UCLA
UCLA Electronic Theses and Dissertations

Title

Divergence in Decoration: Opaque Red Glass in Iron Age and Roman Provincial Temperate Europe

Permalink

https://escholarship.org/uc/item/4gk5r3v1

Author

Wood, Rachel

Publication Date

2025

Peer reviewed|Thesis/dissertation

eScholarship.org Powered by the California Digital Library
University of California

UNIVERSITY OF CALIFORNIA

Los Angeles

Divergence in Decoration:

Opaque Red Glass in Iron Age and Roman Provincial Temperate Europe

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Archaeology

by

Rachel Lindsay Wood

2025

© Copyright by

Rachel Lindsay Wood

2025

ABSTRACT OF THE DISSERTATION

Divergence in Decoration:

Opaque Red Glass in Iron Age and Roman Provincial Temperate Europe

by

Rachel Lindsay Wood

Doctor of Philosophy in Archaeology

University of California, Los Angeles, 2025

Professor Sarah Elizabeth Beckmann, Co-Chair

Professor Sarah P. Morris, Co-Chair

This research investigates the socio-cultural significance of opaque red glass decoration on metalworks in temperate continental Europe and Britain from the Iron Age (4th c. BCE) to the Roman imperial period (c. 2nd c. CE). Through an interdisciplinary approach of archaeological anthropology, art history, and materials science, this dissertation analyzes opaque red glass as a window into indigenous value systems, social networks, and traditions of manufacture, as to prioritize indigenous agency and bring attention to material evidence for Roman epistemicide.

In this dissertation, I address indigenous value and social networks of opaque red glass decoration through the study of personal and portable metal objects in the *longue durée* and on a

large geographic scale. The production, consumption/display, and depositional practices of metal goods with opaque red glass appliqués are investigated using various postcolonial and anticolonial approaches, including but not limited to epistemicide, human and non-human agency, and objectscapes. To question and evaluate perceived changes in opaque red glass consumption and colorant around the time of Roman invasion and colonization of certain regions of temperate continental Europe, glass samples from Mont Beuvray, France, are analyzed using LA-IPC-MS and EPMA.

The study argues that Iron Age value systems linked to opaque red glass decoration were devalued by the Roman imperial system, although the impact varied from location to location. In the Three Gauls, the elite or aristocratic classes of temperate Europe were compelled to capitulate their values to maintain power under the Roman imperial project. By contrast, certain Iron Age values, such as those which rested in martial strength and prowess, survived in areas such as at the *limes* of Roman Britain and the Lower Rhine, perhaps driven by auxiliary leadership. Local fringe artisans trained in glass and enamel arts continued to practice their art in these areas, and expand the uses of color, leading to the secondary or tertiary use of opaque red glass. In summary, this thesis contextualizes opaque red glass objects and material culture broadly in ongoing dialogues about the effects of Roman conquest and colonization on indigenous crafting, culture, and societal organization.

The dissertation of Rachel Lindsay Wood is approved.

Stella E. Nair

John K. Papadopoulos

Greg Woolf

Sarah Elizabeth Beckmann, Committee Co-Chair

Sarah P. Morris, Committee Co-Chair

University of California, Los Angeles

2025

To my mom, who encouraged me to enjoy the outdoors and played with me in the dirt as a child.

I think you started my archaeological training as a toddler.

TABLE OF CONTENTS

LIST OF FIGURES…….....ix
LIST OF TABLES ……... xii
ACKNOWLEDGEMENTS …… xiii
1. MAKING THE OPAQUE, CLEAR: OPAQUE RED GLASS IN IRON AGE AND TEMPERATE EUROPE …….……..…..…..…..…...…..…..……. 1
1.1 Introduction …….. 1
1.2 A Red Roadmap: Description of Chapters ...…… 3
1.3 A Brief Background: Archaeology and History of Continental Temperate Europe 6
1.3.1 Experiences of Elites: From Iron Age to Roman Gaul ...……. 10
1.4 A Short Synthesis: Archaeology and History of Britain ...……...……. 12
1.4.1 Experiences of Elites: From Iron Age to Roman Britain ...……..…… 15
1.5 The State of the Subject: Opaque Red Glass in Iron Age and Early Roman Europe ……. 16
1.6 Archaeological Approaches: Theoretical Influences in the Dissertation ...…...……. 19
1.6.1 Postcolonial Theory ……..……..……...….. 19
1.6.2 Anticolonial Theory ...……...……...… 27
1.6.3 Technology and Social Network Theories …...…… 29
1.6.4 Color and Value Theories ……...……..… 30
1.7 Finishing Touches: Some Final Notes…… 32
2. ORGANIZING OBJECTS: A DATABASE FOR METALS DECORATED WITH OPAQUE RED GLASS IN TEMPERATE EUROPE AND BRITAIN ……. 33
2.1 Introduction …… 33
2.2 Time and Topography: The Chronological and Geographical Limits of the Study ……. 33
2.3 Recovering Red: Site Types with Opaque Red Glass ...……. 35
2.3.1 Funerary Sites …….…….……...…..……... 35
2.3.2 Rivers and Sanctuaries ……. 36
2.3.3 Settlements ……... 37
2.3.4 Hoards …….. 38
2.4 Collection and Classification: Object Types in the Database …… 39
2.4.1 Nails/Rivets and Buttons/Studs .....,.....……..... 41
2.4.2 Fibulae …….……. 43
2.4.3 Jewelry: Bracelets and Disc Torques ……...…… 44
2.4.4 Belts ……. 46
2.4.5 Arms and Armament …… 47
2.4.6 Chariots and Horse Harnessing …… 48
2.4.7 Oenochoes …… 52
2.5 Final Notes: Success and Shortcomings …… 52

3. THE ORIGINS OF OPAQUE RED GLASS IN TEMPERATE EUROPE: FAIENCE, GLASS, AMBER, AND CORAL 54
3.1 Introduction 54
3.2 The Fascinating Beginnings of Faience and Glass 55
3.3 Amplifying with Amber: Creating a Visual Code 59
3.4 Coloring with Coral: Expanding a Visual Code 62
3.5 Decoding Coral Decoration: Moral, Esteem, and Measure Values 68
3.5.1 The Esteem Value of Coral in Temperate Europe 69
3.5.2 The Moral Value of Coral in Temperate Europe 71
3.5.3 The Measure Value of Coral in Temperate Europe 72
3.5.4 Variances in Values Amongst Elites: Summarizing the Value of Coral 73
3.6 Finishing Touches: Some Final Notes 77
4. Tracing Transitions: From Coral to Opaque Red Glass 79
4.1 Introduction 79
4.2 Mapping Metalworks: Common Objects Across the Centuries 81
4.3 Establishing Emblems: Shared Visual Language in the Late Iron Age 86
4.4 Coded Colors: Reading the Symbolism of Opaque Red Glass 87
4.5 Verifying Value and Navigating Networks in Shifting Spaces 89
4.5.1 The Measure Value of Opaque Red Glass within the Iron Age Social System 96
4.5.2 The Esteem Value of Opaque Red Glass within the Iron Age Social System 97
4.5.3 The Moral Value of Opaque Red Glass within the Iron Age Social System 100
4.6 Finishing Touches: Some Final Notes 104
5. Variance in Values: Opaque Red Glass in the Western Roman Provinces 107
5.1 Introduction 107
5.2 Investigating Invasion: Romans in Continental Temperate Europe 109
5.3 Proliferate Production: Glass Working in the Western Roman Provinces 110
5.4 Market Matters: The Consumption of Opaque Red Glass 114
5.5 Verifying Value and Navigating Networks in Provincial Places 118
5.6 Losing Lifeways: Epistemicide in the Three Gauls 119
5.7 Variances in Valuation Amongst Elites 121
5.7.1 The Moral Value of Opaque Red Glass in the Gallo-Roman System 126
5.7.2 The Esteem Value of Opaque Red Glass in the Gallo-Roman System 127
5.7.3 The Measure Value of Opaque Red Glass in the Gallo-Roman System 129
5.8 Changed Systems, Changed Values, Changed Networks 130

5.9 A Rupture for Red: Disruption in Traditions of Manufacture ……. 131
5.10 Finishing Touches: Some Final Notes ……... 133
6. Integrating Identities: Opaque Red Glass in Pre-Roman Iron Age and Roman Britain ….. 136
6.1 Introduction …….. 136
6.2 Cultural Contexts and Social Situations: Pre-Roman and Roman Britain ……... 138
6.3 Glassy and Glamorous: The Glass Industry in Britain 141
6.4 Colorful Costumes and Embellished Elements: Enamel Arts in Roman Britain …. 143
6.5 Verifying Value and Navigating Networks in "The Final Frontier" …..…..…..... 155
6.6 Variances in Valuation Amongst Elites ……... 157
6.6.1 The Moral Value of Opaque Red Glass in the Romano-British System ……. 159
6.6.2 The Esteem Value of Opaque Red Glass in the Romano-British System ……. 162
6.6.3 The Measure Value of Opaque Red Glass in the Romano-British System ……..... 163
6.7 Changed Systems, Changed Values, Changed Networks …… 164
6.8 Mixed Materials: Hybrid Objects and Traditions of Manufacture …….……. 165
6.9 Finishing Touches: Some Final Notes ……. 167
7. Researching Refuse: Incorporating Archaeometric Data from Mont Beuvray 169
7.1 Introduction …….. 169
7.2 Decoding Data: Previous Analyses of Opaque Red Glass ……... 172
7.2.1 Compositions of Opaque Red Glass …….…. 173
7.2.2 Coloration of Opaque Red Glass ……... 175
7.2.3 Dating Opaque Red Glass …….. 176
7.3 Retesting Red: Previous Data and Recent Analyses of Opaque Red Glass at Mont Beuvray …… 178
7.4 Analytical Technique: LA-ICP-MS ……. 185
7.4.1 Reading Results: Composition of Opaque Red Glass using LA-ICP-MS ……. 187
7.5 Analytical Technique: EPMA …….. 193
7.5.1 Reading Results: Composition of Opaque Red Glass using EPMA ….. 195
7.6 Complicating Colonialism: Fringe Artisans in the Three Gauls …….…. 197
7.7 Finishing Touches: Some Final Notes ……. 202
8. Crossing Chronologies: Opaque Red Glass in Temperate Europe …….. 204
8.1 Introduction …….…. 204
8.2 Observing the Opaque: Opaque Red Glass Decoration and Epistemicide …….. 205
8.3 Combining Colors: Polychrome Enameling in the Roman Northwestern Provinces …….. 209
8.4 Finishing Touches: Some Final Notes ……..... 211

BIBLIOGRAPHY ……. 215

LIST OF FIGURES

Figure 1. Map of the "Celtic" world marking indigenous groups. Those in regions colored brown-yellow were referred to as Celts by Greek and Latin authors (Celts, Celtiberians, Galatians, and Galli). The regions colored in green were inhabited by groups that spoke Celtic but were not referred to as Celtic. The regions colored in blue represent groups whose linguistic and ethnic affiliation is uncertain. After Rieckhoff 2012: 27. ……... 2
Figure 2. Group of copper-alloy objects with opaque red glass decoration. Photos taken by Rachel Wood at the British Museum (A-C), and Musée de Bibracte (D). A: Strap union, Canterbury, Kent, England, accession number BM 1876,0707.4. B: Strap fitting (blue and white glass additions), Westhall Hoard, Suffolk, England, accession number BM 1855,0519.9. C: Stud, Hertford Heath, Hertfordshire, England, accession number BM 1958,0704.73. D: Harness piece with enameled head, Mont Beuvray, Burgundy, France, accession number MB 2015-019-1282-004. © The Trustees of the British Museum. ……... 17
Figure 3. Three small ring beads produced at Frattesina, found in Tomb 91 at Terni, dated 950-800 BCE. After Yatsuk et al. 2023: 3-4. …….. 57
Figure 4. Bead produced at Frattesina with opaque red glass bands, found in Bronzetti Sardi grave at Vulci, dated 850-825 BCE. After Yatsuk et al. 2023: 3-4. …… 57
Figure 5. Amber necklace, Iron Age, last half of 6th c. BCE, found in Magdalenenberg, Baden-Württemberg, Germany. After Bittel et al. 1981: 149. ……... 61
Figure 6. Iron Age fibulae with red coral insets filling circular punctures, found at Brignano Frascata in northwestern Italy, dated 7th c. BCE. After Berruto et al. 2023: 2-3. …… 63
Figure 7. Copper alloy and coral brooch, Iron Age, c. 500-400 BCE, found at Wargemoulin in France. D. 3.23cm, L. 2.6cm. British Museum. Accession number ML. 1703. © The Trustees of the British Museum. ……. 66
Figure 8. Hochdorf couch, Iron Age, c.530 BCE, found at Eberdingen-Hochdorf in Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe 2012: 222. ……... 66
Figure 9. One of eight wheeled female figurines (casters) decorated with coral insets, Eberdingen-Hochdorf couch, Iron Age, c. 530 BCE, found at Eberdingen-Hochdorf, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe 2012: 223. ……... 67
Figure 10. Bronze cauldron with reclined felines, Iron Age, c. 530 BCE, found at Eberdingen-Hochdorf, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe and Schorer 2012: 24. ……. 75
Figure 11. Bronze krater. Vix Burial, Burgundy, France. c. 500 BCE. Musée du Pays Châtillonias, Châtillon-sur-Seine. JSTOR images. …….. 76
Figure 12. Drawing of vasiform fibula of the Heuneburg type, found in a burial at Erlangen-Kriegenbrunn, Germany, dated late 6th to early 5th c. BCE. After Chaume and Ney 2015: 62. 76
Figure 13. Cast openwork bronze plaque inlaid with opaque red glass, Late Iron Age, c. 150-1 BCE, found at Mont Beuvray, France. L. 2.3cm. Centre Archéologique Européen. Accession number 2005-039-009-004. Photo by Rachel Wood. …….. 80
Figure 14. Nail/rivet with opaque red glass piece attached to the top of the object, Late Iron Age, c. 150-1 BCE, found at Mont Beuvray, France. L. 2cm. Centre Archéologique Européen. Accession number 2003-032-1099-010. Photo by Rachel Wood. ……... 80

Figure 15. Bronze harness mount with opaque red glass decoration. Roman imperial, c. 50-150 CE, found at Polden Hill, England. British Museum. Accession number 1899,0706.77. Photo by Rachel Wood. © The Trustees of the British Museum. ……..……. 85
Figure 16. Disc torque with opaque red glass decoration in form of rounded pieces riveted in place and sunken enamel, Iron Age, 4th/3rd c. BCE, from Gäufeld-Nebringen, Böblingen, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hauschild 2012: 260. ……..….. 91
Figure 17. Roman wall mosaic with coral and shell decoration, Roman Republican, 3rd to 2nd c. BCE, from Rome, Palatine Hill. Image from the Italian Ministry of Culture and published by BBC. …… 94
Figure 18. Drawing of woman's bronze belt, decorated with opaque red glass, from Cuperly, Marne, France. 3rd c. BCE. After Challet 1992, pg. 76, fig. 31..…… 99
Figure 19. Clear glass cup, mold-blown, possibly from the Workshop of Ennion in Greece (?), Roman imperial, first half of 1st c. CE. H.6.9cm. Getty Museum. Accession number 95.AF.60. CC0 1.0 Universal Deed. ……... 111
Figure 20. Dark blue beaker, free-blown, polished, Roman imperial, first half of 1st c. CE. H. 6cm. Getty Museum. Accession number 2003.362. CC0 1.0 Universal Deed. ……. 111
Figure 21. Amber colored ribbed bowl, Roman imperial, 1st c. CE, unknown provenance. H. 11.8cm. Getty Museum. Accession number 78.AF.27. CC0 1.0 Universal Deed. …… 112
Figure 22. Translucent yellow glass gladiator cup, mold-blown, Roman imperial, probably Gaul. H. 7.1cm. Corning Museum of Glass. Accession number 54.1.84. Image licensed by The Corning Museum of Glass, Corning, NY (www.cmog.org), under CC BY-NC-SA 4.0. ……. 114
Figure 23. Opaque red glass cast bowl with unknown maker. End of 1st c. BCE to beginning of 1st c. CE. Getty Museum. Accession number 2003.232. …….. 129
Figure 24. Strap fitting with opaque red, opaque white, and translucent blue glass decoration, from the Westhall Hoard, Suffolk, England. British Museum. Accession number 1855,0519.10. Photo by Rachel Wood. © The Trustees of the British Museum. ……. 144
Figure 25. Copper alloy mount with opaque red glass, from Farnsfield, Nottinghamshire, England. British Museum. Accession number 2008,8026.1. Photo by Rachel Wood. © The Trustees of the British Museum. …… 148
Figure 26. Copper alloy strap-fitting decorated with opaque red, blue, and white enamels, from the Westhall Hoard, Suffolk, England. British Museum accession number 1855,0519.9. Photo by Rachel Wood. © The Trustees of the British Museum. ……. 149
Figure 27. Copper alloy terret decorated with opaque red, blue, and white enamels, from Westhall Hoard, Suffolk, England. British Museum accession number 1855,0519.1. Photo by Rachel Wood. © The Trustees of the British Museum. ……. 149
Figure 28. Copper alloy linch pin decorated with opaque red glass, from Kings Langley, Hertfordshire, England. British Museum accession number 1940,0203.1. Photo by Rachel Wood. © The Trustees of the British Museum. ……. 150
Figure 29. Copper alloy strap union decorated with opaque red glass, from Canterbury, Kent, England. British Museum accession number 1876,0707.4. Photo by Rachel Wood. © The Trustees of the British Museum. …… 150
Figure 30. Copper alloy strap union decorated with opaque red glass, from Polden Hill, Somerset, England. British Museum accession number 1889,0706.77. Photo by Rachel Wood. © The Trustees of the British Museum. ……. 151

Figure 31. Copper alloy mount decorated with opaque red glass, from Polden Hill, Somerset, England. British Museum accession number 1899,0706.78. Photo by Rachel Wood. © The Trustees of the British Museum. …… 151
Figure 32. Copper alloy dragonesque brooch decorated with opaque red and blue enamels, from the British Isles. British Museum accession number POA.201. © The Trustees of the British Museum. ……. 154
Figure 33. Archaeological map of Mont Beuvray with toponyms. After Buchsenschutz et al. 1998: 11. ……...……...…….…… 181

LIST OF TABLES

Table 1. Object types based on period. ……..…… 82-83
Table 2. Known opaque red glass vessels (in full or partial remains). Boschetti 2011 and Wood 2025 (diss.). …….……...…. 115-116
Table 3. Objects studied at the British Museum. …….……... 146-147
Table 4. Sealing-wax red glass formulae. After Bandiera 2021. ……..…. 177
Table 5. Table of instrument parameters (LA-ICP-MS). After Occari et al. 2019. ……..…. 187
Table 6. LA-ICP-MS results of 20 opaque red glass samples from Mont Beuvray, France. … 189
Table 7. Average chemical composition in wt % of sealing wax red glass base composition from Mont Beuvray using LA-ICP-MS. ……. 189-190
Table 8. Compositional comparisons of sealing-wax red glass recorded by Bandiera 2021 compared to LA-ICP-MS results from Mont Beuvray samples. ……... 191
Table 9. Average chemical composition in wt % of the base glass (sealing wax red) from different regions recorded by Bandiera 2021 and compared to glass composition from Mont Beuvray. ……. 191
Table 10. Average chemical composition in wt % of the sealing wax red glass from different regions. La Tène/Continental, Celtic/Insular, and Hellenistic/Roman and including dissertation data (Mont Beuvray). After Bandiera 2021: 52. …… 191
Table 11. Base compositions of 8 samples from Mont Beuvray from Brun and Pernot 1992. ……. 192
Table 12. Average compositional comparisons of sealing-wax red glass samples at Mont Beuvray recorded by Brun and Pernot 1992 (8) compared to dissertation study samples (20). …….…… 192
Table 13. Average chemical composition in wt % of red brown samples from the 3rd c. BCE to 4th c. CE. After Bandiera 2021: 56-59. ……. 193
Table 14. Table of instrument parameters (EPMA). Personal email communication with Dr. Brian Damiata. ……... 195
Table 15. EPMA results of 19 opaque red glass samples from Mont Beuvray, France in wt %. ……. 196
Table 16. Comparison of average composition of base glass according to EPMA and LA-ICP-MS, in wt %. …….. 196
Table 17. Comparison of major oxides in wt% of sealing-wax red samples from Mont Beuvray using EPMA and LA-ICP-MS. …….. 197

ACKNOWLEDGEMENTS

There are so many people whom I need to thank for helping make this Ph.D. project possible, but I want to start with the institutions which supported this research. First, I'd like to thank The Rust Family Foundation Archaeology Grants Project, the Robert Anderson Trust, and the Cotsen Institute of Archaeology for funding my archaeological research and travel in the United States, France, and the United Kingdom. I would also like to thank the archaeology department at the University College London. I contacted Dr. Ian Freestone because I wanted to analyze glass samples and was very lucky to speak with him about my research when I visited, as he is a fountain of ancient glass knowledge. Thanks to him, I was able to work closely with his former student, Dr. Liam Richards – congratulations to finishing your Ph.D., Liam, and thank you for analyzing those samples and meeting with me so often to explain the chemistry of glass. I'm excited to continue working with you in the future – we have so much to publish.

Next, I'd like to thank the Corning Museum of Glass for supporting my research through the David Whitehouse Residency. The library and archival staff at the Rakow Research Library helped me access materials which I couldn't have accessed easily in California. My host, Ann Jackle, was MVP at the Corning Museum: she introduced me to the glass artisans in The Studio and curatorial and conservation staff members. Through her, I worked closely with numerous individuals: curator of antiquities Dr. Kate Larson, whose knowledge of Hellenistic glass expanded mine; conservator Astrid van Giffen, who helped me pXRF the Egyptian red glass at the museum so I could learn more about other red glasses in the ancient Mediterranean; and Harry Seaman, facility manager of The Studio at Corning, who carefully and patiently explained modern glass formulas and glass working techniques to me. I'd also like to thank my housemate

during the residency, artisan-in-residence Kim Harty, whose knowledge and passion for glass brought forth great conversations about the subject.

I must also extend my thanks to Dr. Sophie Adams, curator of the European Iron Age and Roman Conquest Period in the Department of Britain, Europe and Prehistory at the British Museum. After submitting my study room application, Sophie had to deny access to two objects I hoped to see – but quickly offered to let me study 10 others in their place. Our conversations about opaque red glass and metal objects from the Iron Age and early Roman period taught me so much about glass and metal arts in southern Britain, and I was able to fly from there. I would also like to thank my best friend, Carla Russo, who happened to be working at the British Museum as a conservator at the time and introduced me to Dr. Adams. Carla and I have been part of each other's support systems since we first excavated together in 2015. I apologized a few times for that trip to France I dragged her on for my Ph.D. research, since I forgot to tell her we'd be hiking uphill to visit Iron Age sites. She *did* like the sites, though.

The last institution and group of people I would like to thank are the field workers, staff members, and researchers at the European Research Center in Glux-en-Glenne, and the archaeological museum and site of Mont Beuvray. Greg helped me contact Dr. Sophie Krausz and join her excavation team at the site, and I appreciate her support and acceptance to the excavation. I would also like to thank Hélène Duchamp, conservator at the research center, who helped me study a number of opaque red glass objects uncovered during excavations at the site.

Special thanks are to Dr. Vincent Guichard, the General Director of Bibracte EPCC, whom I could not have completed this dissertation without. Vincent permitted access to anything I needed at the research center and the museum, and gave permission to test glass samples from the archaeological site. He helped me contact Dr. Michel Brun and other individuals who studied

glass from the site before his tenure as director, set up my residency there during the summer of 2023, and even picked me up from Autun and drove us to the research center. His desire to expand research at the site to young scholars outside of Europe is fulfilled, and I look forward to future publications and research at the site in my future academic career.

There are many other academics whom I would like to thank. First, I would like to start with Dr. Nancy de Grummond, who wasn't at all involved in this project, but was my mentor and advisor in my undergraduate and master's programs. I had no idea what to do with my life, but excavating on her project during my sophomore year of college helped me realize that my childhood love of digging in the dirt could become a career. Dr. de Grummond supported and encouraged my interest in studying non-Roman peoples, which (very circuitously, due to the Covid-19 pandemic's start months before my advancement to candidacy) led me to this field.

I'd like to thank the rest of my committee, too: Drs. Sarah Morris, Sarah Beckmann, John Papadopoulos, Stella Nair, and Greg Woolf. When I decided to change my dissertation topic from workshops to glass studies, Dr. Morris especially encouraged the choice and helped me find the resources I needed in the United States. Then, much to my surprise and happiness, Greg Woolf came to UCLA's History Department. I remember the first time that I read *Becoming Roman;* it was a required reading for a course I enrolled in during the first year of my master's degree. After reading that book, I decided to study Iron Age and early Roman Gaul. When he came for his campus visit, I embarrassed myself on purpose and told him that he was the reason I studied what I did, and I will never regret it since he became such an important member of my committee. Greg helped me spread my wings theoretically, methodologically, and professionally. Last, I'd like to give a shoutout to another champion, Sarah B. Not only did she challenge me to

push my research in new directions, but she was my academic and emotional support system through this journey.

The Cotsen Institute has been an essential part of my journey, and several individuals associated with the Cotsen have been essential to my project. The IDP's Student Affairs Officer, Sumiji Takahashi, has had my back always – he's been supportive and a listening ear during my Ph.D. Thank you, Dr. Brian Damiata, for helping me with the EPMA analysis; your enthusiasm about my research kept me awake for that first 16 hour lab session and kept me sane for the second one after the equipment error required us to retest everything. Another "thank you for keeping me sane" goes to Deidre Brin, who helped me so much with digital archaeology, from Adobe Illustrator to database creation. Of course, a final member of the Cotsen's team who deserves all the wonderful things in this world (and a pay raise) is Dr. Vanessa Muros. If only she could have been on my committee – because she should have been, with all the training and assistance she provided me! Without Vanessa, I couldn't have done anything with the glass samples I wanted to analyze. She taught me so many valuable academic and life skills when I came to work with her in EASL.

I'd like to thank my amazing cohort – Alba Menéndez Pereda, Eden Franz, Baisakhi Sengupta, Zichan Wang, Maryan Ragheb, and Kellie Roddy. These ladies are champions and the last seven years would have been impossible to handle. This was the best support system I could have hoped for. I know I cried in front of at least half of them – and had fun at our potlucks with all of them. I want to thank two in particular: Maryan Ragheb and Kellie Roddy. Over the past year and a half, I've spent most of my time thinking, writing, and applying with these two women. Buffy nights, daytime café sessions, and visits to the dog park with Kellie's dog

Georgina kept me sane. Also, thank you to Madeleine Sims, Kellie's amazing wife, who kept us fed and reminded us that academia isn't everything.

Finally, I already dedicated this dissertation to her, but I'd like to thank my amazing mother, Beth Wood. She was so supportive during my lows, celebrated with me during my highs, and was present at every point in between. She raised me to find passion and follow it, to do what I love if it felt right. Thank you for supporting me and my (eccentric) career choice.

RACHEL LINDSAY WOOD

EDUCATION

M.A., awarded May 2018, Florida State University, Classics

B.A., awarded May 2016, Florida State University, Classical Archaeology and Anthropology

SELECTED AWARDS AND HONORS

2024 Marilyn Beaudry-Corbett Fellowship
2023 European Archaeology Center Residency Scholarship
2023 Rust Family Foundation Archaeology Grants Program
2023 Corning Museum of Glass, David Whitehouse Research Residency for Scholars
2023 Robert Anderson Research Charitable Trust
2022 Graduate Student Travel Research Grant
2020 Graduate Research Mentorship
2019 Graduate Student Research Mentorship
2019 Steinmetz Travel Scholarship
2015 Bucher-Loewenstein Field School Award

SELECTED RESEARCH EXPERIENCE

2024 Experimental and Archaeological Sciences Lab at UCLA, Los Angeles, CA
2023 Research stay at the British Museum, London, UK
2023 Research stay at the Corning Museum of Glass, Corning, NY
2023 Research stay at the European Archaeology Center, Glux-en-Glenne, FRA
2023 Research stay at the University College London, London, UK
2022 Archaeological fieldwork, Chantier Bibracte Field Project, Mont Beuvray, FRA
2019 Research travel to Iron Age fortified settlements, FR
2017 Archaeological fieldwork, Cetamura del Chianti, Tuscany, ITA
2015 Archaeological fieldwork, Cetamura del Chianti, Tuscany, ITA

Chapter 1

Making the Opaque, Clear: Opaque Red Glass in Iron Age and Temperate Europe

1.1 Introduction

Most scholarly approaches to Late Iron Age and early Roman provincial temperate Europe are divided chronologically and geographically. It is common practice for scholars who study the Iron Age to end their research with the Roman invasion, and vice versa: Romanists leave matters concerning the Iron Age to scholars trained in the area. There are further divisions in the field: most scholars who were trained outside of Europe are not trained to study Iron Age temperate Europe. Scholars who work on archaeology and history of the continent rarely venture into the archaeology of pre-Roman and Roman Britain, and the same can be said in reverse of scholars whose research focuses on Britain. Further divisions arise because of the language used for periodization in different scholarly circles: Iron Age, pre-Roman Iron Age, La Tène and Hallstatt are used for similar periods. So too is the Roman period in northwestern continental Europe treated entirely differently from Roman Britain, yet with few indications as to why (presumably based on ancient literary sources). Historians, art historians, and archaeologists studying the Iron Age are also divided on the use of the reductionist umbrella term "Celtic," a term appropriated into multiple modern languages after being borrowed from the Greek designation of all individuals in the regions under study in this dissertation as *Keltoi.*

In this thesis, I will actively seek to dismantle the above issues by approaching the trade, production, consumption, and deposition of a single material, opaque red glass, from the Iron Age to the early Roman imperial period in temperate Europe, using multiple, interrelated theoretical approaches: postcolonialism, anticolonialism, value, social networks and traditions of manufacture. My project offers a multiregional and diachronic study focused on the life of one

craft type visible in the archaeological record in northern Italy, Germany, France, Belgium, Luxembourg, the Netherlands, Switzerland, Hungary, the Czech Republic, and Great Britain from the beginning of the 4th c. BCE to the early to mid-2nd c. CE (Figure 1). This study brings a new perspective to craft production and consumption by exploring the value and significance placed on an inherently temperate European craft by ancient artisans and consumers. It applies a multidisciplinary approach to production and consumption by drawing from archaeological, anthropological, and art historical theory, and by using archaeometric analyses of glass waste from the Late Iron Age site of Mont Beuvray (ancient Bibracte) in Burgundy, France. With this work, I aim to create a holistic and interdisciplinary framework for studying specific craft types in production across traditional chronological and geographical divides, with emphasis on indigenous perspectives of craft production and consumption practices.

