undertaken their food processing activities mainly off-site, with the result that samples are rarely large or very promising. What remains of carbonized seeds or broken bones tend to be eroded, gnawed, crushed and trampled, suggesting they were



Figure 1.10. Ceramic processing and finds work: a) Parkinson and Brogan sorting pottery in the courtyard of the Auberge de Provence; b) Coyle McLung recording pottery; c) pottery processing in the Auberge de Provence; d) Bates and Armstrong undertaking flotation in Gozo; e) sieving at Santa Verna; f) Ashley drawing artefacts in the University of Malta.

Table 1.4. Summary table of the archaeological discoveries made by FRAGSUS.

| | Context sheets | Site photos | Site drawings | No. bulk Soil samples processed | Volume soil processed (litres) | Micromorphology samples | Special finds | Animal bones identified | Pottery sherds | Pottery weight (kg) | Finds photos | Pottery drawings | Other drawings | Radiocarbon dates |
|---------------|----------------|-------------|---------------|---------------------------------|--------------------------------|-------------------------|---------------|-------------------------|-------------------|---------------------|--------------|------------------|----------------|-------------------|
| Taċ-Ċawla | 306 | 798 | 107 | 122 | 1255 | 20 | 528 | 1430 | 50,679 | 392 | 2034 | 293 | 41 | 33 |
| Ġgantija | 40 | 119 | 10 | 26 | 292 | 15 | 10 | 82 | 6466 | 67 | 108 | 126 | 2 | 11 |
| Santa Verna | 122 | 905 | 50 | 49 | 863 | 6 | 161 | 547 | 21,546 | 185 | 1046 | 247 | 84 | 23 |
| In-Nuffara | 46 | 213 | 4 | 23 | 763 | 3 | 16 | 321 | 6000 | 150 | 152 | 26 | 0 | 5 |
| Kordin | 203 | 1696 | 92 | 124 | 1226 | 2 | 196 | 193 | 18,766 | 115 | 508 | 96 | 64 | 15 |
| Skorba | 30 | 205 | 9 | 27 | 223 | 3 | 6 | c. 100 | 5859 | 53 | 180 | 54 | 13 | 6 |
| Other sites | | | | | | | | | | | | | | 95 |
| Totals | 747 | 3936 | 263 | 344 | 4399 | 46 | 911 | c. 2700 | c. 110,000 | 962 | 4028 | 842 | 204 | 188 |