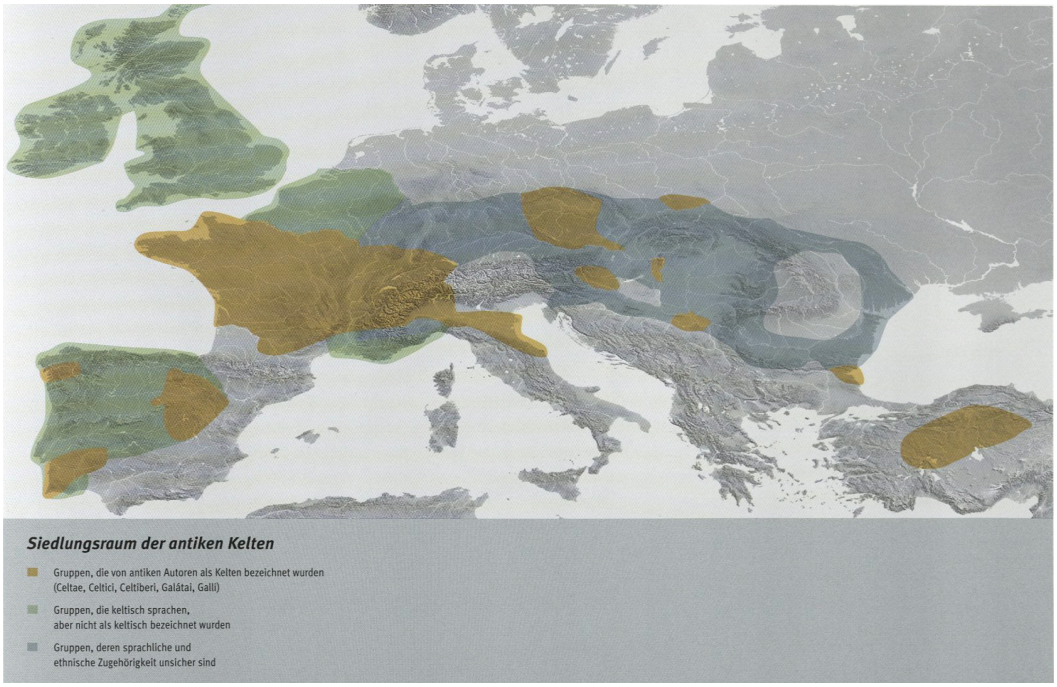

Figure 1 Map of the "Celtic" world marking indigenous groups. Those in regions colored brown-yellow were referred to as Celts by Greek and Latin authors (Celts, Celtiberians, Galatians, and Galli). The regions colored in green were inhabited by groups that spoke Celtic but were not referred to as Celtic. The regions colored in blue represent groups whose linguistic and ethnic affiliation is uncertain. After Rieckhoff 2012: 27.

1.2 A Red Roadmap: Description of Chapters

In this dissertation, I draw influence from a variety of postcolonial approaches that prove particularly beneficial to this study. My dissertation is organized as a study of the production and consumption of a single craft type, opaque red glass, through the main lens of postcolonial theory. In this introduction chapter, I begin with a brief history of the region and period under study, and an introduction to the study of opaque red glass including previous archaeological and archaeometric studies of this glass type. The focus of this chapter mostly includes studies from the 1970s to 1990s, as opaque red glass lost popularity as a field of study in continental temperate Europe until the recent introduction of new methods of technological analysis. This chapter also explains the reasoning behind approaching the topic at hand from a multidisciplinary perspective, which I argue is necessary to obtain a clearer image of the source of opaque red glasses and the techniques, efforts, and value of opaque red glass objects as trade goods.

Chapter 2 is a discussion of the database created during this project. The database explains the temporal and geographical limits of the dissertation, particularly in relation to the goods produced during certain periods and, in many cases, the similarity of these products cross-regionally and diachronically. I also explain the choices behind which objects appear in the database and which objects were not included. Lastly, this chapter details the process of collecting and categorizing the objects present in the database.

Chapter 3 addresses early faience and glass production in the archaeological record of Bronze Age and Early Iron Age temperate Europe and southern Britain and the trade and uses of amber and red coral as a decorative element in the production of gold and bronze luxury goods. In this chapter, I will focus particularly upon the introduction of coral as a technology and craft

related most closely to the working of bones, teeth, and gemstones, and introduced to the area under study by Phoenician and Greek traders. This chapter will approach the material through the lens of crafting and value theories, focusing on the significance of the color combinations created in production of certain categories of objects.

In Chapter 4, I tie the discussion of coral into the beginning of the Late Iron Age and the transition to opaque red glass decoration, including the influence of Greek and Roman craftspeople and tradespeople on temperate European consumption of these materials. This chapter will question the reasons behind the transition from coral to opaque red glass and the technologies and technical expertise necessary to accommodate the introduction of a new material to replace coral. This chapter will also consider the similarities between the red coral and opaque red glass as related to value and color, and compare the functions and deposition of the goods across the archaeological record of temperate Europe and the Mediterranean.

Chapters 5, 6, and 7 narrow the focus of the dissertation to Roman Gaul and Britain as area case studies for tracing the economic, esteem, and moral value of opaque red glass. Chapter 5 briefly discusses the Roman invasion of western and central Europe in relation to the development and movement of glassblowing from the east – e.g., Jerusalem, where the technology was developed – to northwestern Europe.[1] I consider the effects of Roman provincial administration and the introduction of new goods and technologies, such as glassblowing, on local populations and the traditional lifeways of warrior elites, their consumption and depositional practices, and the arts of local craftworkers – all of which lead to a devaluation of decorative metalworks across most (though perhaps not all) of temperate Europe. I demonstrate

[1] I choose to follow the Corning Museum of Glass's spelling of glassblowing as a singular word in this dissertation.

that opaque red glass does not disappear from the archaeological record of these regions but is used to produce opaque red glass molded vessels, such as bowls, from the 40s to 70s CE, on the western European continent, before opaque colors were replaced by clear or blue/green tinted clear vessels. It is also possible that some artisans continued to produce objects such as brooches with opaque red glass decoration in the imperial period, as will be discussed.

Chapter 6 considers the continued production of metal objects decorated with opaque red in Britain in the late Pre-Roman Iron Age and Roman provincial periods. The best evidence for continued consumption is polychrome brooch production, which will be the main case study within the chapter. This chapter will address why metal objects with opaque red glass decoration continue to be produced – in different styles and types using the same color palette – across this province. Its distance from the mainland and strong military presence will forefront the discussion, and the spread of these fibulae across the northern provinces of the empire with the movement of military personnel will play a significant role in understanding how metal objects decorated with opaque red glass became popular again in northwestern continental Europe after almost one hundred years.

Chapter 7 turns the focus of the dissertation to another method for understanding the value of opaque red glass to indigenous populations of temperate Europe in the Iron Age and Roman period: the chemical analysis of ancient glass. By utilizing Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) and Electron Probe Micro Analysis (EPMA) on archaeological samples from the Late Iron Age and early Roman site of Mont Beuvray and then comparing the data to other published studies of Iron Age and Roman period opaque red glass, I demonstrate the similarities between glass at Mont Beuvray and other sites in continental Europe and Britain and demonstrate the benefits of incorporating glass analysis into

anthropological and art historical research. Also, I allude to two common misconceptions in studies on either side of the scholarly temporal divide between Iron Age Europe and Roman Europe: 1) even if compositional data display marked differences in objects, these may not matter – or even be visible – to the naked eye, and 2) disruptions caused by colonialism do not inevitably entail losses of traditional practices, but rather, the disruption of traditional values, as argued in chapter 5.

Chapter 8 is the conclusion chapter of the dissertation. This chapter restates the results of the investigation and addresses the significance of this project to archaeological research in pre-Roman and Roman transition period Europe, and also changes in objectscapes, both subtle and acute, brought by the introduction of new techniques, technologies, forms, and styles over the course of the Iron Age and early Roman period.[2] I will approach the chapter by explaining the benefits of the methods and theories used in this multidisciplinary approach to archaeological material and explore possible uses in other regions studying craftworking in colonized areas. This chapter also addresses obstacles encountered with the approach to this dissertation and considers future work in the field of opaque red glass research.

1.3 A Brief Background: Archaeology and History of Continental Temperate Europe

The following discussion of Iron Age Europe focuses on temperate continental Europe between the Atlantic and Bohemia and south of the North German Plain. Iron Age temperate Europe has been divided traditionally into 2 main phases, Hallstatt and La Tène, named after two major archaeological sites, Hallstatt in Upper Austria and La Tène at Lake Neuchatel in western

[2] Pitts and Versluys 2021; Gosden 2005

Switzerland.[3] The date ranges used to create chronologies for Iron Age Europe lack cohesion; there is no single range used by all scholars, depending upon the region in which the scholarship was produced or more simply, the established chronology that the scholar chose to cite. It is impossible, therefore, to create clear chronological boundaries; the divisions between Hallstatt and La Tène or the Early and Late Iron Ages are proposed as more secure than the internal divisions created within the umbrella categories but there is variation dependent upon site and country – or even within the same country, if we consider that the study of southern France follows chronological divisions which differ from the central and northern areas.[4] Due to such difficulties in dating, I will be using broad categorical terms such as "Early Iron Age" and "Late Iron Age" or "Pre-Roman Iron Age" for Britain.

The Early Iron Age in continental Europe is identified by an increase in iron, bronze, gold, and pottery production, and the working of other raw materials such as coral, amber, bone, glass, and lignite.[5] Large production centers, termed *Fürstensitze*, or "princely seats," by some scholars, are a characteristic of the late 7th and 6th c. BCE in some regions of western temperate European regions, although smaller settlements are more common across most of the continent. Excavations of large settlements demonstrate signs of specialized production, marked social inequalities, monumental architecture and fortifications, settlement layouts, and a large population size with a relatively low population density.[6] These settlements, such as the Heuneberg, are also characterized by Mediterranean imports primarily from Greece and Etruria, often discovered in the excavations of rich aristocratic tumulus burials that surround the site. The appearance of settlements such as the Heuneberg in the Early Iron Age have been considered a

[3] Wells 2011: 406-409
[4] For more on chronologies see: Duval et al. 1990; Collis 1984 and 2003; Buchsenschutz 2015
[5] Wells 2011: 423; Fernández-Götz 2017: 121
[6] Fernández-Götz 2017: 119-120

direct effect of the Greek colonization of Massalia in southern France. Manuel Fernández-Götz, however, argues against this model in favor of one which extrapolates upon evidence from Manching, where the Greek imports found on site date to a generation before the founding of Massalia.[7] Funerary evidence from the 8th and 7th c. BCE also confirms that social hierarches and elite local power developed in the region before the foundation of the so-called *Fürstensitze*, suggesting that the development of these complexes is directly related to changes in local social dynamics rather than external colonial influences. The large production centers of the 6th and 5th centuries were abandoned at the beginning of the 4th c. BCE for unknown reasons. By the second half of the 4th century and early 3rd c. BCE, archaeological data suggests decentralization, an increase in the number of smaller settlements, and reduced social inequalities in burial complexes.[8] The reasons for the abandonment of the *Fürstensitze* are multiple, complex, and contrasting; some sites, such as the Heuneburg, burned down; others show evidence for the destruction of heroic or foundational ancestral images by outside aggressors or internal uprisings against the ruling classes, as at Les Herbues at the foot of Mont Lassois; others, such as Bourges, show a planned abandonment.[9] Based on the evidence at the aforementioned sites, populations separated and migrated to new areas to reduce tensions, discover more fertile lands, or both.

In the 3rd and 2nd centuries BCE, the populations seemed to have recovered, as demonstrated in the widespread production and use of iron tools for agriculture and the appearance of open (unwalled) agglomerations and fortified settlements across the Iron Age landscape.[10] The appearance of the open agglomerations and fortified settlements seems to be

[7] Fernández-Götz 2017: 125
[8] Fernández-Götz 2017: 126. Reduction in inequalities within burials are suggested by decreased quantities of grave goods and a decrease in graves sizes with an increase in their number.
[9] Fernández-Götz 2017: 129-130
[10] Fernández-Götz 2017: 132

correlated with rapid growth brought about by the abandonment of other settlements.[11] Both types of centers varied in size and function; there was some degree of specialization and differentiation within fortified settlements and some open settlements, and most fortified settlements show some level of differentiation between them and other settlements within the region.[12] Some fortified settlements and larger open agglomerations were also centers for the production and trade of goods across temperate Europe and from Italy, as represented by the increase in Roman amphorae at fortified settlements, large open agglomerations, and smaller sites across the landscape. Fortified settlements show some similarities, such as their reliance upon agriculture and stock animals rather than the production and trade of manufactured goods.[13] These major sites, however, varied in size from 20-25 ha[14] to more than 1000 ha and were scattered throughout the landscape.[15] The walls served multiple functions: as a defensive system, an ostentatious display of wealth, labor, and power, and as a representation of community identity.[16] I note that the term *oppida,* first coined by Julius Caesar in the *Bellum Gallicum* in reference to such fortified settlements and used by many scholars today, is problematic due to the sheer diversity among fortified settlements and will therefore not be used again in this dissertation.

One of the major fortified settlements under study in this dissertation is Mont Beuvray, which was settled by indigenous peoples around 150/140 BCE and largely abandoned in the late 1st c. BCE or early 1st c. CE after Augustus reorganized the Gallic provinces and established the

[11] Woolf 1993: 228
[12] Woolf 1993: 227-228. The differences between sites considered by scholars to be "urban" or "urbanized" are based on the presence of internal or intra-site differentiation, such as the location of housing and workshops, although none of these settlements show the presence of temples, monumental architecture, or public spaces.
[13] Ralston 1988: 793
[14] Woolf 1993: 224
[15] Fernández-Götz 2017: 134. There are around 150 known fortified settlements dating from the 2nd to 1st c. BCE.
[16] Fernández-Götz 2017: 137

nearby colony of Augustodunum (modern Autun).[17] Excavations of the site revealed a thriving industrial quarter in the northern part of the settlement and residential, religious, and commercial quarters in the western and southern areas. The enamellers' workshop discovered in the artisanal area of the site is an anomaly, as no other workshops have been uncovered by archaeologists. The abandonment of this area of the site in the early Roman conquest period led to its preservation and subsequent importance to this dissertation project.

After Julius Caesar's campaigns in Gaul in 58 BCE, some major settlements (such as Mont Beuvray) continued to be inhabited for a generation or two before abandonment for nearby Roman colonies. Other smaller indigenous settlements, such as Roanne, became secondary towns (often termed Gallo-Roman) and were inhabited throughout the Roman period.[18] Many major settlements in continental Europe, such as Manching in Germany, were abandoned by 60 BCE or destroyed and abandoned during or directly after the Roman conquest.

1.3.1 Experiences of Elites: From Iron Age to Roman Gaul

Most of the territory covered in this dissertation became the Roman provinces of The Three Gauls: *Gallia Comata* (*Gallia Aquitania*, *Gallia Belgica*, and *Gallia Lugdunensis*). Many elites who lived in these regions and led warriors against the Roman army were imprisoned and/or killed and the new Gallic aristocracy was composed of elites who were forced to align themselves with Rome for survival.[19] In exchange for their loyalty to Rome and influence on local populations, these aristocrats were rewarded with land, legal privileges, and governmental

[17] Guillaumet 1984: 69; Goláňová et al. 2020; Romero and Maillier 2006: 18. Recent archaeological evidence proves that the site was visited for religious purposes until the 3rd century CE.
[18] Wells 2011: 465
[19] Brandt and Slofstra 1983; Woolf 1998; Terrenato 2005 and 2019

powers within the new system. As the Roman Republic gave way to empire, first under Caesar and then Octavian/Augustus, Agrippa, Drusus, and Tiberius, infrastructure and administrative controls increased and the Three Gauls were solidified as provinces; governors from Rome instituted political controls with the assistance of some high-level Gallic aristocrats.[20] In the Roman mindset, the creation of a new aristocratic class in the mid- to late 1st c. CE gained authority, status, wealth, and security and "took the lead in building Roman Gaul."[21]

The archaeological record of post-conquest temperate Europe reveals a complex interplay of indigenous traditions and Roman influence; Iron Age water sanctuaries are found in proximity to Italic temples dedicated to Roman deities, and colonies include Roman fora, civic buildings, and *insulae* with Italian-style *domus.* Settlement patterns change as we see more individuals living in grid-planned cities than rural villages, new building types and materials are adapted by locals, the organization of space changes to reflect new ideologies, and new ceramics, foodways, dress, and personal ornament enter markets and homes.[22] Although Roman conquest brought new social, economic, and political structures to the newly established provinces, archaeological evidence suggests experimentation and a mixture of culture in the first half of the 1st c. CE. We see hybrid building styles and the continuation of elaborate burial traditions, such as the inclusion of jewelry and animal sacrifices and feasting in male burials, in the northern areas of the provinces until the beginning of the 2nd c. CE.[23] Approaches to the study of Roman

[20] Woolf 1998: 39
[21] Woolf 1998: 47
[22] Woolf 2002: 5. On rural residences in the Three Gauls, see Gandini 2008, Ferdière et al. 2010, Van Ossel and Defgnée 2001, Lemaire 2012, and Fichtl 2009. For gladiator cups, which are found only in the northwestern provinces, see Cassibry 2018. On ceramics, see Bonnet 2022, Pitts 2017, Borgers et al. 2020, Borgers et al. 2021, and Hanut 2010. On luxury metal hoards, see Lapatin 2014 and Azéma et al. 2012.
[23] Dananai and Deru 2018

imperialism in the provinces differ, though object-centered,[24] architectural,[25] numismatic,[26] foodways,[27] and epigraphic and textual[28] approaches are most often used in scholarship.

1.4 A Short Synthesis: Archaeology and History of Britain

Iron Age southern Britain presents evidence of political systems and settlement patterns similar to the regionalism present in temperate Europe in the 4th and 3rd c. BCE. At the end of the 2nd c. BCE and beginning of the 1st c. BCE, changes in settlement patterns and material culture transpired, often visualized as reflecting changes in the political structures of southern Britain. Many fortified settlements in central southern Britain were abandoned for nucleated rural settlements identified as enclosed or defended farmsteads, often termed *oppida* again (though showing great diversity and often lacking the formal properties associated with the term in continental Europe), with enclosed meadows and pastureland for horses.[29] David Mattingly argues that the change in settlement patterns in this period suggests the appearance of large territorial groupings of peoples, further proven by regional patterns in pottery styles and later in coinage groups.[30]

John Creighton stresses the significance of the appearance of gold in the form of coins and torques in the late 2nd c. BCE. He argues that the disruption to Middle Iron Age settlement patterns and the appearance of gold are connected, as warrior groups or *comitates* emerged; these individuals were raiding and capturing people for enslavement and sending them to the continent

[24] Gosden 2005; Versluys 2014; Van Oyen 2013
[25] Clavel-Lévêque 2005; Jiménez 2010
[26] Howgego et al. 2005
[27] Luley 2014; Livarda 2017
[28] Müller 2007
[29] Mattingly 2006: 56; Cunliffe 1995; Woolf 1993
[30] Mattingly 2006: 56

in return for gold.[31] Through these practices, warrior groups gained a strong foothold in southern Britain and the horse became a symbol of power. This coincides with the rise in horse gear, including objects with opaque red, blue, and white glass decoration. Changes in locally produced and imported material culture, along with broader settlement patterns in England, may connect to the formation of kingdoms in southeastern England. In this period an increase in trade relations with the continent through northwestern France can be observed, particularly in the evidence of wine, drinking, and feasting paraphernalia used by elite populations.

Archaeological excavations suggest strong regional diversity in political systems and settlement types in the 2nd c. and early 1st c. BCE.[32] Local communities were led by certain elite individuals sometimes termed as chiefs by scholars – male or female, single or multiple are possible. These elites were extracting and redistributing surplus, competing with neighboring groups, and warring and raiding. Some elites were gaining and maintaining power though their control of imported goods, such as wine and feasting paraphernalia.[33] Territorial groupings, which seem to have been fluid in terms of identity and territory, are visible through regional pottery styles and the distribution of coinage groups in the later Iron Age. By the mid-1st c. BCE, many fortified settlements were abandoned and communities were organizing on larger scales; the process was accelerated by direct contact with the Roman world through trade connections with northwestern Gaul and the establishment of the client kingdoms.[34] Based on the identification of serial images on coinage, Mattingly suggests that territories beyond the most southerly client kingdoms were attached to either the eastern or southern kingdom.[35] By the time

[31] Creighton 2000
[32] Mattingly 2006: 43
[33] Mattingly 2006: 56
[34] Mattingly 2006: 56
[35] Mattingly 2006: 80

of the Claudian invasion of 43 CE, Britain was well-accustomed to Rome. Roman goods, symbols, and practices were curated and adapted to construct new forms of elite identity which did not "predispose the British peoples as a whole to submit to military incorporation" but "had the potential to make them more determined opponents of renewed invasion."[36]

Provincial Britain can best be described as having a local and frontier character mixing Roman and indigenous styles, techniques of production, and lifeways such as diet and home building. The local character of Roman Britain could be due to uneven imperial administration of the province and the significant presence of the military. The post-conquest period followed a similar trajectory as other provinces of the empire, as a military commander was set in place by the emperor to control the territory until a provincial governor could be assigned.[37] The military presence was significant for all periods and made a distinct impression on the landscape through the construction and maintenance surveillance locations such as forts, military movements along roads, and at trading posts. According to Mattingly, 10 to 12% of the Roman army in Roman Britain was stationed in 4% of its territory, a significant number when compared to other provinces such as the Germanies, Pannonia, or the North African provinces.[38] It is also notable that many auxiliary troops stationed in Roman Britain were native to the northwestern provinces and Britain after Roman control was established securely.[39]

Though there was rapid installation of urban centers and military settlements under the imperial control of Claudius and Nero, as well as veterans settled in *coloniae* alongside wealthy locals, the rural areas were disconnected from trade and communication and sometimes show no

[36] Mattingly 2006: 84
[37] Mattingly 2006: 93-130
[38] Mattingly 2006: 166
[39] Irby 1999: 3-4

evidence of Roman presence.[40] Overall, there was a slow and uneven establishment of military and civic administration in Britain. For example, the forum-basilica complex, an indicator of Roman style civic government in most other provinces due to its legal and economic nature, only appeared in stone forms toward the mid-2nd c. CE.[41] Towns developed slowly as the pressure for change rested on the shoulders of local elites, since monetary input from Rome funded *coloniae* rather than lower-level towns such as *municipia* and *civitas*-capitals.[42] Early phases of development often drew on Iron Age traditions and symbolism rather than Roman ideals of monumentalization, perhaps related to pre-existing ways of expressing wealth, using space, organizing labor, and manipulating materials.[43]

1.4.1 Experiences of Elites: From Iron Age to Roman Britain

A similar fate befell the elites of Britain as it did those in Roman Gaul: those who chose to side with Rome survived and those who did not would have been killed or disposed of in some way (e.g. enslavement). Twenty years passed between the Claudian invasions and the Boudiccan revolt, a factor which suggests that Roman control of Britain was not established firmly. The presence of *coloniae* without the permanent structures of the Roman political system (curia-basilica-temple complex in the forum) and the number of troops stationed in Britain after its conquest are other points that indicate an unstable control of the region. The Roman provincial system, however, required a provincial governor, magistracies, and priesthoods to be set in place. The elites who survived the conquest were placed in government and religious positions to aid the governor and the army.

[40] Wallace 2016: 126
[41] Gardner 2016: 491-493
[42] Rogers 2016: 756
[43] Rogers 2016: 759; Sharples 2010: 116-124

Mattingly argues that participation in Roman provincial administration opened pathways toward local power. I would say rather that these positions allowed local elites to maintain their power and connections, locally and globally.[44] Though subject to Roman regulation, interreference, and supervision, local aristocrats could maintain or grow their networks of power within acceptable parameters. A few families would have had the seats of power within Roman Britain, as was true in the pre-Roman Iron Age.[45] Aristocrats continued to be the main consumers of Roman goods, as the elites of the Iron Age had been before conquest, while individuals of the lower social classes had less access to non-local goods and foods.[46]

Two major factors separate the conquest of Britain from that of the Three Gauls: 1) southern Britain had major contact with Roman political systems before the conquest, and 2) it was located at the edge of the empire and a seasonally-traveled waterway, the English Channel, separated its populace from the mainland. Its distance from the continent cannot be overlooked, since a sufficient number of soldiers would need to be present in Britain to quell future revolts or invasions from the north. The indigenous people of Britain and their culture were shaped by the province's frontier status.

1.5 The State of the Subject: Opaque Red Glass in Iron Age and Early Roman Europe

Objects decorated with opaque red glass, a synthetic material composed of finely powdered glass colored with a metallic oxide to create the color desired by the artisan and consumer, are widely spread across western and central Europe (Figure 2). Butcher traces the use of opaque red glass back to c. 400 BCE when it was first used as a substitute for coral in the

[44] Mattingly 2006: 281
[45] Revell 2016: 772
[46] Pitts 2008; Blagg 1990

production of decorative studs on torque terminals, on shield bosses, and other display pieces.[47] Archaeological investigations across western and central Europe have brought to light red glass objects in northern Italy, Germany, France, Luxembourg, the Netherlands, Switzerland, Hungary, the Czech Republic, and Great Britain. Traces of red glass workshops have only been discovered at Mont Beuvray, though it is still uncertain whether the glass itself was produced on site;[48] evidence for the use of opaque red glass ingots, however, was discovered during excavations at the site, marking Mont Beuvray as the only certain location of enamellers' workshops in continental Europe.



Figure 2 Group of copper-alloy objects with opaque red glass decoration. Photos taken by Rachel Wood at the British Museum (A-C) and Musée de Bibracte (D). A: Strap union, Canterbury, Kent, England, accession number BM 1876,0707.4. B: Strap fitting (blue and white glass additions), Westhall Hoard, Suffolk, England, accession number BM 1855,0519.9. C: Stud, Hertford Heath, Hertfordshire, England, accession number BM 1958,0704.73. D: Harness piece with enameled head, Mont Beuvray, Burgundy, France, accession number MB 2015-019-1282-004. © The Trustees of the British Museum.

[47] Butcher 1976
[48] Brun and Pernot 1992

Although some scholars approach opaque red glass by briefly discussing its shiny appearance or its connections to blood and/or gender roles,[49] many more scholars focus on the chemical composition of the red glasses across Europe. Their work is essential to our understanding of how enamellers created the red colors we see today and known differences between the formulas. Neither the chemical nor anthropological studies, however, examine the significance or the qualities and quantities used in the production of specific goods. There is also little comparison between the uses of and symbolism of red glass in the Italic peninsula and in Britain, where red glass production continued to thrive under the Roman Empire and into the Middle Ages.[50]

My dissertation builds on the works of scholars such as Nathalie Brun and Michel Pernot, Virginie Challet, Ian Freestone, Colleen Stapleton, Valery Rigby, M.J. Hughes, and Mario Bandiera in order to address red glass production, consumption, and value in non-Mediterranean continental western and central Europe and Britain (which again are often treated separately in studies of red glass production due to differences in composition and production in the *longue durée*).[51] This project also bridges the temporal gap between the obsolescence of opaque red glass in continental temperate Europe at the end of the Iron Age and its continued production in Britain to produce a wider image of the technologies and significance of this craft's production. To create a holistic view of opaque red glass production in Europe, it is necessary to trace the production of this craft geographically and temporally without excluding any areas that had significant cultural contact with each other, as temperate continental Europe and Britain did for thousands of years in ancient world.

[49] Giles 2008; Challet 2019
[50] Challet 1992; Freestone et al. 2003
[51] Brun and Pernot 1992; Challet 1992; Freestone, Stapleton, and Rigby 2003; Bandiera 2021

1.6 Archaeological Approaches: Theorical Influences in the Dissertation

1.6.1 Postcolonial Theory

Postcolonial theory developed to address the widespread to impact of colonialism and imperialism on colonized peoples and landscapes of the early modern period. Archaeologists borrowed postcolonial theory, which first developed in the fields of literature and economics, and adapted it to accommodate studies of the archaeological record and material culture. Modern nation-building has had grave effects on research in the fields of art history, history, and archaeology. In the case of this dissertation, the creation of national and pan-national "Celtic" and Roman identities by political bodies in this region have affected previous approaches to archaeological studies of specific sites. Such is the case with Mont Beuvray or Bibracte, as former French president François Mitterrand claimed Mont Beuvray as a "grand site of Celtic civilization" that "extended over the better part of Europe" and created a European Research Center near the archaeological site to host researchers across Europe.[52] The attention placed on the site and the resources allotted to its excavations and maintenance has affected scholarly views on its significance to Late Iron Age European studies. Mont Beuvray is not the only archaeological site used in nation-building and the formation of a European pan-nationalist identity, but in this dissertation it serves as a useful case study for the treatment of archaeological sites as politically or economically significant to a modern nation.

Although the works of Edward Said, Gayatri Spivak, and Homi Bhabha have largely shaped the field of postcolonial studies and have influenced the ways in which scholars have spoken and written about ancient and modern cultures, their scholarship is not directly beneficial to many archaeological studies. Said's *Orientalism* can be directly applied to literary studies of

[52] Dietler 1998: 82; Dietler 1994

ancient Greek and Roman authors who wrote about the Eastern world, and to issues related to archaeological use of the world "Orientalism" to describe an entire period of art in Greece.[53] Bhabha's *The Location of Culture* and his theories of hybridism and mimicry have been applied to the study of cross-cultural exchange of materials, ideas, and practices between colonizers and the colonized, whose relationship mutually creates hybrid identities.[54] Spivak's "Can the Subaltern Speak?" and *A Critique of Postcolonial Reason* address Eurocentrism and, particularly, European intellectuals' rendering of subaltern people (in Spivak's work, the oppressed and the colonized) as mute and anonymous peoples with no agency or position as fully human subjects in a world that is still colonial in nature.[55] Her studies directly benefit scholarship by encouraging anticolonial approaches and analyses. In summary, Said, Spivak, and Bhabha's contributions to the field of postcolonial theory are immeasurable, yet their theories must be adjusted to fit the archaeological record and, like other works taken from literary studies and economics, must be used carefully and diligently.

Numerous archaeologists have published studies borrowing from literary and economics scholarship, using and adapting their models and frameworks to prove the benefits of postcolonial theory to archaeology. Early archaeological scholarship concerning colonialism emerged from Marxist thought developing in the 1980s, beginning with the use of Immanuel Wallerstein's World Systems Theory and its Core-Periphery model.[56] Michael Rowlands et al.'s 1987 publication, *Centre and Periphery in the Ancient World*, describes cores as entities that controlled more developed technological skills and production processes, forms of labor, and a strong statehood to promote its interests in other areas while peripheries lacked these attributes and their cultures were

[53] Said 1978
[54] Bhabha 1994
[55] Spivak 1988 and 1999
[56] Wallerstein 1974 and 2004

modified to meet the needs of the core.[57] T.C. Champion applies the Center-Periphery model to the study of prestige-good economies on the fringes and describe its transformation, its mode of production, and the relationship between production, economy, and a society's kinship models.[58] World Systems Theory is less often used today due to its weaknesses, including its reductionist approach to the plethora of cultures which exist today and in the past and its inherent prejudice against the agency and developments present within societies either under the control of, or benefitting from exchanges with, colonial and imperial societies.

Postcolonial theory in the past twenty years builds upon previous approaches and offers new insights into the best approaches to study both colonizers and the colonized. Such scholarship includes Chris Gosden's publication, *Archaeology and Colonialism*, which links material things to an individual's construction of identity and shifts in identity due to changes in societies brought about by symmetrical, moderately asymmetrical, and asymmetrical relations, and an edited volume by Jane Lydon and Uzma Rizvi covering theoretical approaches and case studies across the world.[59] These works are expansive chronologically and globally, but due to the nature of the volumes there are no in-depth chronological case studies of specific technological changes in a single society over the *longue durée*. Peter Van Dommelen tackles the history and application of postcolonial theory to the ancient Mediterranean world and the visibility of migration and migrants in the material record and references the invention of new practices, though his short article does not include the effects of the introduction of new technologies brought by migrants.[60] Astrid Van Oyen builds upon the work of Van Dommelen, as her archaeological specialty rests in the Roman world, but she promotes studying archaeological materials through globalization, agent-driven

[57] Rowlands et al. 1987: 4
[58] Champion 1989: 12
[59] Gosden 2004; Lydon and Rizvi, eds. 2010
[60] Van Dommelen 2012

relations and networks on both the local and global scale, and its focus on the broader context of cultural change which "did not occur in a vacuum."[61] Van Oyen's work is one of a number of archaeological publications which can prove useful to the study of material culture on the Late Iron Age and early Roman period at sites such as Mont Beuvray, though such approaches must be implemented with caution, as many finished, unfinished, and broken objects decorated opaque red glass at the site were uncovered in various areas of the settlement while glass waste was found most commonly in refuse pits. These contexts provide little indication of an object's use.

Two theories used in the study of Roman provincial archaeology to somewhat productive ends are creolization and hybridization. Jane Webster borrows creolization theory from literary studies in her study of the synthetic Romano-indigenous goddess Epona to argue that artifacts in the provinces may appear Romanized yet are instead creole, as they operate according to an indigenous set of rules and resist, adapt, or negotiate with Roman styles to serve non-Roman needs.[62] Her argument has not been successful widely in Roman studies, leaving much to be desired because the case study is too specific to apply to the broader Roman world. Similar to Webster, Alicia Jiménez borrows a theory from literary studies, hybridization, and applies it the archaeological study of Iron Age sculpture in Iberia to argue that hybridism is a product of colonial power.[63] Her work proves there is no binary division between the colonizer and the colonized in the western Roman provinces through the interplay of "barbarian" and "Roman" attributes and practices in sculpture. Though their scholarship is beneficial in other studies, neither creolization nor hybridization are the most productive approaches for opaque red glass production in most places on the European continent due to the paucity of production evidence. A third theoretical

[61] Van Oyen 2015a: 221
[62] Webster 2001: 219
[63] Jiménez 2011

perspective that must be noted is David Mattingly's concept of discrepant identities, which addresses the varied ways in which populations in Roman-controlled territories express their identities.[64] He argues that a range of experiences and political, economic, and cultural possibilities and limitations exist within a colonized landscape; in short, there is no singular experience within the Roman provinces. Mattingly's interpretation of identity and experience in Roman Britain is beneficial to this dissertation, though it is nuanced further as I approach archaeological material with an anticolonial lens.

The nature of the material culture under study poses difficulties to applying production and consumption theories. Michael Dietler's study of the consumption of Etruscan, Phoenician, and Greek products, techniques, and technologies in the culture area of Mediterranean Gaul approaches the properties and contexts of objects consumed, and the practices visible in the archaeological area of this region.[65] Dietler calls attention to a desire for certain objects, and also the practices and roles that the consumption of such objects played in the social life, economy, and politics of southern France. Consumption theory is best applied to data with secure archaeological contexts and identification of the uses of material culture. This offers possibilities for the uses of red opaque glass, yet there is no definite answer to the question of the purpose of their production. We can only attempt to reconstruct their uses based upon comparative evidence across temperate Europe.

One particularly beneficial postcolonial study to this dissertation is Andrew Gardner's approach to Roman provincial archaeology through the relationship between people and changing material culture.[66] Gardner attempts to create a framework to bridge the gap between the top-down and bottom-up approach in two case studies of the Roman military in Roman Britain. In a 2013

[64] Mattingly 2007
[65] Dietler 2010
[66] Gardner 2013; see also Tanner and Gardner, eds. 2024

article, he proves that the Roman army is not a monolith, but rather consists of multiple communities and identities tied to each other through certain architectures and practices (even within a single province). His approach accounts for both the violent and oppressive nature of the army and its ability to cause change within a community; so too does it consider differences between military communities and communities affected by military presence. Gardner's framework informs my approach to opaque red glass trade, production, and consumption in Roman Britain, and I will address the influence of Roman soldiers on brooch production in the northwestern provinces.

Corinna Riva and Ignasi Mira's approach to a global history through micro-historical analysis also proves valuable to my project. In their article, the authors call for archaeologists and historians to study objects as social actors at the local and the global, "zooming" in and out in order to create a heuristic picture of the anomalies present.[67] By bringing archaeological anomalies to the forefront, we visualize the norm – or supposed norm – at the global level while highlighting the idiosyncrasies visible in specific settlements or regions, which destroy the concept of a grand narrative. Their case study of citizenship and participation in Iron Age Iberia on the regional, cemetery, and tomb scales over the course of five centuries demonstrates changes in social affiliation and the expression of kinship structures, and the development of sanctuary cults which led to more inclusive participation within the community.[68] Riva and Mira's case study takes into account culturally specific processes across sites and contexts and changing forms of membership, including "different forms of ties, participation, integration and exclusion."[69] This framework aids

[67] Riva and Mira 2022: 5
[68] Riva and Mira 2022: 13
[69] Riva and Mira 2022: 13

my approach as I will work across multiple temporal and geographical scales to demonstrate changes in the use of opaque red glass.

Van Oyen's article on post-colonial artifact analysis follows a similar approach as her actor-network theory article, as she promotes the study of artifacts through practices, such as production and usage. Her article attempts to connect both consumption theory, which focuses on the meanings behind the use of products, and production theory, which is seen as "a template for the inscription of that meaning."[70] Van Oyen's approaches to both actor-network theory and postcolonial artifact analysis prove beneficial as I consider both the production and consumption of metal objects decorated with opaque red glass. Her mention of the study of human and animal interactions with products, particularly in relation to consumption, is also significant to this dissertation. I apply this theoretical approach to explain how certain "things" (in this case, opaque red glass) relate to other "things" (such as bronze and iron objects, or the use of the objects for/on people and horses) and how these things are defined by those who produced and consumed them. The way that the object is used and the way in which the object is produced will also be a focus of the project and will question how the practice behind the production of opaque red glass was used to create "new" products, at least in the eyes of modern scholars, through craftworkers' use of practices already present in their technological repertoire.[71]

Chapters 5, 6, and 7 were influenced by a subset of technology and crafting theory. In his article on the spread of the Roman glassblowing industry in the 1st c. CE, Christopher Lemke defines a tradition of manufacture as "an unobtrusive social institution which regulates variation and can encompass recipes, knowledge of furnace conditions, and melt times."[72] The definition

[70] Van Oyen 2013: 99
[71] van Oyen 2013; van Oyen 2024
[72] Lemke 1998: 270

which he provides is strong, but in the case of opaque red glass, the concept of an "unobtrusive social institution" is untenable and improbable: the glass industry would have taken up space and affected local air and sound quality. Beyond this criticism, though, his argument is of interest. Individuals who produced the base glass ingot or colored it would have followed recipes, needed to maintain certain conditions within the furnace environment, and closely followed melt times. As expected, there is variation in the color of glasses and compositions; it would have been impossible to reproduce the exact same glass every time before the Industrial Revolution. Overall, though, as will be discussed in Chapter 7, the similarity in sealing-wax red glass compositions in Iron Age Europe suggests the use of a general formula and set of procedures for production. There does seem to be a tradition that is followed to produce the same high lead-low copper opaque red glass. According to Lemke, traditions of manufacture need to maintain routines and repetitive practices, or these traditions will change or disappear completely.[73] Based on his assertions, the Roman conquests of the regions under study and the introduction of new technologies such as glassblowing should have caused local traditions of opaque red glass working to change drastically or disappear entirely since "traditions grow out of social context" and the social, political, and economic contexts experienced change. This dissertation, however, will nuance these concepts of the glass industry and offer new perspectives which consider the existence of fringe artisans and the coexistence of tradition and innovation in the northwestern provinces.

Due to the complexities of the material culture at hand, including changes in formulas, lack of primary workshop context, and correct identification of the product's uses, I use Duncan Garrow and Chris Gosden's framework in *Technologies of Enchantment* to analyze the red glass finds at

[73] Lemke 1998: 271

Mont Beuvray.[74] Their book is influenced by the work of Alfred Gell, in particular "Technology of Enchantment and the Enchantment of Technology", in which he argues that consumers of art are not only interested in aesthetics, but the means employed in the object's creation.[75] Garrow and Gosden's approach to Iron Age indigenous art is an object-centered archaeology focusing on objects that are inherently different (decoration, style, etc.) than other objects. They study the interactions between objects, humans, and animals, and the experiential nature of objects, which draw our attention to them through sight. Garrow and Gosden draw attention to the nature of certain objects' differences from others and their links to each other as ancient people visualized and interpreted them. This approach is not affected by a lack of primary contextual information and use, though we may interpret the possible uses and interactions between objects and subjects. I find Garrow and Gosden's object-centered focus best for considering consumption of red glass at archaeological sites in regions under study. Their approach will be used alongside Astrid van Oyen's application of ANT and postcolonial artifact analysis, as Brun and Pernot argued in 1992 that a "Mont Beuvray" formula for opaque red glass appears on this archaeological site, which differs in composition from the "European" formula found at both Mont Beuvray and other sites across Europe.[76] Her frameworks best fit an approach to production, and still prove beneficial to understanding the relationships between production and consumption of objects.

1.6.2 Anticolonial Theory

As the Romanization debate continues to rage in academia – covered by Greg Woolf in 2014 and returned to in Oscar Belvedere and Johannes Bergmann's 2021 edited volume through

[74] Garrow and Gosden 2012
[75] Gell 1994
[76] Brun and Pernot 1992: 249

the lens of globalization – a few publications have led scholarship away from the expectations of such paradigms.[77] Alternative approaches to Romanization can provide new and exciting windows into the complex nature of native peoples' lives and deaths. Fentress's archaeological approach to North Africa after the fall of Carthage focuses on the violence practiced by Roman colonists, who radically eliminated or repurposed existing monuments and established new towns as they took away the lands of the local population.[78] Dan-el Padilla Peralta's work on epistemicide through an anticolonialist lens offers further insight and an exciting framework for this discussion. In 2018, Christopher Lee pushed colonialism studies toward an anticolonialist approach through three lenses:[79]

1. Everyday forms of resistance (ex. revolts, theft, work slowdowns/strikes, popular songs, humor)
2. intellectual production (religious, spiritual, and literary), and
3. Statecraft and ideologies of unity, liberation, and equality of individuals under or previously under colonial rule (ex. Bandung Conference, Non-Aligned Movement, and Pan-Africanism)

Through an anticolonial framework influenced by earlier publications such as Spivak's "Can the Subaltern Speak?", classicist Padilla Peralta discusses how classical writers such as Homer haunt narratives of power and exclusion in 19th and 20th century Caribbean countries.[80] He points to the reception of Homer in texts which gender and fetishize indigeneity while obscuring – or, more aptly, erasing – Afro-Caribbean presence as Dominican elites avoid locating Homer and

[77] Woolf 2014: 49; Versluys, Woolf, Millett, and Fentress in Belvedere and Bergemann 2021
[78] Fentress 2021
[79] Lee 2018; Blouin and Akrigg 2024
[80] Padilla Peralta 2024

Blackness within the same universe.[81] Padilla Peralta's powerful discussion of worldmaking through hauntology and epistemicide – the silencing, devaluing, and destruction of knowledge systems through colonialist practices – will be returned to as I discuss the denial of indigenous knowledge, socio-cultural and political practices, and craft production in Roman Gaul and Roman Britain. These approaches to archaeology in Roman provinces provide new and exciting windows into the complex nature of native peoples' lives and deaths, and guide the field into a new, positive direction which – hopefully – will change it.

1.6.3 Technology and Social Network Theories

The study of technology in the pre-modern world is essential to our understanding of cultural, political, economic development; most of the historical frames in which we work are defined by the invention of a specific technology, e.g., stone to bronze to iron, as antiquated as these designations might be. As this dissertation explores technological change over time, such as the transition from red coral to opaque red glass production and decoration in the regions under study, technology theory provides necessary groundwork for explaining knowledge networks and practices. This theory also acts as a sort of intermediary between the objects under study and the experimental archaeology project and chemical analyses performed on glass samples from Mont Beuvray, France. This body of theory will act as a connecting link between theoretical concepts and our understanding of production in the ancient world and modern practices acting as proof of concept.

Latour's work on objects, technologies, and Actor-Network Theory is of particular interest in this dissertation, wherein he builds a framework for the study of society through

[81] Padilla Peralta 2024: 92

human and non-human actors and actants.[82] In *Reassembling the Social*, Bruno Latour expresses the power of human actors to engage in the creation and critique of social networks or ties, and their ability to impose theories of actions to explain the efforts of humans and non-humans to cause change. In his discussion, objects are actors which participate in multiple actions, both given agency by humans and with their own ability to cause change. The power of objects within society and the connections between human and non-human actors in the social world across regions and time will play a significant role in this dissertation as I trace the social life of opaque red glass.

1.6.4 Color and Value Theories

As color and value theories are used simultaneously for the analysis of the opaque red glass objects under study, I have chosen to combine these two theories in this discussion. In archaeological studies, color theory derives from anthropological studies on color. In 1976, Sahlins wrote that colors are "semiotic codes" which "are engaged as signs in vast schemes of social relations."[83] Individuals use colors to portray specific meanings and relations significant to their socio-cultural context. These colors, according to Alexandre Tokovinine and Cameron L. McNeil, become part of a culture's artistic and symbolic repertoire due to that culture's relationship with the natural world, their subsistence patterns, biological processes, the rarity of the color and difficulty in procuring the raw materials to produce said color.[84] The colored objects are often used as tools for social order and communicate a plethora of meanings within a society. The difficulty in finding or trading raw materials of a specific color in the natural world

[82] Latour 2005
[83] Sahlins 1976: 3
[84] Tokovinine and McNeil 2012: 279

or creating a workable pigment from raw materials relates often to the value placed in the color and objects, situations, and locations connected to said color.[85] These colored objects may be restricted in use, wherein only certain members within a society have access to the final product.

The pertinence of value theory to this dissertation is best seen when we consider its relationship with color, access, and desirability. According to Gert-Jan van Wijngaarden, value is "the total of associations that become attached to an object" as the material good is manipulated by members within a society to define relations with other individuals, institutions, customs, and the spiritual world.[86] The consumption and display of specific objects considered valuable within a society leads to the construction of identities, particularly related to accessibility. The social structures put into place reinforce difficulties for non-members to access goods and, in turn, this increases the cultural value of the object in its purpose to reproduce the identity of the consumers.[87] As social groups manipulate and create identity through said goods, the goods are invested with specific meanings and values that become inherent. If the object stays within that society, it will not lose its economic or social value. Multiple aspects affect the associated value of a good and are relatively unrelated to societal manipulation, particularly in pre-industrial societies: first, the input of labor (i.e., the practices and knowledge necessary to produce an object, the amount of time and energy put into its production) and, second, the scarcity of the raw materials needed for production (e.g., its availability in the surrounding area versus the need for a successful direct or indirect trade route, if it is very easy to procure or almost impossible to access).[88] In the case of this dissertation, both the input of labor and the scarcity of the material need to be considered as deciding factors in the value of opaque red glass copper-alloy goods,

[85] St. Clair 2016: 23-30
[86] Van Wijngaarden 1999: 2
[87] Bourdieu 1984, 100-101
[88] Marx 1975; Mauss 1925; Malinowski 1922; Simmel 1907; Appadurai 1986

since procuring such a specific shade of red in the ancient world was a difficult task. I approach the study of value through the framework provided by Patricia Crook, who separates value into three categories: moral, esteem, and measure.[89] These categories act as a framework for each chapter as I discuss the values created, maintained, and demonstrated through the production and consumption of opaque red glass across temperate Europe.

1.7 Finishing Touches: Some Final Notes

By approaching opaque red glass through traditional methods of archival and museum-based research in conjunction with scientific analysis of glass samples, this dissertation will provide more context for understanding the significance of opaque red glass to the indigenous populations of Europe who produced and consumed the harnesses, chariots, jewelry, fibulae, and belts decorated with it. It will also help us understand the reasons for technical and aesthetic changes at the end of the Late Iron Age and in the early years of Roman colonization in western Europe while emphasizing more nuanced and anticolonial approaches to archaeological data. Ultimately, this work seeks to push the field of Mediterranean and non-Mediterranean archaeology, and especially Roman provincial archaeology, forward by acknowledging the Roman colonial project and the role of material culture in helping us bring to light the true diversity of the Roman provincial world.

[89] Crook 2019

Chapter 2

Organizing Objects: A Database for Metals Decorated with Opaque Red Glass in Temperate Europe and Britain

2.1 Introduction

In this chapter, I will explain the process of creating the opaque red glass database that was central to the dissertation project. I will introduce the chronological and geographical limits of the database, together with information on the site types at which opaque red glass objects have been discovered in Late Iron Age and early Roman period western and central Europe. Next, I will outline the process of collecting information and categorizing the opaque red glass artifacts before I turn to a typological and chronological discussion of objects included. Some final notes on the success of this database for the present study will be addressed, along with possible shortcomings. A future iteration of the database will be available open-access to the public after receiving permission from museum and research institutions to share certain images and information. Until then, access to the database can be granted through email inquiry, when a login and password will be provided at: https://dal.ucla.edu/red-glass/user/login.

2.2 Time and Topography: The Chronological and Geographical Limits of the Study

Once Mediterranean traders introduced opaque red glass to temperate Europe c. 450/400 BCE, the material spread quickly as a decoration for a variety of metal objects throughout the continent until its supposed devaluation in the early 1st c. CE. I focus on the use of opaque red glass as a decorative material primarily for copper and iron personal and portable objects in temperate Europe and Britain up to c. 150 CE. The database reflects the chronological and

geographic limits of the study; objects which date post-100 CE demonstrate developments in the art of enameling in Britain under the Roman Empire.

I have chosen to cover a vast area to produce a more holistic picture of opaque red glass production from the Iron Age to the Roman imperial period. For this reason, I have included many objects decorated with opaque red glass from major archaeological sites in temperate Europe and Britain, though I have limited the objects present in the database to reflect material which I have studied in museums, research centers, and published collections of opaque red glass and enameling in the Iron Age and Roman period. Many scholars refer to the culture area and artistic style under study as "Celtic,"[90] though I will to refer to the individuals living in the region as "indigenous peoples/populations" or "local populations," and to the artistic style with such terms as "decorative metalworks," "opaque red glass decoration," and "enamel," to respect the numerous indigenous societies which fall under this umbrella term and their separate identities.[91] "Celtic" appears only when referring to scholarship which has implemented the term, and it cannot be avoided without causing confusion.

In this study, I have included artifacts from the following present-day countries: Italy, Germany, France, Belgium, Luxembourg, the Netherlands, Switzerland, Hungary, the Czech Republic, and Great Britain. These countries (or parts of them) fall into the Roman provinces of Gallia Transalpina, the Three Gauls (Gallia Belgica, Gallia Lugdunensis, and Gallia Aquitania), and Roman Britain. My choice in including these provinces follows the scholarly tradition of Virginie Challet and her publication on opaque red glass objects in Iron Age temperate Europe;[92]

[90] Fernández-Götz 2014: 3. For use of the term Celtic in scholarship, see Challet 1992; Brun and Pernot 1992; Gugisberg 2018; Ginoux 2020; Dietler 2006
[91] Mattingly 2007; Roymans and Fernández-Götz 2019
[92] Challet 1992

unlike Challet, however, I also address opaque red glass production and consumption in Roman Britain. I include Roman Britain because of its significance to opaque red glass studies: unlike other areas on the continent after the Roman invasion of Gaul (58-50 BCE), there is evidence in Roman Britain for continuous production of opaque red glass in the form of horse equipment, chariot parts, and fibulae/brooches from the late Pre-Roman Iron Age into the Roman imperial period. In the 2nd c. CE, the practice of enameling, which had largely fallen out of favor in Gaul, spreads in the content: millefiori fibulae were produced and traded across northern temperate Europe until at least the 4th c. CE.[93] To accommodate these divergent but interrelated histories, this dissertation and its corresponding database cannot exclude Britain from the tradition of opaque red glass working.

2.3 Recovering Red: Site Types with Opaque Red Glass

There are five main site types at which archaeologists have recovered opaque red glass objects in the study area: burials, rivers, sanctuaries, settlements, and hoards. The trade, production, consumption, and deposition of objects decorated with opaque red glass are discussed in each chapter, beginning with Chapter 4. In this section, I will discuss each site type in the database to make clear how commonly or uncommon the recovery of opaque red glass objects is. I will reference site names or object types from the database in this discussion to add greater context to the discovery of objects and deposition history at each site type.

2.3.1 Funerary Sites

[93] Bateson 1981

Burial deposits of grave goods decorated with opaque red glass decoration first appear ca. 450/400 BCE in temperate Europe. Similar burials in Britain date ca. 250/200 BCE, particularly in East Yorkshire.[94] Opaque red glass objects appear in both male and female burials, though predominantly in male graves, and on a variety of objects. Most rich burials include swords and scabbards, chariot parts, and horse harnesses decorated with red glass. Over the course of the final centuries BCE, the number of burials containing such goods dwindled due to the change from inhumation to cremation burials and changes in these societies' social structures.[95] Burials with opaque red glass decoration are not found in the archaeological record of temperate Europe by the beginning of the 1st c. CE, but various enameled metal types, such as brooches, belt plaques and seal boxes, appear in burials in Belgium, northern France, and the Rhine after the 2nd c. CE.[96] In Britain, opaque red glass grave goods are present in burials through the Iron Age, pre-Roman Iron Age, and Roman periods.[97] Opaque red glass objects in burials discovered in Britain appeared as a solo decoration and in polychrome combinations (alongside blue and yellow) from the 1st c. BCE; these objects continue to be buried in male and female graves through the imperial period.[98]

2.3.2. Rivers and Sanctuaries

Most sanctuaries in Iron Age temperate Europe are water-based in nature, though not all fall into this category.[99] Deposits of weapons, horse equipment, and jewelry are common metal

[94] Anthoons 2021
[95] Anthoons 2021: 4
[96] The R.W. File 31-32
[97] Freestone et al. 2003
[98] Joy 2014; Hunter 2008; Ivleva 2014
[99] Challet 1992

deposits in rivers and sanctuaries. In these deposits we also find evidence of a smaller category of objects decorated with opaque red glass, particularly fibulae and torques. After the Roman invasion, most deposits at sanctuaries southwest of the Rhine River in modern-day Germany change: although fibulae can still be deposited at these sites, they are not decorated with opaque red glass; what is more, the deposition of weapons and horse equipment disappears completely, only to be replaced with anatomical votive offerings.[100] Deposits at the frontier zones of the Roman Empire continue to include swords, yet on the continent these are not decorated with opaque red glass. They are rather *gladii* and *gladius*-like swords that were mass-produced for purchase by Roman troops and *auxilia*.[101]

The deposit of red glass and polychrome enameled objects are found in small numbers, though consistently, at sanctuary sites in Britain.[102] Such objects include brooches, some horse and chariot equipment, and seal-boxes.

2.3.3 Settlements

Evidence of working opaque red glass at settlements consists mostly of small objects, such as nails, rivets, buttons, and studs. Also present at some Iron Age sites, such as Gussage-All-Saints, Dorset, and Fish Hill Streets, London, in southern Britain and Mont Beuvray, Burgundy, in France, are small cakes of raw glass and shells of glass discarded from the object

[100] Hughes 2017
[101] Nicolay 2003; Anthoons 2021; Roymans 1996. Roymans argues that the break in tradition is related to the pacification and demilitarization of many zones and marks "the end of a martial ideology." Nicolay suggests that deposition of military equipment relates to the end of a soldier's tenure in the auxiliary unit and the beginning of his life as a veteran.
[102] Garrow and Gosden 2012

during the finishing process.[103] Settlement deposits of finished products are less common than deposits of opaque red glass objects at sanctuary, burial, and river sites. Rarer to find at settlements (and not found at other site types) are cakes of the raw glass or crucibles with opaque red glass. These deposits are generally found in waste areas of the site, although at sites such as Fish Hill Street and Mont Beuvray, waste is also found in workshop contexts.[104] This is quite rare in the archaeological record, and more sites in Britain dating to the late 1st century BCE and later demonstrate evidence of opaque red glass working than on the continent. The absence of evidence for opaque red glass working in most of Iron Age Europe does not negate the possibility of production at other sites. At present and for this dissertation, however, Mont Beuvray has taken a significant role in understanding production of opaque red glass after the Roman invasions beginning in the mid-1st c. BCE.

2.3.4 Hoards

The final common site type is hoards, or the deliberate and simultaneous deposit of material culture in quantities of more than one object into the ground.[105] There are various types of hoards, though this type of deposit appears commonly in two variations: 1) the deposition of objects meant to be uncovered later in time yet never recovered due, to circumstances unknown to the archaeologist, or 2) the deposition of objects as gifts to supernatural powers.[106] Both variants of hoards suggest that there is a purposeful curation of objects by the individual depositing the goods.[107] The first variation of a hoard suggests that the objects were chosen in

[103] Information gathered from visits to the collections at the British Museum and Bibracte Museum, respectively.
[104] For Fish Hill Street, see Bayley 2015: 185. For Mont Beuvray, see Brun and Pernot 1992
[105] Bradley 2013: 122
[106] Osborne 2004: 1
[107] Joy 2016: 239

fear of the individual(s) losing the goods due to forced migration, fleeing, invasion, or another form of threat – and these objects were never found again. The second variation implies that the deposition was final, and that the individual(s) chose to remove the objects from circulation by providing a sacrifice to local deities.

There are two hoards included in the database: the Westhall and Polden Hill hoards, both of which were uncovered in modern-day England. The objects presented in the database are those that the British Museum permitted me to access for this study. Though few in quantity when compared to the overall number of objects presented in this dissertation, these objects are good representations of types and styles of horse and chariot gear and styles similar to those found in hoards and other contexts in late Pre-Roman Iron Age or Roman imperial Britain.