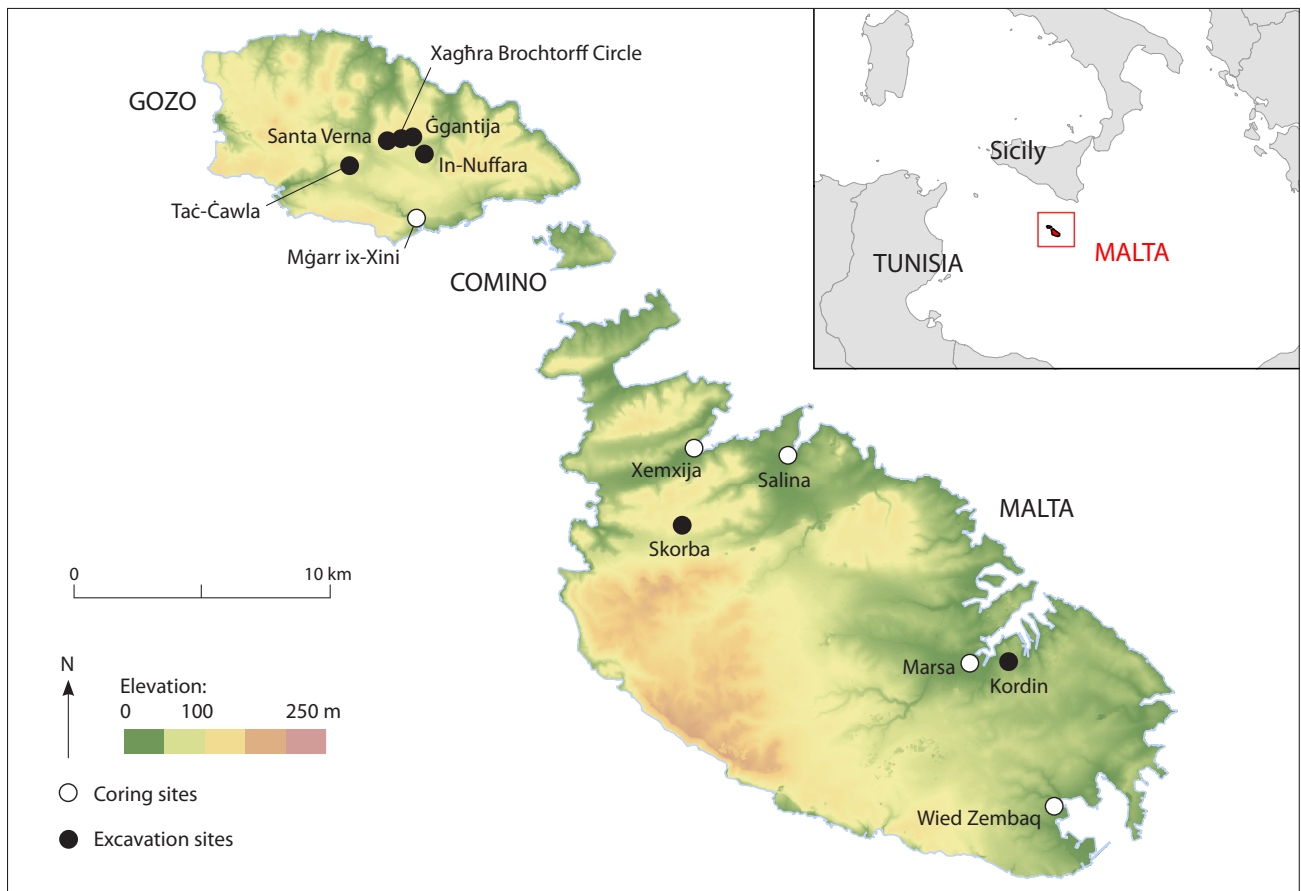

Figure 1.11. Location map of sites investigated by the FRAGSUS Project.

Table 1.5. Chronological range of prehistoric and later sites in the FRAGSUS study as revealed by the dating campaign of the project.

| Period | Phase | Start | End |
|---------------|--------------------------|---------|---------|
| Neolithic | Pre-Skorba | 6000 BC | 5400 BC |
| | Early Neolithic | 5400 BC | 4600 BC |
| | Fifth millennium hiatus | 4600 BC | 3800 BC |
| Temple Period | Żebbuġ | 3800 BC | 3600 BC |
| | Mġarr transitional phase | 3600 BC | 3400 BC |
| | Ġgantija | 3400 BC | 3200 BC |
| | Saflieni | 3200 BC | 2850 BC |
| | Tarxien | 2850 BC | 2350 BC |
| | Thermi | 2350 BC | 2100 BC |
| Bronze Age | Tarxien Cemetery | 2350 BC | 1600 BC |
| | Borġ in-Nadur / Bahrija | 1600 BC | 750 BC |
| Historic | Phoenician / Punic | 750 BC | 250 BC |
| | Roman / Byzantine | 250 BC | AD 870 |
| | Arab / Norman | AD 870 | AD 1530 |
| | Knights | AD 1530 | AD 1798 |
| | Modern | AD 1798 | Present |

probably exposed in a dusty domestic yard or rubbish heap before being finally buried in a deposit. The best means to sample such unpromising material is an effective sampling strategy that ensures sufficient diagnostic pieces are collected through a programme of

systematic sediment sampling for small items, and, in the case of bone, very careful excavation. The *FRAGSUS Project* invested in such sampling, collecting a total of 4399 litres of soil from secure deposits for flotation, and retained every fragment of recognizable bone during excavation. Below, Table 1.4 records the statistics of activities, samples, photos, sherds and so on that accumulated as samples were processed during the three years of *Project* fieldwork (Fig. 1.10). Such figures are remarkable for the Maltese context, and demonstrate the intensive level of labour and dedication shown by the project participants.

1.9. Conclusions

This volume addresses many of the themes posed by the original research questions by examining each site and its particular period and past history through interdisciplinary approaches. The methodologies applied were relatively well tested, and excavation methods inevitably are standardized and rigorous with little room for much innovation. Some scientific applications and digital scanning approaches were relatively new when the project was conceived in 2012. Now, eight years later, many other opportunities have emerged that, in hindsight, may have presented different ways of analysing and thinking about the discoveries that were made, and indeed, posed different types of research