2.4 Collection and Classification: Object Types in the Databases

I began building the database with the last comprehensive study published on opaque red glass in Iron Age Europe, Virginie Challet's 1992 *Les Celtes et l'émail.* Some collections, such as those at the National Archaeology Museum at Saint-Germain-en-Laye, have remained unchanged since the 1990s; therefore, this became the best place to start the database. From here, I built upon the collection: I began with a series of objects excavated at the archaeological site of Mont Beuvray and catalogued at the European Research Center in Glux-en-Glenne. I then included objects from my research visit to the British Museum's main site and its off-site location and warehouse, Franks House. The database associated with this dissertation will grow as I visit more museums and continue this work.

Classifications of many objects from the database are borrowed from previous studies that established most object types and styles. I have classified other objects based on comparanda

found during my dissertation research. Some objects, such as the nails, rivets, studs, and buttons, are difficult to associate with finished objects; I offered multiple possibilities for their use based on comparative data such as chariot parts that represented entire chariots in the *pars pro toto* tradition,[108] and decorated horse harnesses.

Categories of object types and quantities within each category changed over the course of the Iron Age and Roman period, particularly on the continent, though copper alloy remained the most common base metal for opaque red glass decoration. Opaque red glass also could be employed in the decoration of various metal objects, as visible in the Amfreville helmet which is composed of bronze, iron, gold, and opaque red glass.[109]

There are very few opaque red glass beads found in the archaeological record in locations such as southern Britain, and just as few of opaque red glass vessels and stirring rods, such as those found in the France and the Netherlands, dating to the 1st c. CE.[110] There may be aesthetic and technical reasons for their rarity, such as difficulty in keeping the opaque red color due to increased oxygen during production or a preference for different colors of glass in these regions.[111]

The following sections divide objects decorated with opaque red glass into categories based on their typologies. I begin with the most common objects in the archaeological record, which would have been used in the production of a final object, before describing six other categories:

[108] In this tradition, a part of a chariot stands for its whole. This tradition becomes more common in the 2nd c. BCE.
[109] Kruta 1977. See SGL n. 2610 in the database.
[110] van Beek 2002: 9-10
[111] Stead 2006: 115; Henderson 2013: 493

1. Nails/rivets and buttons/studs, which are small decorative and/or functional objects decorated with opaque red glass fastened to other objects
2. Fibulae, or objects which are functional and hold clothing in place but can also be decorative
3. Jewelry, such as torques and arm rings, which can be worn by males and females
4. Belts, which are decorative and functional, and appear in the burials of females
5. Arms and armament, such as swords, shields, and helmets, which appear most commonly in male burials but can appear in female burials
6. Chariot and horse harnessing, which often appear as pieces which are representative of the whole set, in both male and female burials depending upon period and region

Nails/rivets and buttons/studs are present in other categories of objects, such as arms and armament and chariot and horse equipment. When nails/rivets and button/studs are discovered near or attached to another object, the context provides evidence for the purpose and use of single finds (e.g., unconnected to other objects) in temperate Europe.

2.4.1 Nails/Rivets and Buttons/Studs

Small rivets are used to attach rounded pieces of coral and opaque red glass to a variety of objects, such as torques and shield umbos, as early as the 4th c. BCE. For example, two rivets were found directly connected to part of a shield that had mostly deteriorated at the sanctuary of Gournay-sur-Aronde in Oise, France.[112] These two rivets and the other five found in isolation at the sanctuary are made of iron and have large, flat heads hollowed out to form a central area for

[112] Challet 1992: 107-111. See MV n. 1754 and n. 885.7 in the database.

the application of the opaque red glass. Though it is possible that these shields were used in battle, it is highly unlikely: the glass is too brittle to take hits without damage. It is more probable that these shields were ceremonial in nature before deposition or were created as votive offerings.

By the late 2nd and early 1st c. BCE, nails/rivets are found in larger quantities in funerary contexts and settlements across temperate continental Europe, often in the decoration of objects such as belts and appliqués, although single finds appear most abundantly in well-excavated settlements such as Manching in Germany and Mont Beuvray in France.[113] There are three categories of nail-rivet decoration, according to Challet: Type 1, Type 2, and Type 3, which are further subdivided into a, b, and c variants.[114] Type 1 nail-rivets are circular and divided into four streaked quarters, while Type 2 are decorated with radiating streaks from a central point on the head. Type 3 nail-rivets are quadrangular. At Manching, the main style of nail-rivet is a Variant 3 bronze rivet with an enameled quadrangular head. The nail-rivets from Mont Beuvray, which are numerous though rarely found in use, are Type 1 and 2. These are located across the archaeological site, with the largest concentrations found near the enamellers' quarters – either for use or discard if the final product was unsatisfactory – and as offerings at La Fontaine Saint-Pierre, a spring sanctuary.

Two other categories of objects are present at archaeological sites, termed as buttons and studs, were commonly found in Britain from the 2nd c. BCE into the Roman period.[115] Buttons have flat, disc-like heads with enamel decoration and one or two rings for attachment on the back. Enameled bronze buttons have been discovered at Stradonice in the Czech Republic, the

[113] For examples of nails/rivets, see MB 2002-32-418-8 and 2003-32-1099-10, and SGL n. 24228.3.
[114] Challet 1992: 118-123
[115] As an example, see BM 1958,0704.76 from Hertford Heath.

Titelberg in Luxembourg, and at the settlement of Manching in Germany.[116] Studs are rounded and decorated with opaque red glass; the copper-alloy pieces in the database do not have a surviving metal backing, but rather presenting a concave opaque red glass back. The intended use of these pieces is not certain, since studs and buttons are not found attached to a larger object, but it is possible that the buttons were used to decorate some type of cloth. The studs are more variable, although it seems probable these objects would have been attached to a larger metallic object, perhaps a stave-bucket as suggested by Stead.[117]

2.4.2 Fibulae

The second most common category of objects decorated with opaque red glass is bronze fibulae, although most examples are pre-1st c. BCE. These decorated fibulae are found as early as the 4th c. BCE in necropoleis such as Münsingen-Rain, in the Kanton Bern region of western Switzerland, for which the Münsingen-type fibulae gained its name.[118] Most Münsingen-type fibulae have a small, round piece of glass fixed to the arch of the fibula by a rivet, but some are decorated with small, round pieces of glass and coral on the arch. The second type has an enamel-like decorative inlay on the arch of the fibula along with a small, round piece of glass fixed to the arch by a rivet.[119]

Bronze and iron opaque red glass-decorated fibulae continue to appear across various parts of continental Europe in the 3rd c. BCE, including Switzerland, France, and Germany,

[116] Challet 1992: 133-134. See MI n. 1984.5328.13 from Manching in the database.
[117] Hüssen 1983 citing Stead 1971
[118] Challet 1992: 39-48; Buchsenschutz 2007: 132. For examples, see BHM n. 480 and BHM n. 354 in the database.
[119] See BHM n. 582 from Münsingen-Rain and XJM n. 69.12.6 from Ménföcsanak for comparanda.

although most iron fibulae are found in Germany and Switzerland.[120] All iron fibulae are made from a single piece of metal, and the back of the foot has a globular area with a cavity for opaque red glass.[121] The database includes five examples of fibulae from the 1st c. BCE which were uncovered in Hungary, Germany, and France.[122] Two Hungarian fibulae from Törökszentmiklós-Surjánhálom in Szolnok were uncovered in a single burial at a cemetery on the banks of the river Theiss. These fibulae are the Scordisci-type, characterized by their rectangular foot attachment to the arch, and both are ornamented with the same enamel motif of the foot. An Alpine-type fibulae from the settlement of Manching in Germany has a circular foot ornamented with enamel rather than a rectangular one; a single fragment of opaque red glass was discovered on the arch. In the same context was found another fibula of the exact same style but decorated with coral, a rarity in the 1st c. BCE. Two more fibulae were found in the Pâture du Couvent at Mont Beuvray in Burgundy, France, one of which is a peacock-type fibula decorated with a ram's head with inset opaque red glass eyes.[123]

2.4.3 Jewelry: Bracelets and Disc Torques

Though metal jewelry is not uncommon in the archaeological record of temperate Europe, examples of bracelets and disc torques with opaque red glass decoration are fewer. A specific crafting tradition of bronze bracelets decorated with opaque red glass existed in the 4th c. BCE on the Swiss Plateau, as evidenced by three bracelets from Münsingen-Rain.[124] The opaque

[120] Challet 1992: 62-66. Dates for the iron fibulae range from the 3rd to 2nd c. BCE; a definitive date within either century is difficult to determine due to the objects' styles and contexts.
[121] Examples have been found at the sites of La Tène and Manching.
[122] Challet 1992: 124-125
[123] Peacock-type fibulae are called such due to the technological design of the spring cover. See MB 990-9-766-1 in the database.
[124] Challet 1992: 48. See BHM n. 819, n. 58, and n. 354 in database.

red glass iteration of this bracelet, its terminals decorated with opaque red glass circles riveted in place, stems from a Swiss crafting tradition which did not expand beyond its geographical context.

Although torques were common in the 4th and 3rd c. BCE, only a subset was decorated with opaque red glass inlays. An example of this style is a bronze disc torque dating to the end of the 4th c. BCE from Reiningen-Nonnenbruch in the Haut-Rhine region of France, once decorated with small, round pieces of opaque red glass at the place where the piece lay upon the chest of its wearer.[125] Cavities on the torque were also inset with opaque red glass. This piece shares similarities with two other disc torques found in the Marne region of France, both dating to the early 3rd c. BCE. Other 3rd c. BCE torques decorated with opaque red glass in various techniques were found in the Marne and Ardennes regions of France: some are decorated with an enameling technique while others are decorated with small round pieces of opaque red glass held in place by a rivet.[126] Opaque red glass decoration on torques was less common in later period; most extant examples of torques were more simply decorated.

Also discovered in Marne were bronze bracelets with rigid joints, decorated with opaque red glass and dated to the 3rd c. BCE.[127] This style of bracelet is common in the Champagne region, but the addition of opaque red glass makes these bracelets unique. Examples of bracelets from the 2nd c. BCE in the database are bronze bracelets with rigid joins and decorated with enamel-like opaque red glass in a quadrangular form.[128] There is a hollow area on the reverse of

[125] Challet 1992: 49-53. See SGL n. 25135 in database.
[126] For examples of each type, please see SGL n. 34182 (Biene in Marne, France) and ME.4/ME.BG (Ménil-Annelles in Ardennes, France) in the database.
[127] Challet 1992: 66-70. For example, three such bracelets were uncovered during excavations of Tomb 25 at Gourgançon-les-Poplainnaux.
[128] Challet 1992. For example, see the bronze bracelets ML.1964 and MAE n. 1770 BL in the database.

the bracelet which is stylistically similar to the Hungarian enameled belts from the Carpathian Basin dating to the 3rd c. BCE, suggesting a transfer of techniques of production between object types and across space and time.

2.4.4 Belts

Belts decorated with opaque red glass first appear in temperate Europe in the 3rd c. BCE, though examples can be found until the 1st c. BCE. These belts are found only in burial contexts and, most often, with individuals identified as female. Examples have been found through excavations in France, Germany, the Netherlands, Hungary, and Slovakia.[129] Although multiple types of belts are present in this period, three are commonly decorated with opaque red glass: the Swiss-type belt, the Hungarian-type belt, and the Scordisci-type belt.[130] Swiss-type belts include flat rings which separated the links on the belt in such a way that the belt is unable to rotate while worn.[131] This type of link, always undecorated, is found on multiple belts across continental Europe. The Hungarian-type belt – found predominately in Hungary – presents enamel decoration in a rectangular pattern on the intermediary links.[132] The third type of belt is the Scordisci-type, which has links similar in shape to a lyre and is found in combination with the Hungarian-type belt links. These chain-belts are mostly made in bronze, though a few examples can be found entirely in iron or with iron rings included to mend a previously broken belt. If there is opaque red glass decoration, it always appears in the same places on the belt: the belt clasp, the link between the clasp and the rest of the belt, the terminal link from which pendants

[129] Challet 1992: 73-107
[130] For example, see DJM 2008-32-2819-10 in the database.
[131] For example, see PS n.1902.55 in the database.
[132] For example, see MNM n. 106.1886.8 in the database.

commonly hang, and the sometimes the intermediary links between parts of the belt. Though it is most common for the clasp and terminal links to be decorated, these are not present in all examples. Similarly, many of the belt clasps are designed with zoomorphic motifs decorated with opaque red glass enamel, but it is not always present.[133]

Based upon the presence of repairs on pieces such as the belt found at Cuperly in Marne, France, and the existence of the Swiss-type belt which prevents rolling of the chain, we may assume that many of these belts were worn in life. It is quite likely that many of the other objects were also worn in life and not made specifically for deposition; although special due to their opaque red glass decoration, these object types are commonly found as pieces in the archaeological record which would have decorated the body.

Although less often found in the 1st c. BCE, belts with opaque red glass decoration were uncovered in female graves across temperate Europe.[134] These types of belts are found in some areas of Britain and seem to be a type worn by numerous individuals, regardless of the region.

2.4.5 Arms and Armament

It is rare for arms and armament to be decorated with opaque red glass. A particularly famous helmet present in this database is the Amfreville Helmet, from the Seine River near Amfreville-sous-les-Monts in Eure, France and dating to the 4th c. BCE.[135] It is the only helmet known in Gaul to be decorated with opaque red glass.[136] The upper and lower parts of the helmet

[133] For example, see SGL n.67872 in the database.
[134] Challet 1992: 126-128. Three examples were discovered at Stradonice in the Czech Republic, Alsace in France, and Eining in the Netherlands.
[135] Collis 2003: 140. See SGL n. 2610 in the database.
[136] Challet 1992: 54-56; Raftery and Duval 1990: 33, 38; Megaw and Megaw 1989: 112

are decorated with enamel-like glass fixed in place by a resinous substance while two small, round pieces of glass are fixed by bronze rivets with gold heads. The middle part of the helmet is framed by a frieze of opaque red glass pieces, held in place by more bronze rivets decorated with gold leaf. This helmet, though an outlier in terms of the rarity of the find, presents similarities to the Münsingen-type fibulae; the opaque red glass pieces held in place by rivets in the fibulae required the same techniques of production as the helmet. This is another example of the early exchange of techniques and styles of metalworking across temperate Europe.

Other famous examples of arms and armament decorated with opaque red glass have been excavated in Britain. The Kirkburn Sword and Battersea Shield are two examples not presented in the database.[137] The Kirkburn Sword is an iron sword with opaque red glass on the hilt and includes a copper alloy and iron sheath with opaque red glass decoration. The piece dates to c. 300-200 BCE and was excavated from the grave of a man interred in Kirkburn, East Yorkshire.[138] The Battersea Shield is a bronze shield facing decorated with opaque red glass studs. The metal cover of the shield would have been attached to the front of a wooden shield.[139] This object was discovered in the Thames River at Battersea in London and dates c. 350-50 BCE and was most likely deposited as a votive offering. The Kirkburn Sword and Battersea Shield are well-preserved and rare examples of arms and armament decorated with opaque red glass.

2.4.6 Chariots and Horse Harnessing

[137] I was not permitted access to these objects because these are fragile and currently on display at the British Museum.
[138] James and Rigby 1997: 40; Stead 2006
[139] Stead 1985; Jope 2000

Although funerary and votive deposits of chariots, chariot pieces, and horse harnessing have been excavated as early as the 6th c. BCE, there are no examples of such objects decorated with opaque red glass until the 2nd c. BCE. Chariots from this period on are a two-wheeled chariots, a vehicle which could be used in battle or for ceremonial and depositional purposes. Chariots that had metal pieces decorated with opaque red glass would have been used for ceremonial purposes since the glass has little to no defensive purpose and was too fragile to survive warfare.[140] Various pieces of a chariot could be decorated with opaque red glass, including its cotter pins – these metal pieces, usually made of iron, were used to block the wheel hub while in movement.[141] Two categories of opaque red glass-decorated harnessing often appear in this period: horse bridle-bits and yoke guide passes. Bridle bits would have sat across the back of the horse's mouth; the yoke guide pass consists of rings through which the wooden pole, or yoke, sat; the yoke connected two hoofed animals to each other as they pulled a two-wheeled chariot or four-wheeled wagon. Three examples of yoke guide passes were found in a burial at La Garenne-Colombes "Nanterre," each a bronze ring molded in a single piece and decorated with the same enamel motif on the obverse and reverse with an ornamented rounded head.[142] None of the guide passes present evidence of wear on the interior ring though the pieces were found with the remains of chariots and horses; this suggests ceremonial use or production for burial rites.[143]

[140] An argument could be made that such strikingly decorated chariots could relay the immense wealth and resources accessible to a community and its leaders, striking fear in the enemy. If a chariot was used for this purpose, though, I would argue that it would have never seen battle since it would be a waste of resources to fix any parts damaged by the enemy.
[141] Challet 1992: 112-114. For examples, see the following objects in the database: SGL n. 36139 (La Garenne-Colombes "Nanterre" in Hautes-de-Seine, France) and PS n. 1967-748 (Manching-Oppidum in Ingolstadt, Germany). Both date to c. 225-125 BCE.
[142] Challet 1992: 114-117. For example, see SGL n.36143 in the database.
[143] Challet 1991: 115; Hubert 1900: 73

Other examples of horse harnessing and pieces of two-wheeled chariots have been excavated from 1st c. BCE and 1st c. CE contexts, though the pieces from the 1st c. CE have been found in southern Britain only. Yoke guide-rings and yoke guide-ring ornaments have been recovered at settlements, such as such as the pieces at Mont Beuvray: from the enamellers' quarters of Côme Chaudron and Champlain, and the Porrey and Côme Chaudron areas.[144] The yoke guide-rings were decorated on the circular central part with ribbed and enameled nails/rivets, while the yoke guide-ring ornaments were decorated with hemispherical buttons streaked with enamel.[145]

Openwork appliqués with opaque red glass decoration – presumed to be associated with horse harnessing – have also been excavated, such as the pieces from Lacoste in Gironde, France, and La Pierre d'Appel in Vosges, France.[146] Both appliqués are decorated with nail-rivets with enameled and striated heads. Another appliqué from Parc aux Chevaux at Mont Beuvray, France, is identified as a bronze chariot piece;[147] it is incomplete and in two fragments, narrow and elongated with one circular end crossed by a bronze enameled head and an iron shank.

In Britain, horse harnessing decorated with opaque red glass appears as early as the 3rd c. BCE, though the database covers only a handful of the types found. The earliest piece, identified as a horse bridle-bit, was excavated from a burial in Wetwang, East Yorkshire.[148] The piece, which shows signs of wear, was found in the burial of a female along with a two-wheeled

[144] Challet 1992: 129-130. Pieces identified as yoke guide-rings were based on comparanda recovered from chariot burials in Germany dating to the same period. For examples, see SGL n. 24228.3 and SGL n.23819 in the database.
[145] Information on this object as adapted from the Mont Beuvray database accessible on-site at the European Research Center in Glux-en-Glenne, France.
[146] Challet 1992:131-134. See MB n. 2016-34-2895-27 and SD n.IB.360 in the database.
[147] See MB 2010-34-535-19 in the database.
[148] See object BM 2001,0401.2 in the database. Information on this object as adapted from the British Museum Online Collections database.

chariot, which was dismantled and placed into the grave. Other examples from the database date to the 1st and 2nd c. BCE, such as two strap fittings from the Westhall Hoard found in Suffolk, England; these pieces bring together the ends of the horse's reins and are decorated with opaque red, blue, and white enamel decoration, a common polychrome combination in the early 1st c. CE in Britain which will continue into the following centuries and spread across the European continent in the 2nd c. CE.[149]

Strap-unions, which bring together the ends of the horse's reins, also appear in southern Britain in the 2nd to 1st c. BCE, though the enameled ones in the database from the Canterbury burial and Polden Hill hoard date to c. 50-150 CE. The strap union from Canterbury is a single cast disc with rectangular panels on the sides and loops on the underside for the straps, and is decorated with an opaque red glass enamel inlay, most of which is missing. The strap-union from the Polden Hill hoard is also a copper-alloy cast plate with two loops projecting in the back for the straps. Similar to the Canterbury strap-union, the Polden Hill example is decorated with opaque red glass enamel laid into circular insets.

Linch pins, which act in the same fashion as cotter-pins by securing the chariot's wheel to the axle, are a final object type present in the database. One example is a copper-alloy linch pin discovered at Kings Langley with a crescent-shaped head.[150] This piece is plain on one side and inset with red glass in a pattern of interlocking curvilinear motifs on the other, similar to the Polden Hill harness fitting. An iron shank is inserted into the head of the linchpin, which once had insets of an unknown color on either side.

[149] For examples, see BM 1855,0519.9 (decorated using the technique of enameling) and 1855,0519.10 (filled with cut glass inlays in different shades of red) in the database.
[150] See BM 1940,0203.1 in the database

2.4.7 Oenochoes

A final category of objects decorated with opaque red glass are oenochoes, of which only two are present in the database; in part, this is a reflection of the rarity of this type of object, particularly those decorated with opaque red glass. Both oenochoes, dated to the 4th c. BCE, were uncovered at the site of Basse-Yutz in the Moselle region of France.[151] These oenochoes are decorated with two lying animals around the collars of the vessels, while on the caps the back of the animal acts as a handle. Both opaque red glass and coral decoration can be found on the pieces; opaque red glass is held in place by rivets on the backs of the animals, while coral decorates the bottom of the vessels and are the insets of the animals' eyes. The palmettes at the handles of both vessels are also decorated with red glass and coral pearls. This piece and the Münsingen-Rain fibulae decorated with both coral and glass elements represent a mixed category of objects and demonstrates that the transition from coral to glass was not instant. Rather, there must have been many bronze objects decorated with both materials as glass became popular amongst elites and artisans began to learn the technical knowledge to decorate metalworks with opaque red glass.

2.5 Final Notes: Success and Shortcomings

The database compiled for this dissertation is neither exhaustive nor a complete representation of metal objects decorated with opaque red glass in the Iron Age and early Roman periods. However, it is successful as a digital space to compile examples of these types of objects. It can be updated as necessary, does not require reprints of the material, and is accessible

[151] Challet 1992: 57-61; Megaw and Megaw 1989: 76-79; Kruta 1990: 30. See BM n. 1929.5.11.1 and 1929.5.11.2 in the database

to interested parties across the world since it is a public-facing database. This database also collates objects from continental and insular contexts across multiple periods, which are treated separately in most scholarship. Therefore, it bridges traditional divides in the fields of Iron Age/Roman and continental/insular scholarship.

Future projects on opaque red glass will expand the dataset. One project would be to add opaque red glass vessels and stirring rods from the 1st c. CE and enameled objects from Britain and continental Europe dating post-100 CE. A second project would expand the database to include metal objects decorated with opaque red glass in Eurasian steppes, where similar objects are found, and sites in the northern areas of the Italic peninsula. Another project would include amber and coral, both of which decorated metalworks in the Iron Age before opaque red glass was introduced to the artisans' repertoire. Including coral and amber in a future database would assist in tracing connections between materials, object types, and find spots in the *longue durée.* A final project to improve the database would be to expand the languages of the catalogue, which would increase its accessibility to audiences across the world.

The following chapter explores the use of amber and coral as decorative elements in metalworks of Iron Age temperate Europe, as its use is connected closely to the later use of opaque red glass. Chapters 4 (opaque red glass in Iron Age temperate Europe) and 6 (opaque red glass in pre-Roman Iron Age and Roman Britain) will be based on materials from this database, though references to the database will be made in Chapters 5 (opaque red glass in Roman Gaul and 7 (scientific analysis of opaque red glass from Mont Beuvray, France).

Chapter 3

The Origins of Opaque Red Glass in Temperate Europe: Faience, Glass, Amber, and Coral

3.1 Introduction

Four materials were introduced to temperate Europe before opaque red glass appeared: faience, glass, amber, and coral. These materials were used in the creation of beads, bracelets, amulets, decorated metals, textiles, and ceramics in the Bronze and Iron Ages. The artisans' applications of these materials as smaller statement pieces in the production of complete objects share many similarities. Indeed, a connection can be traced between the techniques needed to work faience, early glasses, coral, and opaque red glass in Bronze and Iron Age material culture. Each required a specific set of tools; faience and glass need a fire or furnace, a mold, and tools for fine detail work and polishing while coral requires tools for grinding and polishing. As coral grew in popularity among the Iron Age populations, the object types decorated with coral became more diverse, eventually being used to decorate personal body ornaments, arms, and armament. Glass also grew in popularity as artisans began to work with more colors and discover new techniques to make glass into body ornaments, such as beads. After a millennium of trade and experimentation, the technologies and techniques for coral and glass object production would coalesce into the creation of opaque red glass goods.

In this chapter, I address the trade, production, and consumption of faience, glass, red coral (*Corallium rubrum*, or Mediterranean red coral), and amber in temperate Europe – including southern Britain, France, Germany, the Netherlands, Luxembourg, Switzerland, the Czech Republic, Hungary, and Slovakia – beginning in the Middle and Late Bronze Ages and into the Early Iron Age (1500 – 700 BCE). I argue that coral and amber objects reflected the

social position and personal character of individuals consuming and gifting these goods within their social networks, and acted as agents in the creation and perpetuation of relationships between Iron Age aristocrats, warrior nobles, local gods, and Mediterranean powers. Coral goods were powerful entities used by Iron Age aristocrats to strengthen relationships or cause rifts in the social order through conspicuous consumption practices.

3.2 The Fascinating Beginnings of Faience and Glass

It is widely assumed that faience and glass were created in imitation of semi-precious stones and other precious materials, such as turquoise, lapis lazuli, gold, amber, and, eventually, coral.[152] Archaeologists argue that faience, a mix of silica crystals and a glossy material, was first produced in Western Asia and Egypt in the 4th millennium BCE, using copper and manganese as colorants to produce blue and black glazes.[153] Similar to faience, glass first appears in opaque colors due to difficulties producing translucent or semi-translucent colors which must be melted at higher temperatures than achievable at that time. Indisputable evidence for the primary production of faience is found across Europe, from Scotland to Poland, from 2000-1500 BCE, proving the ability of Bronze Age European artisans to produce vitreous objects.[154] It is unclear, however, whether the technology was transferred from Western Asia by artisans or was a local invention.

Although evidence of glass object production appears in Bronze Age Europe, there is no indisputable evidence for the primary manufacture of glass ingots in this period. Two types of

[152] Henderson 2013: 10
[153] Tite et al. 2007
[154] Henderson 2013: 495

silica faience and glass are found: a plant-ash glass from Western Asia, so-called because of the alkali found in the glass which provide flux and calcium and make the glass durable; and a mixed-alkali glass created from two alkalis which seem to be of mineral origin rather than plant.[155] From 1500 BCE we find increasing production of mixed-alkali glassy faience and glass in Italy, which is not produced in Western Asia at this time.[156] This suggests that primary production of mixed-alkali glasses found in Switzerland, France, Germany, Italy, Ireland, and England was invented in Europe. The site of Frattesina in northern Italy (11th to 10th c. BCE) shows the highest variation in artifact types and colors across Europe, marking it as a significant glass production center.[157] Glass beads, crucibles with red and white glass adhered to the sides, and small clay trays on which glass was reheated and worked have been found, along with multiple broken and complete disc-shaped ingots in cobalt blue and opaque red, which has a core of translucent turquoise green in the center suggesting oxidation in some places and reduction of the glass in others (Figure 3).[158] It is unknown which forms of the glass were manufactured on site, or if some forms were imports; for example, no glass-making furnaces have been found. However, the presence of mixed-alkali glasses at Frattesina proves that these glass colors and types were produced in Europe rather than Western Asia.

The discovery of an opaque red mixed-alkali glass at Frattesina, the earliest known example of this color produced in Europe, raises several questions (Figure 4): what influenced northern Italian artisans to produce opaque red glass in northern Italy as early as the Middle Bronze Age, and why did this glass not appear across other areas of western and central Europe until 450/400 BCE? According to Henderson, there are two possible influences that led to the

[155] Henderson 2013: 494
[156] Henderson 2013: 496
[157] Henderson 2013: 497
[158] Henderson 2013: 497; Biavati and Verità 1989: 295

manufacture of glass in Europe, both of which relate to the smelting of metals. In the smelting of copper, a slag is formed when fuel ash and silica are combined in the crucible; this slag is a brilliant and lustrous glassy material which may have been reddish in color due to copper.[159] However, due to difficulties in maintaining a reduced, oxygen-free environment within the furnace environment, early attempts to create faience and glass using copper oxide caused the material to turn turquoise green. Perhaps the failure to create red faience and early glass, and an interest in the reddish colored glassy slag produced by copper and bronze workers, pushed northern Italian artisans to produce opaque red glass. Though imperfect, the technologies needed to make this color improved over time, leading to turquoise-colored cores in opaque red glass ingots but little evidence of opaque red beads and decorated fibulae due to difficulties associated with the maintenance of a reduced furnace environment.



Figure 3 Three small ring beads produced at Frattesina, found in Tomb 91 at Terni, dated 950-800 BCE. After Yatsuk et al. 2023: 3-4.



Figure 4 Bead produced at Frattesina with opaque red glass bands, found in Bronzetti Sardi grave at Vulci, dated 850-825 BCE. After Yatsuk et al. 2023: 3-4.

[159] Henderson 2013: 493

Trade routes from northern Italy across the Alps into Switzerland and beyond were established in the Neolithic period, yet opaque red glass does not appear outside of northern Italy despite the significance of red to many early societies. Red played an important role in adornment practices beginning as early as the Paleolithic, when red stones, shells, and painted pieces of bone and teeth were used to make amulets, necklaces, bracelets, pendants, and was used in burial practices and cave paintings.[160] Pastoureau argues that the color is associated with sacrifice, violence, courage, life, and death and was used by people to draw attention to themselves, to protect themselves, and to adorn themselves because it was pleasing to the wearer's eye.[161] He suggests that the importance of red as a color stems from fire and blood, two natural elements that are associated with the color and encountered in almost all societies throughout their histories.[162]

With these concepts in mind, it is worth considering why opaque red glass was neither produced nor imported north of the Italian Alps or northwest of the Balkans. Were trade routes for many goods, including glass, poorly established or relatively nonexistent between northern Italy and the rest of western and central Europe? These possibilities may explain the localized production of faience and glass and the late appearance of opaque red glass in the adornment of metal objects in the 5th c. BCE. Perhaps the techniques used to produce a red-colored glass were not discovered in temperate Europe and Britain, which may explain the growing popularity of red coral upon its appearance in 7th c. BCE temperate Europe.

[160] Pastoureau 2016: 16
[161] Pastoureau 2016: 22-24; Coles 2018: 7
[162] Pastoureau 2016: 16-22

3.3 Amplifying with Amber: Creating a Visual Code

Baltic amber, or succinite due to its high concentration of succinic acid, is fossilized tree resin from the area of the Baltic Sea in northwestern Europe.[163] The harvest and trade of Baltic amber into temperate Europe began at the end of the Neolithic and increased in quantity in the Bronze Age.[164] This natural material was harvested from shallow waters and beaches where it had washed up, appearing in sizes large and sturdy enough to be worked into different shapes after cleaning the exterior.[165] Amber can be found in a variety of colors – its color is affected by the composition of the tree resin, the local environment in which it was fossilized, and oxidation over time. Amber changes color, transparency, and surface texture once the outer layers of the material are cleaned and exposed to air, and it would be unknown to the amber worker what color the material would become after the final stages of production.[166] Archaeologically recovered amber is also affected by burial conditions and oxidation, and once it reaches the conservation lab amber demonstrates a range of shades – from golden or honey yellow to deep orange or blood red and from transparent to opaque – which may or may reflect the original color in antiquity.

Since the effects of oxygen on amber changed its color and translucency/opacity, it would have been improbable for an artisan in temperate Europe to predict a specific shade as the outcome. Causey et al. describe the following properties of amber, which made this material magical and desirable to ancient Mediterranean societies:[167]

1. its origins, which would have seemed quite mysterious

[163] Causey et al. 2019: 16
[164] Hunter 2018: 823; Mohen 1988: 221
[165] Causey et al. 2019: 16
[166] Causey et al. 2019: 19
[167] Causey et al. 2019: 28-30

2. its electromagnetic qualities
3. its color, associated with fire and gold
4. its fragrance, which can be enhanced through rubbing
5. its shine and brilliance, associated with the divine and heroes in Greco-Roman mythology

I would like to include one more factor in this list:

6. its ability to change colors

Many materials fade over time and when first cleaned, but fewer natural materials visibly change color while being worked by an artisan. This quality would add to ancient peoples' interest in the material. Its color-changing properties could be another major factor of amber's popularity in bead production, a form which appears commonly in the archaeological record of the Mediterranean and temperate Europe.[168] Neither artisans nor consumers would have known what color the final product would be and, if an heirloom, the color could have changed over generations. Perhaps the uncertainties in amber working are one reason we rarely see metal objects decorated with this natural material in temperate Europe. Many of its other properties would become obsolete, too, if added to metals rather than formed into beads and pendants; the translucency and color would be affected by the metal backing, the scent would become insignificant as it would not touch the skin, and its electromagnetic qualities would be unobservable.[169] Therefore, archaeological finds of amber in temperate Europe are commonly beads associated with the graves of females such as those found in the barrow burial of a 4th c. BCE "princess" from Reinheim, Saarland, Germany, which included over 100 amber beads, or

[168]Hunter 2018: 823; Nava 2011; Pauli 1975

[169] Though its electromagnetic qualities were recognized in the Mediterranean world by the 6th c. BCE (see Thales of Miletus for his experiments with electron), I cannot say if this quality was recognized or understood by Bronze and Iron Age indigenous peoples of temperate Europe.

the amber necklace found in a female burial in Magdalenenberg, Baden-Württemberg, Germany (Figure 5).[170]

Amber does appear as a decorative material on certain objects, such as fibulae in temperate Europe. Very secure evidence of the use of amber as decoration in metal objects is the five coral and amber fibulae uncovered in the late 6th c. BCE burial of the Lady of Vix, located near the city of Vix in Burgundy, France; also found as grave goods were amber beads and a variety of fine metal objects crafted in temperate Europe and the Mediterranean.[171] Though amber was used in the production of some metal objects, another material was chosen more commonly: coral.



Figure 5 Amber necklace, Iron Age, last half of 6th c. BCE, found in Magdalenenberg, Baden-Württemberg, Germany. After Bittel et al. 1981: 149.

[170] Bittel et al. 1981 149; Pope 2018: 1055
[171] Knüsel 2002: 281

3.4 Coloring with Coral: Expanding a Visual Code

Red coral, or *Corallium rubrum*, is a hard marine Mediterranean coral which was used in the production of jewelry and ornaments as early as the Neolithic period in many Mediterranean and Western Asian contexts. The earliest reported coral artifacts are beads and pendants found in the central Mediterranean and Alpine regions of Italy,[172] all of which date to the Neolithic and Copper Ages (c. 4850-2500 Cal. BCE).[173] Skeates argues that early sources of coral include dead coral assemblages found on beaches, shelf reefs on the continental shelf of the Mediterranean, and fossil deposits.[174] The production of red coral goods ceases during the 1st millennium BCE and restarts in the Iron Age, where it becomes more widespread from the 9th to 4th c. BCE in the Golasecca culture area of the eastern Piedmont, Western Lombardy, the canton Ticino, and the Mesolcina valley in Italy.[175] Increased trade between the Golasecca and Etruscan cultures brought more coral into northern Italy in the 8th c. BCE, where it was used as a prestige grave good in women's burials. The 6th c. BCE brought increased contact with Greece through the colony of Massalia along the Mediterranean coast of France at the Rhône Basin, where red coral was harvested for trade. Simultaneously, in northern Italy, coral was used to create pendants and as a decorative insert in the arch and clamp of fibulae (Figure 6).[176] The fragmentation of Iron Age populations in the 5th and 4th c. BCE, however, caused the circulation of coral to diminish, leading to its gradual disappearance from the Cisalpine and Transalpine contexts by the 3rd c. BCE.

[172] Various evidence was discovered at the sites of Grotta d'Asterru, Grotta dei Piccioni, and Caverna Pollera, the Swiss sites of Chamblandes, Concise, and Port Conty, and the southern German site of Schussenreid.
[173] Skeates 1993: 284
[174] Skeates 1993: 282
[175] Berruto et al. 2023: 2
[176] Berruto et al. 2023: 3



Figure 6 Iron Age fibulae with red coral insets filling circular punctures, found at Brignano Frascata in northwestern Italy, dated 7th c. BCE. After Berruto et al. 2023: 2-3.

The trade and use of coral in temperate western and central Europe appears later due to a lack of accessibility, as waters north of the Mediterranean zone were too cold to facilitate the growth of coral. This sudden visibility of coral in the archaeological record in this region by the 6th c. BCE – applied to metal fibulae, bracelets, arm rings, hair rings, and applied to pin rings or carved into necklace beads for women – suggests influence from the colony of Massalia and Greek traders.[177] Scholars propose a second possible source of coral to temperate Europe – the Etruscans of the Italic peninsula.[178] Regardless of arguments for who traded coral – whether it was brought across the Alps or by boat up the Rhône and Saône – multiple scholars connect trade in coral with the wine trade. The symbolism of coral to Iron Age peoples and its connection to wine is a hotly debated topic.

Kruta suggests that wine made its way in temperate Europe across the Alps from Etruria and Etruscan wine merchants.[179] He connects the tree of life motif (Western Asian in origin but

[177] Kruta 1986: 7; Perrin 2000: 196-197
[178] Gomez de Soto et al. 2017; Rondi-Constanzo 1997
[179] Kruta 1986: 7

deeply embedded in Etruscan beliefs) to wine and drinking ceremonies and to coral, which Kruta speculates as major elements of Iron Age religion. Rather than coral being treated as a simple prestige object, the material becomes an element of Iron Age religion; perhaps due to its branch shape when harvested from Mediterranean waters, coral is considered a piece of the tree of life. Kruta briefly suggests its potential connection to *Taxus baccata*, or yew, a tree with bright red berries common across Europe and sacred in pre-Christian Ireland connected to life, death, and immortality.[180] The possible connection between yew and coral – an alluringly red material unseen in these regions – is intriguing yet unfounded for the period.

Perrin also connects coral to the wine trade in temperate Europe and focuses on the symbolic role coral and wine play in the religious sphere.[181] His arguments, however, invoke the influence of Greek, rather than Etruscan, wine and coral traders. Perrin first connects the importation of bronze drinking vessels to the depiction of miniature vases on pins in the Golasecca region of northern Italy, which are encrusted with materials such as amber in the 8th and 7th c. BCE. As coral made its way into temperate European Iron Age societies in the 6th c. BCE and into southern Britain by the 4th c. BCE, it began to take over as the main decorative element in gold and bronze jewelry, pins, fibulae, and arms and armament (Figure 7). Based on the statuettes of women decorated with coral jewelry and coral-inset eyes and nipples, which acted as the feet of a funerary couch or *kline* from Hochdorf (Figures 8 and 9), and 5th c. BCE statuettes and images of men with coral masks and eyes, Perrin suggests that the effects of wine drinking were symbolized by coral through the images of intoxicated deities.[182] Ultimately, he argues that stories of the Greek deity Medusa infiltrated Iron Age religion through the coral and

[180] Kruta 1987: 32
[181] Perrin 2000
[182] Perrin 2000: 197

wine trade, influencing their perception of the power of coral. Perrin makes two connections in his argument: first, both Medusa and coral were once living elements, one of whom caused petrification while the other was petrified. Coral could have represented the power of her gaze to petrify the living and could be interpreted as holding the power of her blood. However, we must approach this argument with caution since we have no evidence that Greek traders or the populations of Europe knew that coral was once a living marine animal. The second part of Kruta's argument rests upon the story of Perseus in Ovid's *Metamorphoses* (IV. 745-747), when the hero placed Medusa's head on fresh seaweed on the shore of the Red Sea, which absorbed her power and hardened into coral. If a version of this story had origins in earlier Greek mythology, the coral could be seen as possessing the power of Medusa herself. As it was her head from which coral gained its power, Iron Age peoples would have been drawn to coral as they were headhunters who displayed decapitated heads of their enemies in various ways.[183]

[183] Perrin 2000: 200



Figure 7 Copper alloy and coral brooch, Iron Age, c. 500-400 BCE, found at Wargemoulin in France. D. 3.23cm, L. 2.6cm. British Museum. Accession number ML. 1703. © The Trustees of the British Museum.



Figure 8 Hochdorf couch, Iron Age, c.530 BCE, found at Eberdingen-Hochdorf in Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe 2012: 222.



Figure 9 One of eight wheeled female figurines (casters) decorated with coral insets, Eberdingen-Hochdorf couch, Iron Age, c. 530 BCE, found at Eberdingen-Hochdorf, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe 2012: 223.

Often the passing of materials between cultures also comes with the transfer of ideas. Stories related to the tree of life or the power of Medusa could have been passed to Iron Age culture by traders, if Aristotle's story of the cup of Gyptis is any indication of the relationship between Greek settlers and indigenous populations. Athenaeus references Aristotle's 4th c. BCE "Constitution of the Massaliotes" in his *Deipnosophistae* (2010.XIII.549), in which the Segobrigii princess Gyptis chose to marry the Phocaean sailor Protis and gave him a bowl of wine or water at a feast to seal their marriage. This story represents the relationships which are often invisible to us in the archaeological record: meetings between Greeks, Etruscans, and Celts, marriages between settlers, traders, and the local population, and the sharing of drink and tales at business meetings and feasts. The few examples we have of drinking vessels in settlements and

funerary contexts, such as the imported Greek cups and drinking horns discovered at the mid-5th c. BCE mound burial at Kleinaspergle, Baden-Württemberg in south-west Germany, are crucial indicators of the networks created and perpetuated in feasting and drinking rituals.[184]

We cannot say with certainty that Iron Age indigenous peoples connected coral to the tree of life, to drunkenness induced by wine, or to the power of Medusa. However, the links between Iron Age divinities, the power of local elites, coral, and wine is evident from funerary contexts. We must consider the obvious value placed in coral across temperate Europe and the networks created through trade, production, and consumption practices. By understanding the meanings and connections created through coral and coral-decorated objects, we are able to recognize the power of opaque red glass as its substitute in later Iron Age temperate Europe and southern Britain.

3.5 Decoding Coral Decoration: Moral, Esteem, and Measure Values

As discussed previously, coral had a variety of uses within Iron Age temperate European society: it was shaped into beads, or applied in pieces of coral to fibulae, pins, arm rings, statuettes, arms and armament. Coral and coral-decorated objects stayed within the social realm of the upper classes, although based upon funerary evidence both men and women could wear this precious material. Its value rested in its desirability and the respect and admiration gained from access and display, the connections and relationships built and maintained within and across social systems involved in coral trade and consumption, and the processes necessary to obtain raw coral, work the material into a usable state, and wear the final product. The processes

[184] Joy 2018: 1217

of creation and the consumption of coral goods are also significant to our understanding of its value and may answer questions related to the agency of Iron Age peoples who possessed coral and their relationship to Greek or Etruscan traders – and the agency of the coral itself to shape events and relationships.

3.5.1 The Esteem Value of Coral in Temperate Europe

According to Crook, there are three categories of value: esteem, moral, and economic.[185] Esteem value is the desirability of the object within the social system, and the respect and admiration gained by possessing certain things. Based upon the presence of coral as bodily ornaments in grave goods and the decoration of divine statuettes with coral, the esteem value of coral was quite significant. The personal possession of coral goods could have increased the respect and admiration one possessed within the social group. If we consider Perrin's arguments for the link between wine, coral, and Medusa, then the spiritual power of the individual who dons coral should also be discussed. Men and women who wore coral artifacts could connect themselves to immortality and the power to petrify others, such as enemies from other communities. These individuals may also be seen as blessed by the gods – the power that coral holds is represented by the wheeled statuettes from the Hochdorf couch (Figures 8 and 9). Perhaps women and men in Iron Age temperate Europe believed they gained godlike powers or blessings by wearing coral, or saw it as apotropaic and wore it for protection. Individuals within the community who did not have access to coral but recognized the significance of the material within their spiritual, political, and economic spheres demonstrated respect and admiration

[185] Crook 2019: 3

towards the upper classes and perhaps wished for a similar material with which to protect themselves or connect to the divine world.

If coral goods were given as gifts between elites within the local community and between Iron Age settlements, or perhaps passed down to later generations, then we should also consider the cultural biography of coral pieces – the individual or individuals who owned the piece first, the meaning behind the gift for creating friendships or maintaining relations, and the length of time it was used or worn by someone. Graeber suggests that gift giving was a major part of exchange between members of these communities.[186] The value of a good may often come from the giver; if a person of power gifted coral to another individual of similar prowess, then the coral object expresses the respect and admiration the giver felt for the receiver. Heirlooms act in a similar fashion; an object often possesses a similar power to speak of the admiration gained through the work of a former owner when it is passed on to another generation and may activate as a symbol of power. Objects such as the copper and tin ingots found aboard the Late Bronze Age Ulu Burun shipwreck and kula rings exchanged in modern-day Papua New Guinea are suggested examples of gift exchange between significant individuals within and between societies and civilizations.[187] These gifts acted as connecting points between people and a reminder of the relationships created and maintained through their exchange. In particular, kula rings were significant not for their material value but for the hands through which these objects passed on their journey to the next person. A luxury material such as coral in the form of easily transferable objects could have been passed between individuals before their final deposit in a grave, at a settlement or as a votive at a sanctuary site. Though disposed of in various ways, the

[186] Graeber 2001
[187] Bass 1986; Weiner 1988

value of the coral objects was not lost but simply changed its initial meaning. Since coral decorated statuettes of gods and bronze vessels used in ritual feasting, coral objects must have maintained or gained esteem value upon deposit in a religious context.

3.5.2 The Moral Value of Coral in Temperate Europe

The moral value of coral defines the meaning of the object in relation to the morals of the individual. We may consider the connections between traders and the local elite system, within the producer and consumer circle, and across social spheres in Iron Age temperate Europe. Coral might have demonstrated strong and friendly relationships with Greek and Etruscan peoples; an influx of goods, such as wine and bronze drinking vessels, could only be present if healthy relationships existed between traders. Within Iron Age society, possession of coral proved an individuals' ability to gain access to a desirable material which is not harvestable in temperate Europe. The rarity of coral and the amount of coral which someone possessed expressed two significant facts in Iron Age society: first, that the local community and elites were wealthy enough to gain access to precious materials; and second, that this expression of wealth may connect to the ability of leaders to hold large-scale festivals and wealth redistributions for the lower classes. Previous research on Iron Age temperate Europe suggests that wealth redistribution, similar to the potlach, would have occurred on a semi-regular basis to maintain relations with warrior nobles, whom the elites relied on for support and power, and other lower socioeconomic classes while promoting friendly competitions and displays of wealth and power between community leaders.[188] On a final note, the coral may represent the intimacy between

[188] Arnold 1999

wearer and the gods, which would be beneficial to the community at large. Religious leaders and the aristocratic class – who were often seen as religious leaders themselves – could have worn coral to express their fealty to the gods.[189]

3.5.3 The Measure Value of Coral in Temperate Europe

The third type of value, measure, usually correlates to monetary value. However, Graeber argues convincingly that wealth in Iron Age temperate European society only held value through display, conspicuous consumption or destruction of objects through burial or ritual, and gift-giving or exchange to other members of the community.[190] I argue that we should also consider the length of time which it takes to create coral beads, pins, fibulae, statuettes, swords, or helmets decorated with coral, the type of object made from or decorated with coral insets, and the length of time required to gain access to a new supply of coral as adding to the measure value.

Corallium rubrum was harvested in the western Mediterranean and traded either upriver from the Rhône Basin and Massalia or across the Alps from northern Italy into Switzerland and southern France with wine and bronze vessels; after these trade networks were established, it would be easier to gain access to coral. However, a significant amount of time is necessary to travel by either route. If coral was traded in a raw state or as semi-worked pieces, local artisans required more time to work the coral and string it or inset it into gold and bronze goods. Each step of the trade and craftworking processes would add to the value of the coral good and raise the trade cost. This is one of many probable reasons why access to coral was limited to

[189] Aldhouse-Green 2018: 1297
[190] Graeber 2001; Moore 2018: 978

individuals in temperate Europe who were capable of accumulating goods and services – the cost of the material and the finished object could be more than the price of imports such as wine and bronze vessels if we consider the limited number of coral artifacts found in these regions.[191] Control of the material was gained through the limited supplies available and due to significant work required by the artisans to produce a final product which was consumable, destructible, or exchangeable.

3.5.4 Variances in Valuation Amongst Elites: Summarizing the Value of Coral

The economic, esteem, and moral values of coral also affected – and were affected by – the networks created through trade, production, and consumption, which was tied closely to the creation of identity and the power of an individual's position in politics, economics, and religion. Within the social group, wearing coral symbolized the significance the wearer held within the community and the power they held over it. In Latour's work on technologies and Actor-Network Theory (ANT), agency lies in the network of actors as human actors create social networks and cause change; the same is possible for objects, which also create connections between humans and non-human actors in the social world.[192]

As mentioned previously, wine and coral were introduced into multiple regions of Iron Age temperate Europe simultaneously. The conspicuous consumption of coral is closely tied to the introduction of wine and large bronze mixing and serving vessels by Greek and Etruscan traders, which were used in communal consumption taking place in public, domestic, religious,

[191] Champion (1977) catalogued 1200 coral objects across temperate Europe from 6th to 3rd c. BCE.
[192] Latour 2005

and funerary contexts.[193] Although wine and coral are consumed quite differently, these two imports share similarities in consumption patterns and, in turn, the creation and perpetuation of social networks. Both were artificially curated and consumed within the aristocratic class. Those who wore coral connected themselves to each other and to the larger Mediterranean world through Greek and Etruscan merchants. Coral consumption might have extended to the vassals of the aristocratic class, often termed as warrior nobles, who both relied on aristocrats to obtain raw resources and were the body which allowed the aristocrats to survive and thrive. There are three main networks we can visualize in this scenario: that between members of the aristocratic class, another between aristocrats and their vassals, and a final link between aristocrats and Mediterranean traders. Each network was affected by the agents within such spheres, and a significant space in which these networks were created and thrived was the feast.

Though we have few texts that discuss feasting practices in Iron Age temperate Europe, Diodorus Siculus and Julius Caesar both stress the concepts of guest-friendship and generosity towards others;[194] large-scale bronze drinking vessels have been deposited in such burials as the Late Hallstatt Hochdorf (c. 550 BCE) and Vix (c. 500 BCE) burials (Figures 10 and 11).[195] According to Arnold, imported pottery and bronze vessels for wine consumption were curated and artificially maintained through inter-elite distribution.[196] Wine could be stockpiled and distributed, unlike beer and mead which needed to be consumed quickly after processing and could intensify their political influence through ritual feasting. Based on the northern Italic copper alloy fibulae with vasiform elements inset with coral – a similar type to vasiform fibulae of the Heuneberg type (Figure 12) and possibly connected to imported bronze vessels such as the

[193] Hamilakis and Sherratt 2012: 187; Hayden 2001: 3
[194] *Library of History* Book V; *de Bello Gallico*
[195] Arnold 1999: 75; Dietler 1996, 2001, and 2010
[196] Arnold 1999: 74

Vix krater which may have been decorated with coral inlay in a similar fashion as the late 4th c. BCE Basse-Yutz flagons – I argue that coral and its consumers played significant roles as agents that created and maintained networks necessary to retain the political and economic control of Iron Age aristocrats in temperate Europe.[197]



Figure 10 Bronze cauldron with reclined felines, Iron Age, c. 530 BCE, found at Eberdingen-Hochdorf, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hoppe and Schorer 2012: 24.

[197] Perrin 2000: 197-199; Gomez de Soto et al. 2017: 35



Figure 11 Bronze krater. Vix Burial, Burgundy, France. c. 500 BCE. Musée du Pays Châtillonias, Châtillon-sur-Seine. JSTOR images.

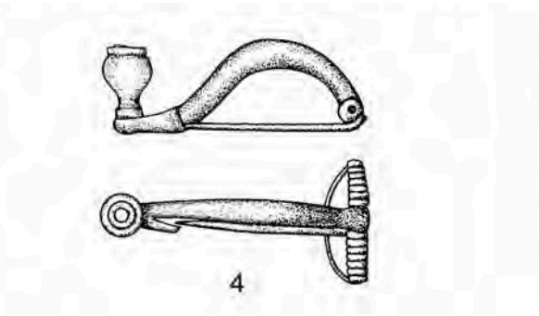

Figure 12 Drawing of vasiform fibula of the Heuneburg type, found in a burial at Erlangen-Kriegenbrunn, Germany, dated late 6th to early 5th c. BCE. After Chaume and Ney 2015: 62.

We should also consider the networks created in trade and gift exchange of coral and coral-decorated objects. As previously mentioned in regard to prestige good economies, the

status of Iron Age leaders was dependent upon the ability to obtain prestige items and to maintain their connections to Greek and Etruscan traders.[198] Since coral was one object traded alongside other goods such as wine and oil in exchange for local lumber and other forest goods, and perhaps enslaved individuals, the consumption of coral was a visual and physical marker of the networks created through these exchanges. The number of objects made from or decorated with coral should be seen as less significant than the ability for an individual's ability to gain access to coral goods, since we have no viable way to determine if the number of prestige objects correlates directly to the power of an individual. We should strongly consider if these coral objects acted as agents of influence within their social networks, leading to the conceptual developments of the personal character of giver and receiver; this material could create strong relationships between parties or potentially cause rifts in the social order. It could also mark the close relationship between the aristocratic class and Mediterranean merchants, aristocrats and noble warriors, and perhaps aristocrats and the gods.

3.6 Finishing Touches: Some Final Notes

Glass has a longstanding history in Iron Age temperate Europe, although its creation and use varied depending upon region and period. Faience production is visible across temperate Europe and Britain beginning in 2,000 BCE, while glass production does not appear until the 11th or 10th c. BCE at the archaeological site of Frattesina, Italy. It is this site where we first see the production and consumption of opaque red glass. However, this color of glass does not appear in the rest of Europe until 450/400 BCE. Instead, amber and coral were traded into the regions of

[198] Frankenstein and Rowlands 1978: 77

temperate Europe under study – from the Baltic and Mediterranean, respectively – and incorporated as decoration in metal objects. While trade in amber may have come with other raw materials, coral was brought into the region by traders bartering Mediterranean wine and its associated mixing and serving vessels in the 6th c. BCE for metals and enslaved peoples. As the main material used in the decoration of metalworks over the course of two centuries, an exploration of the value of coral and the networks created through its exchange and consumption inform our understanding of its popularity amongst the aristocratic classes of Iron Age temperate Europe. Its significance as a material for decoration and display was uncontested until the mid- to late 5th c. BCE with the appearance of opaque red glass, which mostly replaces coral in the decoration of fibulae, bronze vessels, arms, armament, horse equipment, chariots, and other gold, copper, and iron goods. The next section will explore the transition from coral to opaque red glass, considering its value, networks, and the technical and technological knowledge which allowed for its consumption in later Iron Age temperate Europe and Britain.

Chapter 4

Tracing Transitions: From Coral to Opaque Red Glass

4.1 Introduction

At first glance, the transition from coral as the predominant material made for metal decoration to opaque red glass seems technologically distant; coral working requires no heat while glass working requires a complete melt of the material to fuse to the metal surface. When comparing production techniques in the creation of fibulae, however, it is clear that the two materials share more similarities than differences. A study by Berruto et al. suggests that a bronze Iron Age fibula from the Piedmont region of northwestern Italy was decorated with coral insets made either by mixing powdered coral with a binding agent to adhere to metal fibulae or by cutting small pieces of coral and shaping the material to fit into the cavities in the metal.[199] Before the introduction of true enameling brought by the Roman expansion into temperate Europe,[200] opaque red glass could also be crushed into a powder and mixed with a binding agent or cut into small pieces to fit into cavities before melting the glass into the object (Figure 13).[201] Glass could also be melted into a semicircular shape and riveted in place, a technique used in the application of coral (Figure 14). When introduced to indigenous temperate Europe, artisans' technical knowledge of opaque red glass working, which was ultimately related to its unique composition (production makes the glass more viscous and it melts at a lower temperature, yet it is difficult to maintain its color when melted for application) would be supplemented by previous experience in other glass working technologies, which were introduced to temperate Europe in

[199] Berruto et al. 2023: 12
[200] Gosden 2005: 205
[201] Butcher 1976: 44

the Late Bronze Age.[202] Rather than focusing upon the technical transition from one type of red decorative material to another, as this is difficult to trace without workshop spaces to study, our interest should lie in the transition of value and social networks previously established in the display, trade, gifting, and deposition, from one material to another.



Figure 13 Cast openwork bronze plaque inlaid with opaque red glass, Late Iron Age, c. 150-1 BCE, found at Mont Beuvray, France. L. 2.3cm. Centre Archéologique Européen. Accession number 2005-039-009-004. Photo by Rachel Wood.



Figure 14 Nail/rivet with opaque red glass piece attached to the top of the object, Late Iron Age, c. 150-1 BCE, found at Mont Beuvray, France. L. 2cm. Centre Archéologique Européen. Accession number 2003-032-1099-010. Photo by Rachel Wood.

[202] Henderson 2013: 494

In this chapter, I explore the trade, production, and consumption of opaque red glass in continental Europe and Britain over the course of five centuries, from the 4th c. BCE through the 1st c. CE. By examining these objects in the *longue durée* across the regions under study, I argue that the opaque red glass acted as a marker of connections between local and extra-regional communities; it evidences trade and socio-economic networks with civilizations in far-off places. In the Late Iron Age, the use of this material in decorative metalworks reflected the power and prestige of Late Iron Age warrior elites. The use of opaque red glass shifted, however, as power dynamics and pressure from colonizing forces affected the personal and social values of Late Iron Age leaders, warriors, and their families.

To advance my argument, this chapter begins with a general overview of the historical context and a brief review of copper and iron object types which appear in the archaeological record during each period (Table 1). Next, I will discuss Late Iron Age art of this period as a shared visual language that is local, mutable, and color coded to draw upon the collective symbol and value systems of the community. Based on these discussions, I will delve into an analysis of the value of opaque red glass and the social networks created through trade, production, and consumption of objects decorated with opaque red glass in the pre-conquest period.