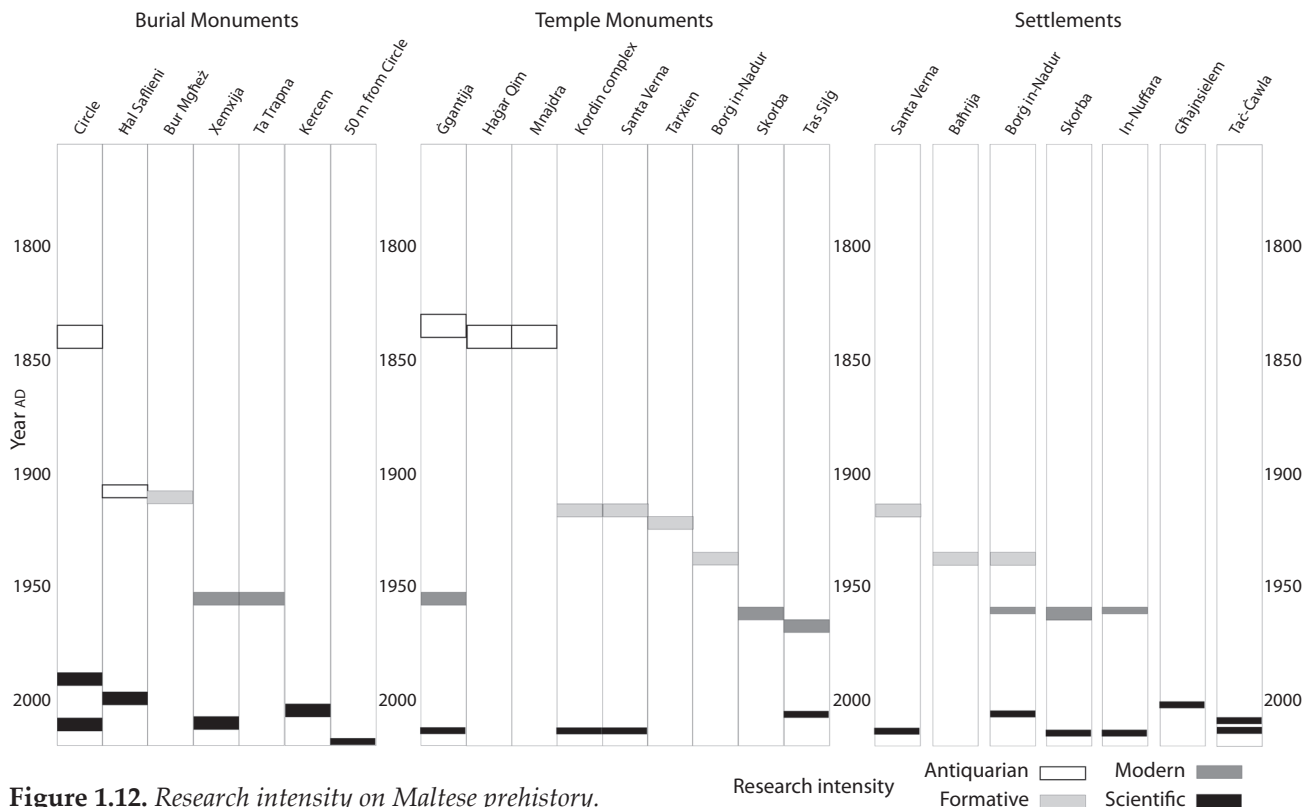


Figure 1.12. Research intensity on Maltese prehistory.



Figure 1.13. Images of scholars and fieldworkers of Maltese prehistory: a) Renfrew and Malone at Hagar Qim in front of display, 2018; b) Bonanno and Gouder, 1994; c) visit to Hagar Qim, from left to right: Hunt, Keefe, Renfrew, Malone and Stoddart.