4.2 Mapping Metalworks: Common Objects Across the Centuries

The 4th c. BCE was a time of transitions on the European continent, most visible through funerary archaeology. Beginning in the 5th c. BCE, there was an increase in the number and size of cemeteries and a reduction in visible disparities in wealth and monumentality, particularly in areas such as the Champagne and middle Rhine-Moselle regions in France, Germany, and

Switzerland, respectively.[203] Based upon grave goods in this period, it is evident that contacts with the Greek world became limited by 450 BCE while connections with the Etruscans continued until the end of the 5th c. BCE.[204] The relationships between Greek, Italic, and Late Iron Age peoples in this period is best evinced by excavated burials with imported grave goods and strongly exhibited gender markers. For example, elite female graves – such as the elaborate four-wheeled wagon burials of the 6th c. to 5th c. BCE and two-wheeled chariot burials of the 4th and 3rd c. BCE in Switzerland, Germany, France, and England – often appear with imported Italic and Greek goods, perhaps offered in their graves during funeral rites to express the global reach of Late Iron Age leaders.[205]

Table 1 Object types based on period.

Period	**Object Types (Continent vs. Britain)**
4th c. BCE	Continent: bronze oenochoe, bronze fibulae, torques, helmets made from gold, bronze, and iron, bronze swords, bronze scabbards, and bronze shields Southern Britain: n/a
3rd c. BCE	Continent: fibulae (bronze and iron), bronze bracelets, bronze torques, bronze belts, shield umbo rivets, bronze linch pins, bronze yoke guide-rings, bronze and iron chariot cotter-pins Southern Britain: some bronze horse bridle-bits, bronze and iron rein rings
2nd c. BCE	Continent: bronze belts, bronze bracelets, bronze shield umbo rivets, bronze and iron chariot cotter-pins, bronze bridle bits, bronze yoke guide-passes Southern Britain: bronze horse bridle-bits, bronze and iron rein rings
1st c. BCE	Continent: bronze and iron fibulae, bronze belts, bronze yoke guide-rings, bronze yoke guide-ring ornaments, bronze chariot appliqués, bronze and iron nail-rivets, bronze buttons

[203] Brun 2018: 1246
[204] Pope 2018: 1065
[205] Collis 2003: 992; Verger 2015; Lambot 2019

	Southern Britain: bronze strap-fittings, bronze strap-unions, bronze studs
1st c. CE	Continent: n/a Britain: bronze strap-fittings, bronze strap-unions, bronze studs, bronze and iron linch pin

In the 4th and 3rd c. BCE we see drastic changes in the funerary realms of northern France, Switzerland, and lower Germany. There is a wider distribution of grave goods in flat cemeteries, replacing an earlier practice of aristocratic barrow burials and suggesting less hierarchical social structures.[206] By the later 3rd c. BCE, there is a general decrease in the size of burial grounds from 100 graves to less than a dozen with few to no grave goods present in these burials as cremations replaced inhumations.[207] While Mediterranean imports were lacking in temperate Europe in the late 3rd c. BCE, we see an adoption and adaptation of Mediterranean-influenced motifs such as tendril scrolls and other foliage on locally-crafted goods.[208] Flagons, swords, helmets, torques, bracelets, fibulae, and two-wheeled chariot fittings in iron and bronze became the artistic medium for the creative combination of Late Iron Age temperate European and Mediterranean styles.

On the continent, the adoption of cremation caused burials in the archaeological record of the 2nd and 1st c. BCE to be less visible, though a general trend toward the deposition of household goods rather than decorated ornaments and weapons is observable.[209] In these periods, the uses of opaque red glass in the production of metal objects is more visible in the archaeological records of the following site types: settlements, such as seen in the trash pits of

[206] Megaw and Megaw 1989: 92
[207] Megaw and Megaw 1989: 126. Reasons for these changes in burial culture will be discussed later in this chapter.
[208] Joy 2015: 146; Verger 2015: 117; Szabó 1990: 33
[209] Kaenel 1990: 85

Fish Hill Streets in England; sanctuary sites, where these appear as votive deposits, such as Gournay-sur-Aronde in France; and in hoards, particularly those found in Suffolk, England.[210]

Production of bronze and iron objects decorated with opaque red glass in southern Britain demonstrates an adaptation of continental concepts through the trade of goods, and perhaps gifts, into local systems of knowledge. It is probable that migration and intermarriage led to the adaptation of continental burial practices in the southern Britain, since newer and stronger relationships between communities could lead to increased wealth and status. Perhaps it was through intermarriage that the rich chariot burial culture from Champagne and Marne in France was adopted by the Arras culture of Yorkshire in the 300s BCE, when this burial style was largely localized on the European continent.[211] Ornamentation in southern Britain developed slowly from the later 3rd c. BCE onwards, borrowing stylistic ideas from the continent in the decoration of swords, daggers, shields, helmets, horse harnesses and headpieces, fibulae, pins, torques, and arm rings in insular shapes and types (for example, fibulae with swivel mechanisms rather than functional springs).[212] Metalwork in the late 1st c. BCE and 1st c. CE included objects unseen in previous centuries, such as drinking and eating equipment (tankards, cups, and spoons or scoops), and mirrors.

Grave goods are often in bronze, though some pieces such as pins and fibulae are iron; horse harness pieces, shield covers, and sword scabbards mostly produced in iron on the continent are commonly found in bronze in Britain (Figure 15).

[210] Lewis 2020: 111; Bradley 1990
[211] Megaw and Megaw 1989: 189
[212] Kaenel 1990: 88; Jope 2000: 17, 44



Figure 15 Bronze harness mount with opaque red glass decoration. Roman imperial, c. 50-150 CE, found at Polden Hill, England. British Museum. Accession number 1899,0706.77. Photo by Rachel Wood. © The Trustees of the British Museum.

Linear scrollwork and glass decoration began to decorate a small number of objects in the late 3rd and early 2nd c. BCE before taking a strong hold in Britain in the 1st c. BCE and 1st c. CE.[213] In particular, horse gear became significant media for the expression of Late Iron Age glass artistry, with opaque red, blue, yellow, and white enamel decorations present into the 1st c. CE.[214] Overall, we can trace a wide dispersion of techniques and technologies of production affected by local choice, which led to stylistic fragmentation in the archaeological record of the regions under study. As it is horse gear that received widespread artistic decorative motifs rather than human-worn goods in the later centuries BCE and early 1st c. CE, the significance of the horse must have risen dramatically among Late Iron Age communities across Europe. Their significance lies in the family expenses needed to care for horses, their mobility across lands, and

[213] Sherratt and Raftery 1990: 102
[214] Hunter 2008: 159

their purpose in both warfare and border protection, as will be discussed in more detail later in this chapter.

4.3 Establishing Emblems: Shared Visual Language in the Late Iron Age

Late Iron Age warrior elites in temperate continental Europe and southern Britain shared and adapted artistic styles and techniques of production, and often emphasized the significance of certain object types through their decorations. Gosden has argued that Late Iron Age objects were created with styles that are recognizable and repeatable to create a universe "onto which people need to fit."[215] Garrow and Gosden continued this line of thought when they asserted that artifacts in the Late Iron Age established chains of relationships that allow people to evoke thoughts, memories, and connections between each other and the objects themselves.[216] The use of these objects, whether in life or death, articulated differences in status, ethnicity, age, and gender while demonstrating the abilities of the consumer to obtain and dispose of exotica as they see fit.[217] The connections between the stylized art – mostly zoomorphic, anthropomorphic, and vegetal in nature – and reddish bronzes and blueish irons in combination with the jewel-like red color of the glass created a visual panoply that demonstrated connections between locals and to far-off places and worlds, including those of the living, the dead, and of heroes and gods.[218] These connections were maintained and expressed as these objects were worn and gifted at political and religious gatherings such as rites-of-passage and feasts, and when deposited in

[215] Gosden 2005: 194
[216] Garrow and Gosden 2012: 111
[217] Bradley 1990: 34, 137
[218] Buchsenschutz 2007: 63; Ginoux 2020: 128

graves and sanctuaries the objects were forced out of circulation and into the realms of the otherworld in the ultimate form of building prestige.[219]

The following sections explore the value of opaque red glass metalwork and the social networks created and maintained through its consumption and deposition from the 4th c. BCE to the 1st c. CE. A number of these objects can be connected to specific sex groups – when osteological identification has been possible, it is clear that most belts, torques, and armlets decorated with opaque red glass come from female graves while male graves often included helmets, shields, and horse equipment.[220] It is generally assumed that arms, armament, and horse equipment were buried with males although, after reevaluation of Iron Age chariot burials from Champagne in France and Wetwang Slack in England, archaeologists determined that both men and women could be buried with chariots and horse paraphernalia.[221] The value and networks embedded in these shared objects may differ between males and females, and will be explored as we consider the roles of opaque red glass goods in the formation and display of status, ethnicity, and relationships in late Iron Age temperate Europe.

4.4 Coded Colors: Reading the Symbolism of Opaque Red Glass

Ginoux suggests that the play of light on metal and polychromy created through the combination of metals and organic materials such as amber and red coral were significant players connecting humans to the natural environment, since these materials often decorated Late Iron Age metalwork with zoomorphic, anthropomorphic, and vegetal motifs in the mid-1st millennium

[219] Bradley 1990: 39
[220] Pope 2018: 1052-1058; Muller et al. 2009: 84
[221] Verger 2015: 136; Lejars and Gruel 2015: 235; Halkon 2020: 10; Giles 2008: 69

BCE.[222] These were intimate and tactile objects, often held by the hand or attached to the body to draw the attention of viewers with their colors, shine, and intricate maze-like designs.[223] The playful combination of materials and symbols acted as agents in the social sphere, connecting the living to the dead, human to the divine and to the natural environment, and were encoded with special meanings.

In the previous chapter, two scholars' arguments for the symbolism of coral were addressed. The first author, Kruta, suggested that red coral was significant due to its similar color to the berries of the yew tree, which in pre-Christian Ireland symbolized life, death, and immortality.[224] The second author, Perrin, connected the petrified state of coral to the petrification powers of the Greek goddess Medusa.[225] Kruta's and Perrin's arguments suggest that Late Iron Age religion was a uniform and stable system of beliefs from the Bronze Age or earlier until the Middle Ages; instead, I agree with Fitzpatrick's argument – it is unlikely that Iron Age religious beliefs were traditional or timeless.[226] However, some stylistic elements continue to be used into the 4th and 3rd c. BCE, such as heavily stylized vegetation, animals, and human faces.[227] By the end of the 3rd c. BCE and the beginning of the 2nd c. BCE, common motifs in the artist's repertoire were triskeles, s-shapes, and geometric motifs which continued to include some floral and zoomorphic elements.[228] These elements were sometimes decorated with opaque red glass in order to enhance and draw attention to the design, and of course the individual in possession of the object itself.

[222] Ginoux 2020: 132
[223] 2020: 139
[224] Kruta 1987:32
[225] Perrin 2000: 200
[226] Fitzpatrick 1991
[227] Lewis 2020: 113
[228] Lejars 2015a: 279

When discussing art of the later Iron Age, Giles connected the color red to blood, arguing that "coral is blood formed of water in the sea" and opaque red glass is "blood formed of fire in the forge."[229] Objects decorated with opaque red glass are considered as charged with sacred or ancestral forces related to a spiritual dimension.[230] These relationships between colors and designs lead, quite obviously, to questions regarding their relationship to each other when combined in a single design. If we agree with Lewis' argument that the triskele is a stylized horse in motion (its head as one part and legs as the other two), then is the red surrounding the horse related to blood? Limiting the symbolism of red opaque glass to a single meaning leads to reductionism and simplification of Iron Age temperate European cosmology. The color red and, in turn, coral or opaque red glass could have differing meanings depending upon the social context or even gender and age of the consumer and producer of the materials. Red as used in a decorative motif could relate to life, death, blood, or longevity, a combination of these, or none – there may have been entirely different concepts we are unaware due to a lack of literature from these pre-literate cultures. Regardless of the symbolism of the color itself, the value of opaque red glass can be found in its combination with other colors, its use in specific metal objects, and the contexts in which it appears in the archaeological record – including with whom, when, and where, and how.

4.5 Verifying Value and Navigating Networks in Shifting Spaces

Although opaque red glass decorated a variety of bronze and iron objects from the 4th c. BCE to the 1st c. CE, most were personal and portable – worn on the human body or held in

[229] Giles 2008: 73
[230] Giles 2008: 73; Helms 1988

human hands, worn on the body of the horse, or decorated horse-drawn vehicles (see Table 1). The esteem, moral, and measure values of these goods related to the symbolism, use life, and final deposition of the good; these values were affected by the networks in which they appeared and disappeared and presented themselves variously over space and time. In this section, I hope to demonstrate the benefits of extensive research into opaque red glass craftworking and decorative traditions and exploring the social networks which connected people and objects in Late Iron Age regions of Europe and beyond.

Opaque red glass decoration is predominantly found on fibulae produced in local styles and some bronze bracelets and disc torques from the Champagne and Marne regions in the 4th c. BCE. Helmets and oenochoe adorned with opaque red glass are rarer, though versions of these objects without opaque red glass do appear otherwise in the archaeological record. In the 3rd c. BCE on the continent, fibulae, bracelets, and torques (Figure 16), primarily from chariot burials in Champagne and Marne, France, have been found, along with the widespread appearance of opaque red glass-decorated belts, particularly in Hungary; fibulae, pins, torques and arm rings, and some objects such as shields which could date within a 200-year range of this century are found in Britain. The adoption and adaptation of continental styles in southern Britain – represented by specific object types, styles, and burial practices, as seen in the Arras culture of Yorkshire – is visible from the 3rd c. BCE, yet opaque red glass-decorated objects cannot be securely dated to within the 3rd c. BCE. Early pieces on the continent and southern Britain sometimes included both coral and opaque red glass decoration, though it was more common to see one or the other used in the decoration of metal goods.



Figure 16 Disc torque with opaque red glass decoration in form of rounded pieces riveted in place and sunken enamel, Iron Age, 4th/3rd c. BCE, from Gäufeld-Nebringen, Böblingen, Germany. Landesmuseum Württemberg. Photo by P. Frankenstein and H. Zwietasch. After Hauschild 2012: 260.

Connecting the material culture to significant changes developing on the continent and southern Britain grounds the value of opaque red glass and its application to certain objects. From the 4th c. to 3rd c. BCE, Late Iron Age styles spread across the continent and southern Britain through trade and, presumably, intermarriage.[231] While the large wagon mound burials found in Champagne and Marne, France in the 6th c. and 5th c. BCE were abandoned for smaller two-wheeled chariots, this burial type was adopted as square and round barrows by the Arras culture of Yorkshire from the late 5th to the 1st c. BCE though in relatively small numbers, comparatively; otherwise, burial culture in temperate continental Europe consisted predominately of flat cemeteries while burials of any type in southern Britain were rare.[232] On the continent, these cemeteries decreased in size and fewer goods were deposited; in particular,

[231] Webley 2015: 129
[232] Halkon et al. 2019; Collis 2003: 139

there were far fewer Mediterranean imports deposited in graves than earlier periods and two-wheeled chariots were replaced by chariot parts which represented the whole in the *pars pro toto* tradition (Figure 6).[233] Scholars have proposed various reconstructions of Iron Age societies in the last few centuries BCE based on both textual and archaeological evidence, and it is probable that there is significant regional variation – while some groups were more hierarchical and large-scale, others could be small-scale and egalitarian.[234] The fracture of earlier traditions may be reflected in the archaeological record by the adoption of new burial practices, though we cannot prove the socio-political mechanisms of each community based on the funerary evidence. The adoption of the *pars pro toto* tradition and focus in burial culture on horse equipment in the last two centuries BCE and 1st century CE across most of Europe, however, suggest changes in local value systems and interactions between communities. Archaeological material across the regions under study could share many characteristics yet function differently between societies based upon nuances in each community's social, political, and religious composition.

Opaque red glass, however, was not a locally made material – it was produced in either Italy or, more likely based upon recent LA-ICP-MS analysis of Iron Age opaque red glass from Prague, was produced in and traded from Egypt.[235] As there were no direct trade networks from Egypt to temperate Europe or southern Britain, opaque red glass must have been traded by non-direct routes. Buchsenschutz suggested axes of exchange from north to south between the Adriatic and the Baltic Seas, through Bohemia, the Elbe Valley, and the Vistula in Poland which began in the Late Bronze Age.[236] Other trade routes existed across the Mediterranean Sea through the Greek colonies in southern France and southern Italy and Sicily from the 7th and 6th

[233] Anthoons 2021: 4
[234] Thurston 2009; Moore and González Álvarez 2021; Moore 2007
[235] Zlámalová Cílová et al. 2024
[236] Buchsenschutz 2007: 42

c. BCE, and trade routes across the Alps along north-south and east-west axes were in use from at least the 11th c. BCE.[237] However, I suggest that the Late Iron Age peoples who invaded northern Italy and settled in the Piedmont region gained access to opaque red glass from Italic peoples with longstanding ties to Egypt and traded opaque red glass north, east, and west of the Alps. These trade networks may have also been the main route for red coral in the 6th and 5th c. BCE, since the Etruscans harvested coral reefs along the shoreline long before this natural material appeared in the archaeological record of Iron Age temperate Europe.[238] As Rome began to expand its territory north in the 4th c. BCE, the city-state likely gained control of coral deposits along the Italic coast. The recent discovery of a wall mosaic composed of shell and red coral dating to c. 300 BCE found on the Palatine Hill in Rome is strong proof of this possibility (Figure 17).[239]

[237] Henderson 2013: 497
[238] Gomez de Soto et al. 2017; Rondi-Constanzo 1997
[239] News coverage of this mosaic can be viewed by accessing the following: https://www.bbc.co.uk/newsround/67801309 (consulted April 2024). The full publication is awaited with interest.



Figure 17 Roman wall mosaic with coral and shell decoration, Roman Republican, 3rd to 2nd c. BCE, from Rome, Palatine Hill. Image from the Italian Ministry of Culture and published by BBC.

As coral harvesting fell under the control of Rome and the city-state took control of the trade routes from the Po Valley north into Transalpine Gaul and across the Alps, opaque red glass – with a distinctive formula that included higher levels of copper and lead oxide than other opaque reds found in the Mediterranean in order to create its deep red color[240] – began to replace red coral. Its similarities to coral are evident, with its brilliant red color likely connected to blood, life, and death.[241] Opaque red glass, however, might have offered even more fascinating qualities to Late Iron Age society – it was shinier than coral and likely came in larger supplies as ingots rather than slim branches.[242] Less would be lost during working of glass than coral, too – glass

[240] Hunter 2008: 156
[241] Giles 2008: 73
[242] Hunter 2008: 158

can be remelted in any form and maintain its color if melted in the correct conditions, a transformative and perhaps magical property that organic materials such as coral lacked.

Objects decorated with opaque red glass entered the artistic repertoire of Iron Age temperate European populations and acted as agents within each community's social sphere; these communities may have been more or less egalitarian or hierarchical, respectively, but depositional evidence in burials, settlements, and ritual sites suggest these objects were consumed by a smaller part of the overall composition of Late Iron Age societies. The symbolism and value of these objects were created by the hands of metalworkers and glassworkers and perpetuated by the stories and memories of consumers and their audiences. Influenced by the works of Bourdieu and Sørensen, Bradley argues that the biography of an artifact needs to include its possible uses to symbolize distinctions between living individuals within a society, including status, ethnic differences, age, and gender as the objects act to reinforce social norms through their constant exposure.[243] These pieces might not be in use daily, yet any politically- or religiously-significant gatherings attended by local warriors and their families would be a moment in which to display opaque red glass-decorated goods.[244] The eventual deposition of many artifacts in settlement pits, hoards, graves, and sanctuaries offer other significant venues for display and acquirement of prestige. As discussed in the chapter on coral decoration, Latour's Actor-Network Theory and Crook's three types of value – esteem, moral, and measure[245] – will be applied in the following sections in order to explore the significance of opaque red glass to elite individuals in the Late Iron Age.

[243] Bradley 1990: 34
[244] Buchsenschutz 2007: 223
[245] Latour 2005; Crook 2019

4.5.1 The Measure Value of Opaque Red Glass within the Iron Age Social System

As with coral, I choose to consider the measure value of opaque red glass with Graeber's definition in mind: wealth only held value through display practices, conspicuous consumption, or the destruction of objects through burial or ritual, gift-giving, and exchange.[246] Another aspect of an object's measure value should be the time taken to gain access to the glass and to create the final product. As opaque red glass was an exotic product most likely produced in primary glass workshops in Egypt, access to the material was limited and required long-distance, indirect trade networks. The time taken to create a final product depended upon the technique used; powdering glass would take more time than breaking off small pieces to melt and fuse to the metal object. Overall, the time and efforts necessary to access opaque red glass and work the material into a final product took longer than it was necessary to craft an object made of only bronze or iron. Therefore, the monetary value of opaque red glass-decorated goods would be higher than other similar products of the time.

The display of these objects should also be noted – all could be decorative pieces on the human body, the horse, or the chariot, whether worn during life or added to the deceased's costume upon their death. The object itself is an interactive agent on its own, representing a concept and embedded with symbolism.[247] Objects acquired by gift exchange and worn by the living at specific events represent a new relationship created between the giver and the receiver, one of a debt that must be repaid through the exchange of other gifts of equal value.[248] Similarly, some gifts may be bridal gifts which act to tangibly and visibly demonstrate an exchange of

[246] Graeber 2001
[247] Ginoux 2020: 128
[248] Bradley 1990: 38

wealth and secure the newly created relationship between husband, wife, and their respective families.

Most visible to archaeologists, however, are the networks of measure value presented in the deposition of objects in burials, at sanctuaries, and in hoards. The hoard represents the loss of wealth which had been accumulated by an individual or group of individuals; the burial of the goods demonstrates their wish to keep that wealth, which was lost when the owner(s) could not return.[249] Garrow and Gosden suggested that some hoards were purposely left as gifts to the gods, similar to ritual deposits; in the case of hoards of this type and ritual deposits, the objects could be seen as payment to the gods – whether this payment is for a future service or intended to repay a debt.

The final payment of a debt between the living and the dead could be represented by the deposition of grave goods. Giles suggested that some goods were gifted to the deceased by mourners who needed to close an outstanding debt.[250] An object decorated with an exotic and scarce material such as opaque red glass was costly to the commissioner; depositing such an object finalized the repayment in a final, public moment in front of the deceased, the gods, the ancestors, and the community.

4.5.2 The Esteem Value of Opaque Red Glass within the Iron Age Social System

The esteem value of opaque red glass – or its desirability and the respect and admiration gained by possessing a material decorated with opaque red glass – is similar to that of coral, as it

[249] Garrow and Gosden 2012: 110
[250] Giles 2012: 126

quickly became an object of desire for its inherent qualities. The shine of opaque red glass as inset or enameled to an equally shiny, gold-like bronze or bluish iron was aesthetically pleasing. In sun or by fireside, both materials would glisten and garner attention. This combination of materials presented both the wealth of the person who wore it and their social status as a member of the warrior class and their entourage, or married kin, all of whom had gained access to scarce materials.

The cultural biography of these pieces remains a mystery yet acts of gift-giving and heirlooming need to be considered.[251] During rites of passage such as births, deaths, and marriages, celebrations of successful raids or battle, and perhaps at potlaches in the community, opaque red glass objects could be gifted or exchanged between members of the warrior class, their entourage, and kin. Pieces such as the opaque red glass-decorated belts worn by women in burials uncovered in France, Hungary, and near the Rhine River in Germany could be given as a bridal gift from a husband or perhaps her father, or perhaps as gifts from one elite woman to another to cement relations between their social groups.[252] The links of the Swiss-type belts discussed earlier in this chapter were purposefully crafted to prevent twisting of the belt, which suggests these belts were worn often, and some pieces show use wear and the addition of iron rings to replace broken bronze pieces (Figure 18).[253] These opaque red glass-decorated belts, bronze fibulae, and torques most often worn by women were markers of their sex, identity, and status.[254] By wearing these objects, a woman displayed her status with and connections to the warrior class. These objects may have demonstrated her husband's or father's global and glocal relationships with traders of opaque red glass or special artisans from a specific town; a woman

[251] Giles 2012: 126
[252] Lejars and Gruel 2015: 235
[253] Challet 1992: 73-107
[254] Lejars and Gruel 2015: 234

could act as a marker of her male relatives' prestige within their society and used as a tool to garner more respect from the members of their community or other leaders from neighboring towns.[255] Upon the death of a high-status woman, mourners could place objects into the deceased's burial to articulate subtle values and key ideas.[256] The funeral procession and the deposition of a woman and grave goods, which included objects decorated with opaque red glass among a number of other personal ornaments and sometimes chariots, could continue to garner respect and admiration. This rite of passage acted as a final venue for competition as heirlooms and other personal possessions of the woman were deposited alongside new objects to demonstrate the mourners' respect and admiration for the dead and their living kin – including their husbands, brothers, and fathers who led these rites.

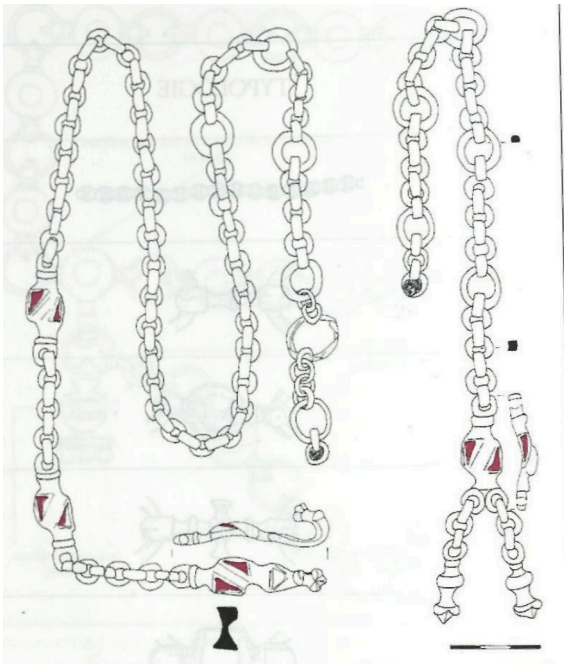

Figure 18 Drawing of woman's bronze belt, decorated with opaque red glass. Cuperly, Marne, France. 3rd c. BCE. After Challet 1992, pg. 76, fig. 31.

[255] Verger 2015: 235
[256] Giles 2012: 126

Unlike female-associated objects, which are found primarily in graves, male-associated objects adorned with opaque red glass have been discovered variously in votive deposits, hoards, and burials. Votive objects, grave goods, and hoarded objects attributed to men often include arms, armament, and horse equipment.[257] As previously discussed in relation to women, some objects were personal possessions and possibly heirlooms, or were commissioned with the single purpose of deposition in mind. In this patriarchal society, arms, armament, and horse equipment were symbols of male power. Horses and chariots were symbolic of leadership in these communities, which depended upon the horse to patrol and defend land, and, when necessary, to lead attacks against rivals.[258] In conjunction with arms and armament, these objects were emblematic of the capable leader and his closest warriors. When decorated with opaque red glass, metal objects of the warrior elite could carry a significant esteem value. The red glass demonstrated the warrior's ability to access and afford exotic materials and have objects created by specialized artisans; these goods were eye-catching due to artisan's expert use of polychromy and the materials' inherent shine. The symbolism behind the engravings in the metalwork and the application of the color red would recall stories of ancestors and gods present in their collective memory. The opaque red glass acted as an enhancing agent, drawing the respect and admiration of the social group for the consumer's – or, in the case of a grave good or votive, perhaps the offeror's – knowledge of the past and connections to other worlds, or their ability to consume these goods or repay debts with them.

4.5.3 The Moral Value of Opaque Red Glass within the Iron Age Social System

[257] Collis 2003: 137
[258] Lewis 2020: 118-119

In the warrior class, opaque red glass reflects the connections created within their social class, as these individuals were the only citizens able to access opaque red glass ingots and goods decorated with the glass. The types of objects decorated with opaque red glass varied over time, yet we can assume that these were symbolic statement pieces in the costume of the male warrior elite, his family, and vassals.[259] Social explanations for the rare discoveries of objects decorated with both coral and opaque red glass may suggest that some attempted to hold ties with the symbols and messages of the old social system. However, the sharp decrease in coral use in metalworks across most of Iron Age temperate Europe after the 4th c. BCE suggests that most elites did not want to associate themselves with a material so representative of the previous political system. It is also possible that there was a decrease in access to coral, which drove leaders toward the adoption of new materials through which to instill and demonstrate values systems. It is probable also that opaque red glass was considered unique and desirable to these populations because its color is more permanent, and it was highly reflective in light. These enchanting qualities may have symbolized the community's bright future under its leaders, who could also withstand harsh conditions, be flexible under pressure, and stand the test of time.

The meaning of opaque red glass could be manifold to the wearer: the connections with Greece and Etruria were slowly lost, and so were the connections to the old aristocracy – in the place of these was a connection with other peoples on the Italic peninsula, such as the Romans whom they had sacked in 390 BCE.[260] With the migrations into northern Italy came access to goods that had previously been unavailable, such as opaque red glass; the shift to societal focus on the warrior class and the migrations across Europe brought forth new trade relationships

[259] Lejars and Gruel 2015: 234
[260] Plutarch, *Parallel Lives,* The Life of Camillus; Livy, *The History of Rome* Book V

which were previously unexplored – or, had yet to be fully exploited. The consumption of opaque red glass within the warrior class across Late Iron Age societies made visible these relationships. The Roman conquest of Etruria and Cisalpine Gaul after the Hannibalic Wars also marked a significant moment, as Rome had gained territory as far north as the Alps – and, in return, gained direct access and control of trade networks across the peninsula and into temperate Europe along north-south and east-west axes.[261] These trade networks brought opaque red glass into temperate Europe through the territory of Cisalpine Gaul by way of merchants who had access to societies north and south. Though it is possible to say that indigenous populations of temperate Europe and southern Britain recognized that opaque red glass was not local and was made far away, it is unlikely that these communities knew the product came from Egypt, the Levant, or Italy. Perhaps it is best to consider that Iron Age communities interpreted opaque red glass on metal objects as a statement of association with other culture and groups who consumed it and with the traders who brought the material into each community.

In southern Britain imported glasses, such as opaque red, were used in the creation and decoration of many objects. The moral values of these goods perhaps related to sustained relationships with the continent through the harbor sites established along the south-eastern coast of England,[262] or intermarriage with continental people. The composition of British opaque red glass before the Roman period matches the high-lead oxide, high copper composition seen in opaque red glass from the continent, suggesting that the glass was traded across the English Channel. Opaque red glass was an exotic prestige good used in the creation of similar object types, though there are acute stylistic differences which suggest adaptation of the glass into local

[261] Purcell 1990
[262] Webley 2015: 128-129

symbolic systems. Some consumers perhaps demonstrated their far-flung connections across the Channel through personal display practices, but it is more probable that opaque red glass communicated shared value systems and social connections of individuals across southern Britain. The local value systems and the social networks established consumption of a small number of fibulae, pins, and torques decorated with opaque red glass in the 4th and 3rd c. BCE displayed these connections on their bodies and demonstrated the significance of these material connections within and between their communities.

By the 2nd c. BCE and into the 1st c, CE, horse equipment is the main object of glass decoration that we can correctly identify – in red but also blue, and eventually using the Roman technique of enameling in the 1st c. CE – and studs which may have decorated stave-buckets or cloth. Horse and chariot equipment may have had similar values in Britain as the continent, as we know from Caesar (*Gallic War*, IV.33) and Pomponius Mela (*De Chorographia*, III.52) that the indigenous populations of southern Britain fought on foot, horseback, and by chariot until the mid-1st c. CE. As decorated horses and chariots patrolled and protected territories, or appeared for rituals, funerals, and other special events, the power, wealth, and control of the wealthy were on display for members within and beyond the local community.

The use of studs is elusive – though possibly used to decorate cloth, we have no evidence for this use. However, studs have been found in graves in association with stave-buckets. The stave-bucket was used for mixing wine in ceremonies; though relatively small, these wooden buckets covered by copper alloy sheet metal and opaque red glass studs would have caught the eye of any onlooker at a ceremony. Perhaps the red matched with the perceived color of the wine, enhancing its power or the power of the vessel itself by drawing attention to the connection between liquid, glass, the sheet metal and its decoration. Wine and red glass from far-off places

combined in the stave-bucket at ceremonies to connect people and ritual to the gods and to each other through participation in ritual acts, such as drinking, speaking, listening, and interacting with objects and people. The glass-decorated stave-buckets also bespoke of the power of the owner, both politically and socially; their ability to host and offer enchanting elements for others to see and interact with bespoke of their social capital, wealth, and goodwill to the community and gods.

4.6 Finishing Touches: Some Final Notes

The value of opaque red glass decoration is tied to Late Iron Age social structure and trade networks tying temperate Europeans to each other and, tangentially, to Mediterranean cultures. Based on the archaeological evidence presented, shifts in the objects which were most significant to temperate European societies were affected by the local socio-political power structures and relationships between local and more long-distance communities, including relationships with the Mediterranean Basin brought by Roman expansion. The value of certain objects shifted as power dynamics and pressure from outside forces pushed into temperate Europe and, in turn, opaque red glass was used to decorate objects that were seen as most significant to specific social and political shifts within each period. While the warrior class first took inspiration from previous ruling aristocracies and largely replaced coral with the new opaque red glass being traded into these regions, there was also a shift to the significance of the human body in the 4th and 3rd c. BCE for showing dominance and garnering respect. Opaque red glass was an enthralling element with fascinating properties – it changed between liquid and solid states, was reflective of the sun and fire, maintained its deep red color over time, and enhanced the metal objects which it decorated. This material was part of a larger shift in many

communities toward a focus on the human agents and opaque red glass' significance for establishing and maintaining relationships within and beyond the local community.

In the 2nd and 1st c. BCE on both the European continent and southern Britain, we see another change in the archaeological record that focused on the decoration and display of horses and two-wheeled chariots. The emphasis on decoration of horse and chariot could have been a visual representation of the increased need for patrolling and defense across territories.[263] These opaque red glass objects represented the ownership of horse and chariot by the warrior elite and the ability to fulfill their promise to protect the populace. In turn, the display of such objects on horses and chariots garnered the respect and admiration of the people; not everyone could own a chariot, and it seems likely that chariots were owned by the household rather than an individual.[264] Opaque red glass-decorated metalworks brought marked visual attention to the horse and two-wheeled chariot and in, turn, the collaborative ability of the households of the warrior class.

The discovery of hoards and burials in the archaeological record of the 1st c. BCE and 1st c. CE in Britain continues to emphasize the significance of the horse and chariot. Iron Age styles mixed with Roman techniques of metalworking and enameling in Britain,[265] keeping decorative metals traditions alive using new techniques and technologies. There is a split with the continent by the end of the 1st c. BCE, where metal objects decorated with opaque red glass objects became rare or nonexistent on the continent but continued to be present in the art of Britain. The next chapter will draw attention to changes in temperate European societies after the Roman invasions, focusing on the introduction of new techniques and technologies of production as I

[263] Lewis 2020: 118
[264] Giles et al. 2020: 54
[265] Lewis 2020:112

investigate the few examples of opaque red glass works visible in the archaeological record of western and eastern continental Europe in the 1st c. CE.

Chapter 5

Variance in Values: Opaque Red Glass in the Western Roman Provinces

5.1 Introduction

Understanding the production of opaque red glass and its associated copper-alloy and iron artifacts proves difficult, especially from c. 50 BCE to c. 40 CE. Nail-rivets and studs found decorated with opaque red glass which were discovered in the La Tène D archaeological layer at Mont Beuvray, for example, have been dated from 150 BCE to 1 BCE – these objects date to either before or after the Roman invasion.[266] Therefore, we cannot say with any certainty that production of opaque red glass-decorated objects ceased at the time of Roman invasion. It is quite possible that production continued for some time after the Roman occupation began. Fibulae such as those found at Vertillum and the Gallo-Roman temple at Villiers-de-Duc in Burgundy, which are dated stylistically to the 1st to 3rd c. CE, open researchers to the possibility of a market for enameled fibulae production at least in the 1st c. CE.

But, although any signs of continued production and use, or absences, of these object types are difficult to identify, we can be certain that opaque red glass was used in the production of new object types: monochrome mold-blown vessels, monochrome mold-made twisted stirring rods, and polychrome mosaic mold-blown vessels; broken pieces of red glass were also used in mosaics or as game tokens.[267] However, scholars assumed for decades that sealing-wax red glass – beloved by Iron Age populations of temperate Europe – was replaced by another opaque red

[266] Brun and Pernot 1992
[267] Arletti et al. 2006; Boschetti 2011; Boschetti et al. 2016; Boschetti et al. 2017

glass called red-brown glass, assumed to be a duller type preferred by Romans and therefore adopted by local populations to meet imperial taste.[268]

In this chapter, I focus upon developments on the European continent, as Britain requires a separate treatment due to its isolation across the Channel and the (proven) continued production of opaque red glass-decorated metal objects in Iron Age styles until the Middle Ages. I consider a period of c. 120 years of opaque red glass production on the continent, though there are many gaps in our knowledge – particularly in relation to chronology – which will be addressed within the chapter. The first section considers the Roman invasion of territories in Iron Age temperate Europe through the lens of epistemicide, building on the recent works of Dan-el Padilla Peralta.[269] I then provide a short history of the production of glass on the continent after the Roman invasion, and the spread of glassblowing into the provinces. The following two sections discuss the production of opaque red glass goods specifically, first by addressing patterns in the typologies of opaque red glass goods and their consumption and deposition in the archaeological record. Then, I interpret the value of opaque red glass in these Roman territories and the social networks visible to us through those consumption and deposition patterns, influenced by the works of Crook, Latour, and Van Oyen,[270] before addressing the effects of Roman colonization on indigenous traditions of manufacture through the lenses of epistemicide and concepts outlined by Lemke on traditions of manufacture.[271] In the conclusion, I argue that, even if opaque red glass remained in use on the European continent, it lost its value as a decorative material when the social and symbolic values of consumers were silenced and

[268] Brun and Pernot 1992 were early instigators of this argument, as the results of their study of opaque red glass at Mont Beuvray suggested the presence of a glass formula which differed from other red glasses analyzed in temperate Europe and belonging to a similar period.
[269] Padilla Peralta 2024
[270] Crook 2019; Latour 2005; van Oyen 2013
[271] Lemke 1998

devalued through Roman epistemicide. Gallo-Romans created a new system of practices and symbols to demonstrate their status, identity, and network connections within the Roman imperial structure. New techniques and technologies of glass production – such as glassblowing – replaced most traditional practices and monochrome clear glass vessels became a market staple across the Roman Empire.

5.2 Investigating Invasion: Romans in Continental Temperate Europe

Objects and lifestyles from the Iron Age do not simply "disappear" upon Roman conquest; instead, we must take into consideration the violent destruction and silencing of Iron Age culture by Romans while indigenous peoples strove to survive, thrive, adapt, and resist imperialism. Approaching epistemicide through indigenous craftworking traditions such as glass working and decorated metalwork serves as a profound case study, since Roman conquest across the Mediterranean and beyond led to not only major changes in indigenous social and political structures, but to the spread of new materials, products, and the cessation of others.[272] The following section addresses the effects of the Roman invasion on local glass industry. The introduction of glassblowing – both mold- and free-blown – from the newly conquered Syro-Palestinian coast quickly spread westward as specialists moved across the empire and spread the craft. Through the introduction of new technologies and the expectations of Roman colonists in major settlements founded by the empire, sealing-wax red glass met its greatest (elemental) enemy – oxygen.

[272] Padilla Peralta 2024

5.3 Proliferate Production: Glass Working in the Western Roman Provinces

Glass working in the Roman Republic and early Empire was influenced by Hellenistic traditions. Mold-produced glass vessels of the 3rd and 2nd c. BCE were slumped and cast polychrome glasses,[273] produced in bright opaque colors such as blue, red, and white.[274] The incorporation of the Hellenistic world into Roman hegemony in the 2nd c. BCE led to an increased scale of production and commerce of glass across the Mediterranean and beyond.[275] By the late 1st c. BCE, mold- and free-blown glass technologies were invented and primarily used in the production of bottles, bowls, and drinking cups (Figures 19-21). Archaeological remains of glass production waste found in the Jewish Quarter of the Old City of Jerusalem, dating to 37-4 BCE suggest that this technology was invented along the Syro-Palestinian coast.[276] Glassblowing did not occur in a single step, and did not spread instantly across the Roman world. Early glassblowing waste and the weight of glass vessels from the late 1st c. BCE to the early 1st c. CE suggest that the earliest form of blowing used glass rods, which were replaced later by clay pipes.[277] It was not until the mid-1st c. CE that scholars assume that the iron blowpipe was introduced across the empire, based on the appearance of heavy-weight vessels (500g and over) first in northern Italy, then in Avenches, Switzerland (mid-1st c. CE) and Saintes, France (c. 100 CE).[278]

[273] Glass is heated in a kiln and shaped over a mold to produce a vessel during slumping, while glass is melted and poured into a mold in order to produce a vessel during casting.
[274] Henderson 2009: 209- 210
[275] Henderson 2009: 227
[276] Israeli 1991: 47; Grose 1977: 12. Remains of glass working include cast bowls, glass rods, spirally twisted rods, cosmetic sticks, gaming pieces, whorls, inlay pieces, and flat beads.
[277] Stern 1999: 447
[278] Stern 1999: 447



Figure 19 Clear glass cup, mold-blown, possibly from the Workshop of Ennion in Greece (?), Roman imperial, first half of 1st c. CE. H.6.9cm. Getty Museum. Accession number 95.AF.60. CC0 1.0 Universal Deed.



Figure 20 Dark blue beaker, free-blown, polished, Roman imperial, first half of 1st c. CE. H. 6cm. Getty Museum. Accession number 2003.362. CC0 1.0 Universal Deed.



Figure 21 Amber colored ribbed bowl, Roman imperial, 1st c. CE, unknown provenance. H. 11.8cm. Getty Museum. Accession number 78.AF.27. CC0 1.0 Universal Deed.

Glassblowing drastically changed the production of glass goods, as this technology produced less waste than slumping and casting, was less labor-intensive, faster, and led to the production of new classes of items which could only be produced in clay and metal before its invention.[279] Provincialization – including the establishment of fixed trade networks, colonies, and relatively stable governance – stimulated the spread of new goods, technologies and techniques of production, and the movement of individuals, including glass blowers from the Mediterranean, into the northwestern territories.[280] New markets for goods enhanced the market for blown glass and facilitated the trade of raw and complete glass vessels into temperate Europe and beyond the *limes* of the Roman Empire.[281]

[279] Stern 1999: 442
[280] On ceramics, see Fulford and Durham 2013; Mirguet-Archambeau et al. 2009; Van Oyen 2015b; Borgers et al 2020. On architecture, see Ferdière et al. 2010; Fichtl 2009. On agricultural exploitation, see Van Ossel and Defgnée 2001.
[281] Grose 1977: 10

Archaeological evidence for glass working in the 1st c. CE features prominently in northern Gaul. In the modern territory of France, over 67 glass working sites have been discovered, 9 of which date to the 1st c. CE while 16 date to the 2nd to 3rd c. CE.[282] Lyon, Besançon, Autun, Reims, Amiens, Bonne, Rezé, and Saintes are a few of these major sites, with Lyon hosting a total of 20 kilns in its artisanal zone on the left bank of the Saône River at Montée de la Butte.[283] Furnaces and waste glass from the 1st c. CE have also been discovered in Cologne and Avenches on the Rhine.[284] Finds of glassware in these areas are both imports from the Mediterranean and local wares; regional production can be identified by particular glass types and maker's marks which are found either primarily or, sometimes, only in areas north of the Alps.[285] Early glassware made in the western provinces mimicked the shapes of Italic imports, yet as production spread and boomed, glass types became more regionalized and specialty types such as globular jugs with collared rims which appeared only in markets north of the Alps.[286]

Glass vessels were used for a variety of purposes in the ancient Mediterranean: as tableware, for storage and transportation of solids and liquids, cosmetics, scents, bath oils, and medicines, for example.[287] Though luxury glass such as gladiator cups existed on the Roman market in the late 1st c. CE (Figure 22), glass was used to mimic more desirable materials used to produce tableware in particular, such as gold, silver, bronze, hardstones, and alabaster.[288] Glass was popular because it could be used to make skeuomorphs of goods in other luxury materials

[282] Robin 2016: 21
[283] Foy 2003: 36-37
[284] Fleming 1997: 11
[285] Leblond 2017: 27
[286] Fleming 1999: 54
[287] Stern 1999: 481
[288] Fleming 1997: 12; Stern 1999: 442

and could be produced more quickly and with less raw material wasted in production. Sealing-wax red glass appeared sparingly in temperate Europe and the Mediterranean – and was especially rare in monochrome. As the 80s CE approached, its use in the creation of any goods, whether vessels or mosaics, dwindled until it could only be traced to workshop spaces in Britain.



Figure 22 Translucent yellow glass gladiator cup, mold-blown, Roman imperial, probably Gaul. H. 7.1cm. Corning Museum of Glass. Accession number 54.1.84. Image licensed by The Corning Museum of Glass, Corning, NY (www.cmog.org), under CC BY-NC-SA 4.0.

5.4 Market Matters: The Consumption of Opaque Red Glass

Material evidence of monochrome opaque red glass objects is limited to a small number of vessels, most of which were mold-cast rather than free- or mold-blown (Table 1).[289] This is likely due to the temperamental nature of opaque red glass, which easily turns to opaque green

[289] Cottam 2019: 49, 347

glass due to oxidation.[290] According to Boschetti, the context of opaque red glass vessels is unknown, with only a few found *in situ* in Egypt, Greece, and Pompeii and interpreted as produced in the Levant or central Italy.[291] Based on a diverse data set collected from multiple archaeological sources, I have determined that opaque red glass vessels have been found in Egypt, Greece, Italy, Crimea, Austria, and the Netherlands (Table 2). The vessel fragments found on the Magdalensberg in Austria were discovered during excavations of the indigenous settlement, while most other vessels and fragments were uncovered *in situ* in funerary contexts. Boschetti and her colleagues' scholarship concerns opaque red glass tesserae found in the Bay of Naples, primarily Pompeii, and therefore their information draws primarily from site reports and glass studies from the Mediterranean world.[292]

Table 2: Known opaque red glass vessels (in full or partial remains). Boschetti 2011 and Wood 2025 (diss.).

Location	# of vessels found	Types
Egypt	13	Hemispherical bowls with ridges on exterior (6); bowls with horizontally outsplayed rim (2); Isings 2 carinated bowls (3); bowl with profiled contour (1); orange beaker encased in red (1)
Greece	3	Skyphos with handles (1); Globular bottles (2)
Italy	6	Isings 2 carinated bowls (1); hemispherical bowls with ridges on exterior (2); Isings 5 plate or bowl (1); Isings 28 unguentarium (1); Isings 20 bowl on small base ring foot
Crimea	1	Isings 5 plate or bowl (1)

[290] I have discovered this issue firsthand, through my own experimental work with Dr. Vanessa Muros in the Experimental and Archaeological Sciences Lab at the Cotsen Institute of Archaeology, forthcoming.
[291] Boschetti 2011: 86
[292] See Boschetti 2011 and Boschetti et al. 2024 for more information on the use of opaque red glass tesserae in the production of mosaics in Italy. This colorful addition is less popular by the late 1st c. CE.

Austria (Magdalensburg)	5	Fragments from Isings 2 carinated bowl (1); fragments from Isings 34 beaker (1); fragments from small drinking vessels (2); C (1)
France (Fréjus)	1	Fragmented, unknown shape
France (Lyon)	2	Fragmented, unknown shape
England (Colchester)	1	Fragment and rim of shallow bowl
Unknown	22	Isings 2 carinated bowls (11); footed bowls, one marbleized in orange (2); Isings 28 unguentaria (4); footed bowl (1); fragment of dish with ring base (1); Pear-shaped perfume bottle (2); fragment, unknown shape (1)
Total	54	

The list of vessels provided by Boschetti in her 2011 article, however, is not exhaustive. Scholarship published on archaeological material in the northwest provinces proves that opaque red glass was mold-blown into vessels and twisted into stirring rods for a brief period. An opaque red glass vessel was discovered in Nijmegen, Netherlands,[293] while opaque red glass fragments were found in the workshop space at La Montée de la Butte in Lyon, a major glass working site in France.[294] Regardless of the low number of opaque red glass shards found in Lyon – 14g of random opaque red glass fragments, totaling 1.5% of the assemblage of trench F26 – we know that opaque red glass vessels were produced in the ancient Mediterranean and at least one region of the northwestern continental provinces until c. 80CE.

[293] Cottam 2019: 190-191. Opaque red glass fragments were also found at Roman Colchester, England, and are mentioned in the associated table; see Harden 1958: 157
[294] Motte and Serge 2003: 311

This date – 80 CE – is mentioned in most scholarship as a turning point in glass production for opaque colors. Based upon his research in the Rhineland, Henderson claims that after c. 70 CE there is limited archaeological evidence for the addition of colorants to glass batches.[295] There is a bias inherent in connecting changeovers of glass production to 70-80 CE, since archaeological material is best dated at sites which provide a strong *terminus ante quem*, such as those in the Bay of Naples affected by the eruption of Mt. Vesuvius. In support of a turning point sometime in the last two decades of the 1st c. CE, there is material bias toward natural bluish green or colorless glasses occurred in the last quarter of the 1st c. CE when glass recycling became a significant part of the glass industry.[296] In order to produce a new batch of opaque glass through recycling, either each glass color would need to be remelted separately or a colorant would need to be added to a base colorless glass; otherwise, a muddy brown glass would be produced. Therefore, a shift to colorless or natural glass colors occurred in primary and secondary production centers for ease of production and to reduce prices, as glass workers began to regularly recycle glass in their workshops rather than buy new glass ingots in larger quantities.[297]

Based on the data provided in this section, we can make two assumptions:

1. Opaque red glass vessels were produced, albeit in small quantities, in the northwestern provinces from c. 40 to 80 CE.

[295] Henderson 2013: 232
[296] Stern 1999: 451. Stern determines that glass recycling was discovered in the early Flavian period based on the literary works of Pliny and Martial. While Pliny does not mention glass recycling, Martial does – therefore, Stern argues from silence that recycling was discovered between 70 and 86 CE. However, there is possible archaeological evidence for glass recycling in earlier periods – a basket full of broken glass was discovered during excavations of the Pisanelle villa at Boscoreale, dating to the late 1st c. BCE. Rather than glass recycling being discovered in the period between Pliny and Martial, it could be more appropriate to say the practice was popularized across the Roman Empire in this period. See Larson 2019 for more details on this subject.
[297] Boschetti 2011: 90

2. The popularization of glassblowing and glass recycling to reduce costs for artisans and allow them to produce larger quantities of vessels partially led to opaque red glass falling out of style by the last quarter of the 1st c. CE

Still, opaque red glass was once a major element in the decoration of Iron Age metalwork. Though it is possible that some nail-rivets, buttons, and studs were produced by artisans in the early imperial period,[298] we have little to no secure evidence on the continent for the production of metal objects decorated with opaque red glass after Caesar's conquest. The potential for large-scale abandonment of this practice in the northwestern continental provinces is significant to our understanding of changes in the value of this indigenous art – the material may have changed but red was an important color used in the decoration of high-status personal objects for nearly 500 years in these regions – and the creation of new social networks between significant members of the local community and Roman officials.

5.5 Verifying Value and Navigating Networks in Provincial Places

There are a few veins of thought which need to be addressed in this section. First, I will discuss epistemicide and changes in values from the Iron Age to the Roman period. The destruction of indigenous cultural traditions, and the forceful diffusion and absorption of Roman culture in order to survive – including civil, religious, political and social systems – led to new transformations of the elite, from warrior to aristocratic politician. In the process, opaque red

[298] Archaeological finds at the site of Mont Beuvray include opaque red glass nail-rivets, studs, and buttons found in workshop waste areas. Deposits at the sanctuary date to between 150 BCE and 20 CE, at which time the site was mostly abandoned for the nearby colonies of Augustodunum (Autun) and Lugdunum (Lyon). There is little archaeological evidence at the site or surrounding sites after the Tiberian period. The seizure of mining evidence in the vicinity of Mont Beuvray in the 1st c. CE is further evidence used for the abandonment of the site for other settlements. See Moore et al. 2013 and Petřik et al. 2022.

glass was devalued as a status marker and symbol of the elite populations. This section will also address what took the place of opaque red glass metalworks in expressing identity and sending messages of political, socio-economic, and religious value to viewers – for example, public monuments, the *domus* and its decoration, and Roman clothing and adornment. Then, I will discuss the production of opaque red glass from the artisan's perspective and the traditions of manufacture which have fractured during the Roman period due to shifts in local values and recycling practices to reduce costs of production. I will include a brief discussion of glass types which became status markers – all of which were personal but not portable and resided in the home.

5.6 Losing Lifeways: Epistemicide in the Three Gauls

According to scholars specializing in anticolonialism, epistemicide is the silencing, devaluing, and destruction of indigenous knowledge systems (e.g. memories, traditions, and beliefs) through colonialist practices.[299] As colonial powers dominate and attempt to change the colonized to meet their social, political, economic, and religious expectations, colonizers actively deny indigenous knowledge and socio-cultural and political practices. In this dissertation, I extend the concept of epistemicide to the production of indigenous and local material culture and argue that the devaluation of certain indigenous artisanal skills and technologies, materials, styles, and object types in Roman Gaul exemplify epistemicide. After the Roman conquest, we do not see enameled objects in the places which we expect: waste and failures in workshop spaces or trash pits at the edges of industrial areas, or finished products in domiciles, as votive

[299] Spivak 1988; Blouin and Akrigg 2024; Padilla Peralta 2024

offerings to gods and goddesses in aquatic locations, or as grave goods for the deceased to take with them to the afterlife. These indigenous social and religious practices of production, consumption, display, and deposition become mostly invisible to archaeologists. This sharp change would not have happened without the violent takeover and subjugation of indigenous continental populations.

These portable and personal metal objects decorated with opaque red glass – fibulae, torques, arm rings, chariot and horse harnesses, and women's belts – were enmeshed within the identity and value system of the peoples of Iron Age temperate Europe. These objects played a major role in demonstrating social and religious status within the community and beyond its boundaries; at feasts, diplomatic gatherings, parades, weddings, births, and funerals, a number of people, animals, and objects (alive and deceased) would have been properly arrayed to relay their significance and connections to each other – elites, their warrior entourages, their wives and children, and their horses and chariots. The Roman invasion brought forth the installation of colonial administration, the movement of most military personnel to the edges of conquered territories and away from their homelands, the encouragement of new religious and social rituals, and new production techniques and technologies. Rome insinuated itself into every possible crevice it could; even offerings at sanctuaries changed dramatically as swords, fibulae, and other personal metal objects were replaced by terracotta, marble, and – sometimes metal and wooden – ex-votos, such as at those along the Seine River at sanctuaries to the local goddess Dea Sequana or the syncretic god Apollo Vindonnus.[300]

[300] Aquatic sanctuaries can be found across most of Europe. In the Three Gauls, the healing sanctuaries along the Seine River were in use from as early as the 4th c. BCE into the Late Roman Empire. The practice of offering ex-votos of the anatomical type was not a Celtic practice, but was introduced after the Roman invasion. For more information on this subject, please refer to Deyts 1971, Romeuf 1986, and Hughes 2017.

As Iron Age elites such as Vercingetorix would be imprisoned, paraded in Rome, and killed if they chose to fight against Rome (*BG* VII.75-90), there was only one possible choice: become as Roman as possible in the public eye.[301] The desire to survive and maintain some semblance of social status under Roman control – to not lose all wealth, social position, and network ties – first led elites to join Caesar's side in the Gallic Wars. The practices of personal display which would gain Roman favoritism would not be those which had helped them maintain their status in the Iron Age. In turn, artisans needed to create new products which matched Roman tastes, commissioned by various individuals in the community, to maintain their relevance and livelihoods. While fibulae or horse equipment continued to be practical metalworks commissioned by various members of society, most other portable metal goods from the pre-conquest period were not. As glass working became the project of specific artisans trained to make vessels and beads, most enamellers likely became full-time metalworkers since the practice of enameling required knowledge of metal and glass arts which were transferable. Glassblowing, on the other hand, would have required a new set of technological know-how and specialized equipment, and glass bead production could have become part of the business. Nearly four hundred years of cross-craft traditions changed in temperate Europe due to epistemicide.

5.7 Variances in Valuation Amongst Elites

[301] Brandt and Slofstra 1983; Woolf 1998; Terrenato 2005 and 2019

By way of the destruction of local knowledge practices and knowledge systems brought on by conquest, colonialism, and an instinct towards survival, Gallic elites positioned themselves to became mediators between the imperial and local governments. These individuals were given legal status, access to wealth, and political powers in northwestern Gaul by the early to mid-1st c. CE.[302] They complied with imperial law and expectations in order to survive and benefit from the Roman system, and found themselves as intermediary bodies between the Roman state and the indigenous peoples. Though some elite men may have gained status in the imperial hierarchy through military tenure, local warfare was no longer a socially viable means of gaining prestige within the community or the empire. Instead, the Roman imperial system coopted elites, both male and female, into a governing class which participated in government, cult, and economic activities, for example.[303] We may use the Batavians as an example: Nicolay states that Roman authorities took over the recruitment of soldiers – thus the power of local aristocrats to recruit their clients as soldiers was removed and stationed auxiliaries away from their homeland.[304] He argues that traditional martial values broke down as the walls between "warrior" and "civilian" rose, and presenting oneself as a warrior or warrior elite lost its significance when power structures and local traditions were lost and a standing military took the place of earlier institutions. We see a similar situation across most of continental temperate Europe as the production and consumption of arms, armament, horse harnesses, and chariot equipment declines in the early Roman imperial period. Instead, there is increased consumption among the elite classes of other materials and goods introduced into local markets and workshops by Roman traders and artisans.

[302] Woolf 1998: 25
[303] Woolf 2002: 13; Ando 2006: 182; Hemelrijk and Woolf, eds., 2013
[304] Nicolay 2007: 369

As their focus shifted to becoming political intermediaries rather than warrior elites who held public feasts and ceremonies to demonstrate their wealth, power, and connections (and spread the wealth through local forms of gift giving), Gallic aristocrats gained a new identity which separated them wholly from their great-grandparents – and with this new identity came change in conspicuous consumption.[305] Elite Gallo-Romans participated in imperial and local networks, but their strongest ties had to be with those above them on the socio-political ladder – Roman citizens in positions of power – and individuals on the same step. Woolf argues that the paucity of civic culture in interior Gaul supports this concept, as monetary wealth was spent not on euergetism but on private residences and burial culture.[306] I agree with his statement and add that this does align with known practices from the Iron Age in temperate Europe. There is plentiful evidence for gift giving and wealth distributions when we consider burial culture and feasts in particular, and it is rather more difficult for scholars to say that wealth was put into public projects other than the extensive building of walled settlements. I add to his argument by acknowledging the violence present in the creation of the new social order within the Three Gauls, and add that the consumption of opaque red glass was directly affected by the new networks through which elite Gallo-Roman identities were maintained.