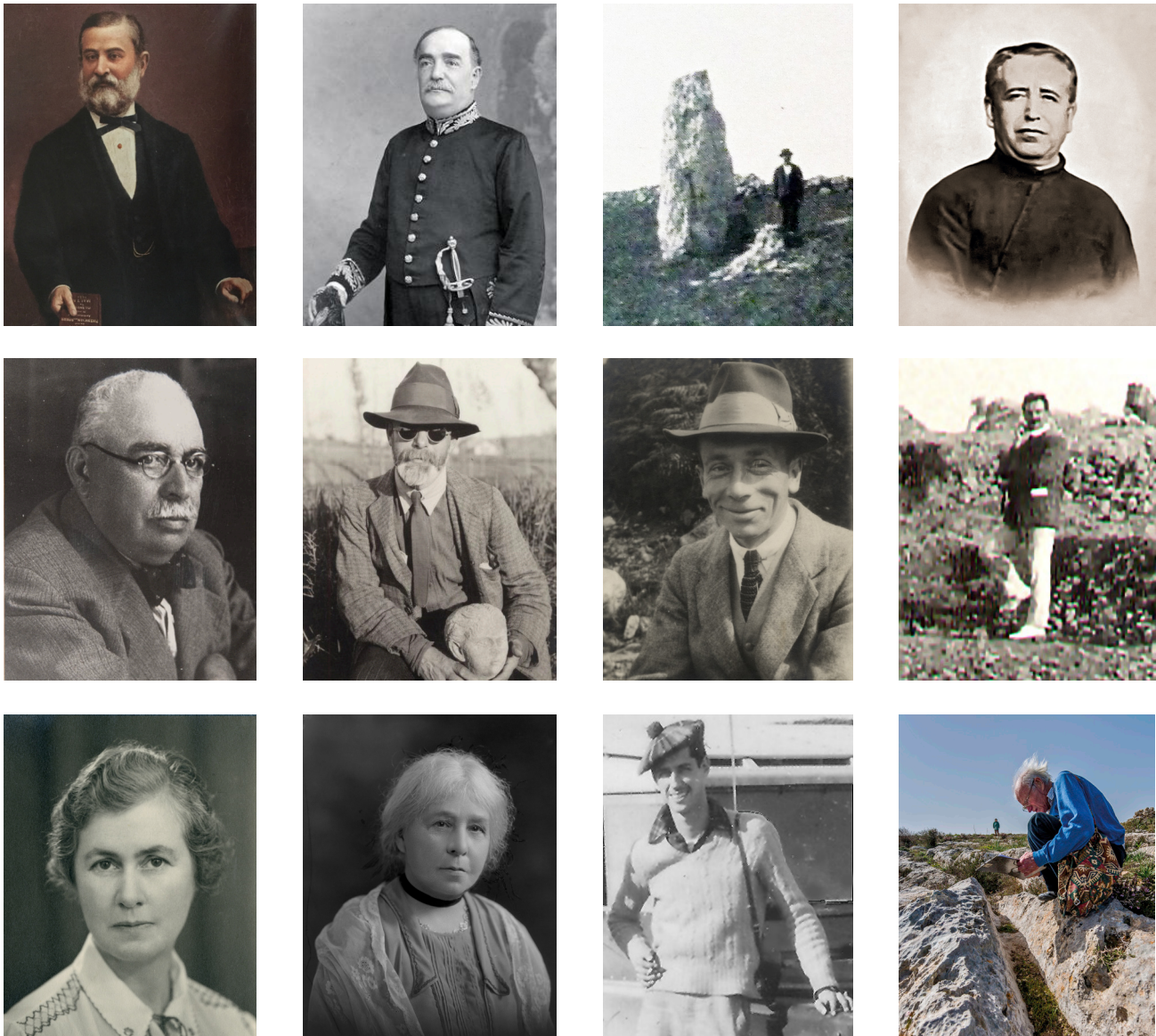


Figure 1.14. Research pioneers of prehistoric Malta, from top left: A.A. Caruana (University of Malta); N. Tagliaferro; A. Mayr; Father E. Magri (with permission from 'the Jesuit Delegate for Malta, Society of Jesus'; photo Daniel Cilia); T. Zammit (reproduced with permission, National Museum of Archaeology, Malta); T. Ashby (BSR Photographic Archive, BS collection, bs-0143); E.T. Peet (reproduced with permission: Griffith Institute Photograph 101.141; © Griffith Institute, University of Oxford); R.N. Bradley; G. Caton-Thompson (photographed by Ramsey & Muspratt, Cambridge, 1938; © courtesy of the RAI); M. Murray (reproduced with permission, NPG London); J.D. Evans (reproduced with thanks to his family); and D.H. Trump (photo Daniel Cilia).

questions too. Nevertheless, the collected data and wealth of ideas that have resulted from this collaborative and interdisciplinary work provide a point of reference for ongoing and future investigations into the rich prehistory of Malta. The goal – as set out in the many questions listed above – is to interrogate the nature of the world in which the Temple People lived, and the manner by which it emerged, was sustained and changed. The

three volumes collectively have achieved an important exercise in cross-disciplinary research to tackle these questions. They also pay homage to the scholars who went before and who developed the understanding of cultural sequence and the many questions that emerge; and we illustrate some of the fieldworkers and scholars who have formed the study and data collection of prehistoric Malta (Figs. 1.13 & 1.14).

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.

Editors:

Caroline Malone is a Professor in the School of Natural and Built Environment, Queen's University Belfast.

Reuben Grima is a Senior Lecturer in the Department of Conservation and Built Heritage, University of Malta.

Rowan McLaughlin is Senior Researcher in the Department of Scientific Research at the British Museum, and previously Research Fellow for the *FRAGSUS Project*; he is honorary research scholar at Queen's University Belfast.

Eóin W. Parkinson completed his PhD at Cambridge University and is currently Leverhulme Research Fellow at the University of Malta.

Simon Stoddart is Reader in Prehistory in the Department of Archaeology, University of Cambridge.

Nicholas C. Vella is Associate Professor of Mediterranean Archaeology in the Department of Classics and Archaeology, University of Malta.

*Published by the McDonald Institute for Archaeological Research,
University of Cambridge, Downing Street, Cambridge, CB2 3ER, UK.*

Cover design by Dora Kemp and Ben Plumridge.

ISBN: 978-1-913344-03-0