Elite Roman consumption practices in the provinces fell under two main categories: first, public benefaction through building projects and dedications, and second, private domestic spaces. In the Three Gauls, public dedications such as monuments, statues, and inscriptions appear on a smaller scale than any other province of the Roman Empire.[307] We might perhaps envision this as a form of resistance, or a connection to previous practices, as none of these were

[305] For a similar concept, see Webster 2001 on creolization
[306] Woolf 2002: 14
[307] Goodman 2007; Woolf 2002

traditional forms of public display. Gallo-Romans would have been familiar with euergetism due to Roman education systems established in the Three Gauls,[308] and the Roman practice of taking children as hostages to Rome or to Massalia in Gallia Narbonensis to inculcate Roman culture and *mores* into them from youth.[309] Purposefully not participating in this practice when archaeological evidence proves it to be happening in other provinces, such as in the Italic peninsula and the eastern empire, suggests tacit resistance. [310]

The emphasis in public consumption practices seen in the Iron Age however, such as horse and chariot decoration, are mostly invisible at sanctuaries, burials, and settlements in the Roman period. Based on archaeological evidence, men in the Three Gauls no longer displayed consumption of personal jewelry or military equipment seen in the Late Iron Age; jewelry was worn predominantly by elite women instead, though there are no more torques and arm rings, and bronze belts decorated with opaque red glass disappear since Roman women's clothing did not require a belt.[311] Private displays of wealth in the domestic sphere overtook public as:

1. New sources of power derived from maintaining networks with Roman administration and religious practices, and through relationships with officials and individuals of the same socioeconomic status,
2. Elite identity was no longer tied to warrior prowess or ability to protect the local population from invaders, both local and non-local, because this type of identity could be seen as an act of treason and resistance which would be quickly squelched through continued acts of violence.

[308] See Tacitus *Annales* 3.43, which mentions a school for the children of Gallic nobles at Augustodunum (modern Autun)
[309] Creighton 2000
[310] Goodman 2007; Woolf 2002; Lomas and Cornell 2003; van Nijf and Heller 2017; Zuiderhoek 2009
[311] Milovanović 2018: 136; Woolf 2002: 11

The influx of new goods, technologies, and techniques of production brought Gallic elites a new "sign system" which allowed for individualism in expressing meaning, personal taste, and cultural competence within Roman expectations.[312] While some personal and publicly worn objects became signs of allegiance to Rome and personal financial power gained through that allegiance, such as the *toga* and signet ring for men and the tunic, *stola*, and various pieces of jewelry for women,[313] objects of the Late Iron Age such as decorated sword sheaths, torques, and arm rings became obsolete symbols of eliminated warrior customs and costumes.

The old displays of power, social connections, religious relationships, and wealth of the Iron Age were silenced and devalued by Roman imperialists. Opaque red glass and the bronze and metal objects which this material had once decorated could not maintain their meaning under colonial power on the continent since Iron Age episteme had to be left in the past. The meanings associated with the glass lost their context as it became unnecessary to demonstrate the relationships within and between local indigenous communities through the combination of these materials. Local esteem, moral, and measure values within and between social groups had drastically changed. The messages interpreted by viewers enchanted by the metalworks decorated with opaque red glass were no longer those which needed to be sent in the social system. Messages related to personal display and portable objects had changed with the adoption of Roman clothing and accessories, Roman objects and materials, and fluency in Latin and Greek texts and culture, which demonstrated strong ties to the Roman state and powerful governmental officials. Adoption and adaptation of Roman lifestyles, architecture, and goods were needed to

[312] Woolf 1998: 181
[313] Olson 2008

mark the prestigious position of Gallo-Roman men, women, or children within this new societal structure, and therefore became the main markers of moral, esteem, and measure values.

5.7.1 The Moral Value of Opaque Red Glass in the Gallo-Roman System

Moral value in the elite classes of Roman society was often driven by *humanitas*, or enlightenment and cultivation of Roman moral traits.[314] By proving their dedication to the Roman virtue of *humanitas*, Gallo-Roman aristocrats could function in Roman political and social spaces and gain access to wealth, property, citizenship rights, and powerful positions in local government. Across the western provinces, moral value was demonstrated through access to education and ownership of Roman and Greek literary works. Wearing Roman clothing and accessories, owning objects desirable to elites such as silver plate and cups, wearing Roman-style rings, and participating in Roman religious rites demonstrated *humanitas*.[315] This value separated them from lower class Gallo-Romans and placed them in a middle ground between the Roman imperial system and local administration, amplifying their significance to the Roman state.

Traditions of opaque red glass decoration had no place within the new moral system, as it did not display *humanitas*; rather, conspicuous consumption of opaque red glass metalworks would suggest the opposite, particularly for men as *humanitas* was tied to Latin language, literature, rhetoric, and Roman religion. Wearing powerful objects embedded with Iron Age episteme could be dangerous to their survival. Torques, arm rings, and belts for women were

[314] *Humanitas* includes *benevolentia, observantia, mansuetudo, facilitas, severitas, dignitas,* and *gravitas.* All traits are connected *to religio, fides,* and *mores* in the Roman social system, and are expected to be ingrained in the thoughts and actions of the upper echelons. Please see Woolf 1998 for an in-depth explanation of these terms.
[315] Lapatin 2014; Henig 1983; Ward 2023

replaced by gold earrings, rings, and necklaces decorated with pearls, jet, amber, and other precious materials. Glass could be used as a low-cost alternative to precious stones, yet the distinctive European formula for sealing-wax/opaque red glass in the Iron Age was replaced by the early 1st c. CE by a popular Roman red glass with higher levels of magnesium.[316] This Roman glass was said by some academics, incorrectly, to be duller than the red glass used across temperate Europe and preferred by Romans. Red-brown glass, which was used to decorate mosaics, some gold jewelry, and enameled bronze and brass brooches, takes precedence as a decorative element across the Roman Empire, though sealing-wax red glass does continue to appear in reduced quantities at least into the 2nd c. CE.[317] Overall, however, opaque red glass loses its value as display practices which were once driven by possession of portable and personal decorative metalworks are erased in many indigenous European communities in the early Roman imperial period. Rather than "becoming Roman," these individuals are "forced Roman" through the forceful replacement of their local social and value systems.

5.7.2 The Esteem Value of Opaque Red Glass in the Gallo-Roman System

Esteem value relates to the respect and admiration for ownership across the social class, and beyond the continent, as members of the Gallo-Roman aristocracy competed to demonstrate their wealth, status, and personal connections. The ownership of specific goods and materials elevated the status and value of local aristocrats, particularly those who could demonstrate *humanitas* through ownership of a Roman-style *domus* or *villa* and their associated decoration, such as statuary, wall paintings, and mosaics influenced by Greek and Roman history, myth, and

[316] Brun and Pernot 1992; Boschetti et al. 2016
[317] Bandiera et al. 2019. I will return to this subject in Chapter 7.

foodways, or Roman-style clothing and jewelry. Monumental architecture and dedicatory inscriptions also garnered respect and admiration, as these places were physical and longstanding markers of public benefaction, wealth, and social prowess.

It is unsurprising that ownership of goods decorated with, or completely molded from, opaque red glass became less significant to local elites since the respect and admiration gained by living a warrior lifestyle were replaced by government connections and offices, where there was no place for traditional objects of manufacture and display. Consumption practices moved toward goods, materials, spaces, and places which demonstrated personal connections to Rome and its officials. To survive under Roman hegemony, gain citizenship, and retain status and connections, Gallo-Roman aristocrats needed to rise within the new social system by consuming goods with more of a Roman character.

As previously mentioned, archaeological evidence proves that monochrome opaque red glass cast bowls were produced in Italy and the Roman western provinces (Figure 23). These bowls survive in small numbers and only entered local markets for around 30 years. Local artisans attempted to work opaque red glass, a material which was part of their traditional repertoire, into new product types using Roman glass technologies and techniques of production. These glass bowls, however, differed greatly from high status glassworks such as cameo glass vases and gladiator cups. Their deep red color was the only distinguishing marker; other opaque glass bowls, in green and blue, appear around the same period. Only around 40 of these objects have been found intact and date to a short window, as Romans turned to more easily recyclable clear glasses which Pliny stated resembled rock crystal.[318] The esteem value of opaque red glass

[318] *Natural History* XXXVI, 200. Not all of these were perfectly clear glasses; most had slight blue or green tints, suggesting a range of types. See Jackson 2005.

bowls lasted only a short period as glassmakers and glassmaking changed to meet market expectations and lower cost of production through glass recycling, which could be done more easily (and with more aesthetically pleasing results) than through the recycling of opaque colored glasses.



Figure 23 Opaque red glass cast bowl with unknown maker. End of 1st c. BCE to beginning of 1st c. CE. Getty Museum accession number 2003.232.

5.7.3 The Measure Value of Opaque Red Glass in the Gallo-Roman System

Measure value is directly translatable to monetary value, which was introduced to local communities across temperate Europe in new and fascinating ways, since coin usage was widespread and necessary for transactions in the Roman period. Accruing monetary wealth could lead to new displays of esteem and moral value and could assist in social movement up the proverbial ladder of Gallo-Roman government. In a significant shift from the display of personal wealth and status through public practices in the Iron Age, displays of personal wealth are most visible in the private sphere in the Roman period.

The artisans' use of opaque red glass shifted to personal objects which were no longer purposefully portable; these objects instead stayed within the home for use at private dinner parties or for more private viewing practices. Opaque red glass was shaped by glass artisans into stirring rods and small bowls or broken into tesserae to create a mosaic. For the first time, opaque red glass had monetary value – it was purchased from an artisan either at their workshop or at the marketplace. It could have measure value as a gift from one individual to another, perhaps as a bowl used for special meals and not for everyday use. The rarity of the bowls on the market could suggest a higher price if we believe small numbers suggest market scarcity.[319] Scarcity, however, did not lead to their disappearance from the repertoire of goods produced at an artisan's workshop. The measure value of these bowls must have depleted over time as Roman tastes, population increase and higher demand for glass objects, and the onset of recycling practices forced artisans to produce clear or bluish-green clear glasses for local and global markets. Demand for change and standardization forced experimental practices out, as these were too expensive to maintain and opaque red glass could change color easily when blown or recycled.

5.8 Changed Systems, Changed Values, Changed Networks

Indigenous peoples living in Roman Gaul were forced to change their value systems and networks to fit their new urban and socio-political environments. As Roman values were forced into local systems and became required for Gallo-Roman aristocrats to take part in if they wanted to survive under imperial control, these individuals adopted Roman practices of display. As

[319] Market scarcity is a psychological principle that describes how people value scarce or costly resources more than abundant ones.

artisans were forced to change their indigenous practices to fit the new needs of local populations, the value of opaque red glass and its production had to change. The values, network ties, display practices, and traditions of manufacture encompassed in Iron Age indigenous populations' consumption of opaque red glass could not continue to survive in the value systems of local elite populations in Roman Gaul.

5.9 A Rupture for Red: Disruption in Traditions of Manufacture

Though there are always signs of production failure, archaeological evidence proves that artisans in the Iron Age had the technical know-how to properly work glass into bracelets, beads, and melt glass to metal objects. However, attaching molten opaque red glass – or any glass – to metal surfaces fell out of favor sometime between the 1st c. BCE and the 1st c. CE since the surfaces which they had decorated in the Iron Age lost their symbolism and value under Roman hegemony.[320] Traditions are part of a specific social context, and can only exist when continuously practiced within said context or the tradition will change or fade away.[321] Technological conditions, access to resources, and ideals of consumption and the socially-constructed concepts of how an object can be used must be maintained for a tradition to flourish. Therefore, the institution of Roman trade infrastructure, glassblowing as a major industry for household and military necessities, and forceful installation of Roman values through epistemicide led to the almost total erasure of opaque red glass working and its application to a wide range of metal objects.

[320] As already mentioned, archaeological evidence for enamel working at the archaeological site of Mont Beuvray, both an Iron Age and Roman period settlement, cannot be precisely dated to the end of the Iron Age or the early Roman period. It is possible that enameling occurred on site until sometime in the mid-1st c. CE.
[321] Lemke 1998: 270-271

There is little to no information regarding how glassblowing was introduced to the Three Gauls, yet evidence suggests that production of blown vessels, in particular ones with mold-blown relief, increased in the Claudian period.[322] This correlates with the suggested timeframe for the production of opaque red glass mold-blown bowls found across the empire, including the Three Gauls. As mentioned earlier in this chapter, it is suggested that glassblowing spread to Italy through the migration of glass workers from the Syro-Palestine coast after Roman conquest of this region. Similar migrations to the *coloniae* and *civitates* of the Three Gauls by independent glassmakers is possible, and local glassworkers could have learned this new technology as apprentices to masters. Glassblowing may have also been introduced during military occupation periods in the Three Gauls, of which there were quite a few in the early 1st c. CE.[323] Regardless of how this new technology and techniques of production were introduced, the result was a new tradition of manufacture and object types. It also led to the destruction of a longstanding artisanal practice, as glass working became a practice for vessel production rather than metal objects. Through a brief revaluation of the significance of glass in northern Gaul due to the introduction of new glass object types, ingot colors, and technologies and techniques of production, objects such as glass vessels and stirring rods were produced locally and sold at local markets. Opaque red glass vessels and stirring rods were more difficult to produce due to the temperamental nature of the copper within the glass, particularly its reaction to oxygen which changed the color of the glass to black, green, or blue. Through the introduction of recycling, a preference for clear glasses across the empire, and due to difficulties in maintaining the color, blowing opaque red glass fell to the wayside. Meanwhile, the artisans who had once produced numerous metal goods decorated with opaque red glass could not continue to produce objects which had lost their

[322] Leblond 2017: 29-30
[323] Woolf 1998: 32

significance and became a relic of a bygone era eliminated through the colonization and suppression of the Iron Age populations.

There are, however, some objects which suggest the practice did not disappear entirely from the continent. Fibulae found in at Vergillum and Villiers-de-Luc in Burgundy, dating to somewhere between the 1st c. CE and 3rd c. CE, may be an indication of fringe artisans who continued to produce small numbers of objects using traditional methods of manufacture. The lack of enameled goods which can be securely dated to the post-Roman invasion period, though, make it difficult to determine if enameling does have a place amongst some local populations, such as women who continued to need fibulae to hold their clothing in place. The return of enameled metalworks to the northwestern continental provinces in the 2nd and 3rd c. CE may add credence to this hypothesis, but it might have also been the migration of fringe artists in Roman Britain to the Three Gauls who reintroduced the practice – in new styles and in polychromy – to the regions. If some artisans continued to produce enameled fibulae, then this may be an act of resistance by a certain subset of the Gallo-Roman population who feared the disappearance of their traditional practices and messages. If enameling was reintroduced by artisans from Britain, then this is a striking indicator of epistemicide within the artisan class.

5.10 Finishing Touches: Some Final Notes

Through Roman conquest and epistemicide, a new class of aristocrats rose to power in temperate continental Europe. Violent suppression and reorganization of the northwestern parts of the empire created a new elite body which could only survive and thrive under Roman rule by abandoning traditional value systems and social networks. By adopting and participating in

Roman social values, such as *humanitas*, elites who survived the conquest, along with their descendants, gained citizenship, offices, and wealth. The adoption and adaptation of Roman systems of culture, value, power, economy, and religion was both ephemeral and tactile as these replaced indigenous systems.

Personal and portable objects in the Iron Age, such as horse harnesses, chariot decorations, torques, and women's belts were no longer acceptable for elite classes as their values were forced to shift from emphasizing military power and indigenous knowledge systems to Roman concepts of political and religious power once military control was ceded to the Roman state. A short period existed where embedded crafts and materials such as opaque red glass were repurposed to create molded monochrome bowls, yet the color of glass became less significant than object type and style over time. There is a noticeable trend across the Roman West toward clearer-colored glasses, which were easier to recycle in large batches and were valued due to their clear and crystalline state.[324] Simultaneously, opaque red glass was slowly replaced by red-brown glass favored by Romans across the empire. Opaque red glass in monochrome for decorating metal objects disappears from local systems due to Roman control over primary glass production centers across the Mediterranean basin in the first two centuries CE.

A fascinating amalgam of tradition, adoption, and innovation lies in the production of glass in Roman Britain which is not visible to us in the archaeological record of the continent. Metal objects such as horse fittings and brooches continue to be decorated with red glass after the Roman conquest. New colors and object types are added to the artistic repertoire of

[324] Jackson 2005; Price and Cottam 1998; Bamford 1977; Bimson and Freestone 1988

craftworkers, and the red-brown glass popular amongst the Romans is also used in the production of these goods. The next chapter will explore enamel arts in the Britain and the local values and networks which differentiated the region from continental Europe, leading to a new tradition of manufacture created through the crossover of local practices and Roman innovations.

Chapter 6

Integrating Identities: Opaque Red Glass in Pre-Roman Iron Age and Roman Britain

6.1 Introduction

In the previous chapter, I argued that both the destruction of local and shared systems of value, symbols, identity, and power, and the introduction of new systems and technologies brought into the Three Gauls by Roman colonists and imperialism led to the devaluation of Iron Age personal and portable opaque red glass-decorated metal objects. Continental elites who had instigated production of such objects had no choice but to adopt Roman customs, values, and symbols to maintain wealth, power, and prestige. Their political and religious affiliation to the Roman state and imperial cult gained them favor and safety while Late Iron Age displays of wealth related to gift-giving, feasting, and raiding would be scorned as un-Roman practices. In the early Roman imperial period, opaque red glass was used in the creation of mosaics, polychrome mosaic bowls, and small mold-blown bowls and stirring rods that have been found in various contexts across the Roman west. Iron Age metalwork with opaque red glass decoration, meanwhile, mostly disappeared from the archaeological record of the continent in the 1st c. CE.

There are a few fibulae, such as those discovered during excavations of *Vertillum*, Verault, Côte-d'Or in the northeast, assigned dates which range from the 1st to 3rd c. CE due to the use of stylistic dating techniques, which suggest the existence of fringe artisans who continued to produce enameled metal objects which were not of an Iron Age style or typology.[325]

[325] Exner 1939: 39 suggests gaps in the production of enameled brooches from the end of the Iron Age to the beginning of the 2nd c. CE. This source seems to be followed by most scholars. Also interesting to consider are enameled grooming instruments found in Germany, which date to the Augustan or Tiberian period and are not found

Scholars date the re-introduction and production of polychrome enameled fibulae in various combinations of red, yellow, blue, white, and green in northern continental Europe to the 2nd c. CE, though these conform to Roman fibulae typologies.

By contrast, this tradition of metalwork – applying opaque glass to portable metal objects meant for personal display – has no break in Britain from its introduction in the 1st c. BCE until the Middle Ages. Production of metalwork decorated with opaque red glass does evolve, however; there is no straight line from one period to another. The objects produced are variable, from the types of metal goods decorated to the color combinations of glass, but opaque red remains the most popular color. Combinations of indigenous and Roman symbols and images, polychrome color palettes, various sizes and shapes, can be found in Britain and – by the second century CE – along the frontiers of the empire. In this chapter, I argue that opaque red glass retained its value in Britain after the Roman invasion because of its location as a frontier zone, both physically speaking and in the worldview and mindset of indigenous peoples and military personnel stationed there. Objects enameled with opaque red glass, and other glass colors, were worn by multiple social classes as artisans modified personal objects which were a significant part of the costume of local peoples and military personnel (and their horses), such as brooches and horse harnesses, to incorporate Roman ideas and styles into insular traditions of manufacture. The epistemicide of Iron Age symbols of religion, power, and communal connections that were demonstrated through the consumption and deposition of glass-decorated metalworks in the northwestern continental provinces is not present, though there are significant changes in the use of opaque red glass in object production.

---

after this period. The probability that the technique of decorating metalworks with opaque red glass has a longer production period on the continent than assumed – at least into the Tiberian period – will be addressed in Chapter 7 on scientific approaches to glass studies and dating.

I begin this chapter with a section on the socio-cultural context of the Late Iron Age in Britain, addressing differences in populations and exploring the complicated relationships of the southeast kingdoms with Gaul and Rome. The next section will address the various forms of glass working, in particular developments from the Claudian invasion to the end of the century, before focusing solely on opaque red glass. I compare the value and networks created, maintained, broken, and reworked across these two centuries, and the Iron Age traditions of manufacture maintained by fringe artisans specializing in enameling before addressing my conclusions.

6.2 Cultural Contexts and Social Situations: Pre-Roman and Roman Britain

As discussed in the introduction of this dissertation, leadership in southern Britian and continental temperate Europe during the Iron Age was varied and regional in nature. Kings, chieftains, war leaders appointed by such persons during periods of alliance between tribal federations, and spiritual leaders such as druids were members of the ruling classes with varying levels of power.[326] Material culture reflects this regionalism, as there are shared practices and object types across Iron Age temperate Europe which were consumed and deposited in different quantities in the archaeological record. When analyzed with attention to regional lenses rather than "big picture" and "top-down" approaches, there is a mix of cultures, adoption, and adaptation in Britain.

[326] Mattingly 2006: 43-50

In considering the period up to the Claudian invasion of 43 CE, a few general statements can be made based on the works of Mattingly, Creighton, and other specialists in the field:[327]

1. There is an uneven distribution of continental and Roman goods in the Late Iron Age and Pre-Roman Iron Age, which suggests differential contact and levels of control levels, vis à vis the movement of goods. This is true, in particular, when comparing archaeological material found in southeastern England to other areas of southern Britain.
2. In the southeast, kingdoms appeared in the 2nd c. BCE. These kingdoms grew and maintained strong ties with Rome after the invasion of Julius Caesar, presumably becoming client kingdoms. Children of client kings were brought to Rome for long periods of time, taught Roman culture, and brought Roman material culture, ideas, and practices back to the client kingdoms.[328]
3. Power was redefined and asserted in various, locally-specific ways which may or may not have been affected by leaders' experiences with each other in southern Britain and/or with elite peoples geographically further afield, such as individuals in northwestern Gaul and Rome.
4. Indigenous "Celtic-style" art flowered in the 1st c. BCE and motifs that went out of fashion in southern England in previous centuries, such as compass decoration, were rediscovered and incorporated into metalworks.

The four statements above demonstrate differential access and variability in local practices and cultures in relation to levels of contact with Rome in the late Republic and Principate. Connecting them geographically is the general increase in indigenous-style metalworks for

[327] Garrow and Gosden 2012; Mattingly 2006; Creighton 2000; Champion 2016; Megaw and Megaw 1989
[328] Creighton 2000

personal display and ornament in the archaeological record of the 1st c. BCE and 1st c. CE.[329] Though Hunter once argued that the threat of Rome stimulated desire for visual symbols in societies under the threat of conquest,[330] hoard evidence suggests that much of late Iron Age art was associated with Roman items and that production continued well into the early empire.[331]

Personal ornaments such as fibulae, weaponry, horse gear, and neck and arm ornaments varied depending on regional desires; some objects, such as brooches, often followed indigenous styles of art while beaded torques were an indigenous form with Roman styles and technologies of production.[332] These styles of goods are often found in or near military spaces, which were composed of Roman legionary soldiers from Rome and Italy and auxiliaries units raised from the local population of Britian, Upper and Lower Germany, the Gallic provinces, Spain, Thrace, Syria, Africa, Pannonia, Dacia, Dalmatia, and Raetia.[333] Military personnel, their wives, and people who lived around military settlements were a major presence in local markets and the production of goods, with money spent predominately on metalware, jewelry, colored textiles, and glassware.[334] The distribution of some types of elaborate brooches, belt fittings, and fibulae skewed towards military sites, particularly those with indigenous designs, such as fluid and curvilinear motifs inset with colorful opaque red and blue enamels. Military personnel and their families had significant effects on the popularity of these goods; women, in particular, needed multiple brooches in order to wear their everyday clothing such as the Gallic coat and cloak and

[329] Hill 1997
[330] Hunter 2007: 289
[331] Farley and Hunter 2016: 131; Davies and Spratling 1976
[332] Johns 1996: 182-185; Farley and Hunter 2016: 132-134
[333] Irby 1999: 3-4
[334] Mattingly 2006: 211-216

possibly pioneered new styles in the provinces due to their functional needs and personal tastes.[335]

In this section, I have established the local character of Roman Britain so as to provide a backdrop to the material category under scrutiny: opaque red glass. The previous chapter argued that archaeological evidence for the use of opaque red glass in the production of finished goods changed in the late 1st c. BCE and early 1st c. CE with the provincialization of the Three Gauls and the introduction of glassblowing. Based upon this argument, we might expect something similar to have happened in Britain – but the following section will demonstrate that there were industries specifically for metalworks decorated with opaque glasses that continued to thrive after the Roman conquest.

6.3 Glassy and Glamorous: The Glass Industry in Britain

In the Iron Age, glass could be found predominately in the form of beads and as a decorative device on metalwork. According to Willmott, glass bottles in clear blue/green, brownish yellows, bright turquoise, and opaque reds and blues were exported from Rome to client kings in the late Republic and early imperial period.[336] After the conquest and installation of Roman auxiliary units in Britain, glass appears in various forms across the territory – in traditional forms such as beads and bangles, and new object types such as gaming counters, window panes, mosaic *tesserae*, and storage, drinking, and eating vessels. Evidence for glass production in Britain comes commonly in the form of furnace remains, crucibles, and

[335] Mattingly 2006: 209
[336] Willmott 2005: 18

glassblowing waste such as moils.[337] The earliest date for large-scale local glass production in Roman Britain is unknown, though it seems to have begun one or two decades after conquest. While Willmott argues that glass artisans arrived alongside the Roman army and established the industry quickly in the 1st c. CE,[338] Price suggests that glass was not locally produced until after 50-60 CE, based on shop finds at Colchester.[339] It is possible that glass production in Britain was variable and local, since archaeological evidence reveals a close association between military forts and glass production soon after the conquest. While glass artisans were present at most forts early on to lower costs and control supplies to legions, individuals living in or near *coloniae, municipia,* and *civitas*-cities may have had access only to imported goods for the first decade or so.

Mold-blown, free-blown, and slumped glasses are present at sites across Britain by the end of the 1st c. CE. Colors and shapes of vessels change over time, which is also true in the continent; polychrome and vividly colored bowls are rarely found in Britain after the Neronian or early Flavian period (post-70 CE), but were numerous in the early post-conquest period.[340] This trend toward clearer colors of glass in vessel production did not affect glass-decorated metalworking, which seems to have been kept as a separate industry. As previously discussed in the chapter on Iron Age opaque red glass, the term "enamel" is used by glass scholars to address the production of glass-decorated metal objects. This term is complicated and suggests that glass was ground into a powder, moistened, and mixed with an organic binder, but the material also could be roughly cut into small shapes, softened, and pressed into place, a process which Bimson

[337] Willmott 2005: 23
[338] Willmott 2005: 18
[339] Price 2005: 180-181. The glass vessels in *insula XIX* at Colchester were placed above Gaulish Samian (or sigillata) vessels and melted on top of the pottery after a fire. Price suggests that imported pottery and glass vessels were stocked together in shops.
[340] Price and Cottam 2001: 170

believes was the only way to work opaque red glass without altering the color through remelting.[341] Brun and Pernot evinced through SEM-EDS analysis of 40 opaque red glass samples in France that this glass maintained its microstructure regardless of how it was applied.[342] There was variability, however, in the artisans' application of glass, even on the same object. An artisan could use two different techniques for a single object: enameling through the processes described above, and pressing glass into a metal cavity or creating a rivet/stud/stud with small glass pieces melted in place before attaching the rivet/nail/stud to the final product. While "sunken enameling," as Brun and Pernot term "Celtic" or indigenous enameling due to the greater depth of the metal cavities when compared to medieval enameling,[343] was used on some objects, it was not as common as melting broken pieces of glass.[344] However, by the early 1st c. CE in Britain, the main technique for applying opaque glasses to metal objects is correctly termed as champlevé enameling.

6.4 Colorful Costumes and Embellished Elements: Enamel Arts in Roman Britain

Johns argues that the glasses made for enameling were different than those made for glass vessel-making, as opaques were not commonly produced for vessels. There may be exceptions to this rule, since there is evidence for millefiori bowls and opaque blue, green, and red mold-blown bowls dating to the 1st c. CE. Even more compelling evidence is the use of translucent blue in the decoration of a strap fitting from the Westhall Hoard, suggesting that the divide between glass

[341] Bimson 1987: 169
[342] Brun and Pernot 1992
[343] Enameled metals found in the Middle Ages and forward have shallow cavities for enamel application, while in the Iron Age tradition the cavities are far deeper and create a different effect.
[344] By the 1st c. BCE, the technique of enameling was mastered in Celtic regions of the continent and was the most common practice.

working in translucent blue-green glasses and enameling in opaques was not an impermeable wall (Figure 24). Therefore, I do not believe that we can categorize "glasses for enamel" and "glasses for vessel-making" separately in this way; instead, glasses which were translucent in color were chosen for vessel-making by the 2nd century CE while opaque glasses with different formulas were originally chosen for enamelworks and were in use continuously, and some artisans chose to experiment with glasses not traditionally used for enameling metals.



Figure 24 Strap fitting with opaque red, opaque white, and translucent blue glass decoration, from the Westhall Hoard, Suffolk, England. British Museum. Accession number 1855,0519.10. Photo by Rachel Wood. © The Trustees of the British Museum.

Champlevé enameling as a technique used by artisans who created glass-decorated metalworks in Roman Britain, particularly those which were made of copper-alloy, also needs to be addressed. Johns suggests that enamel in red, blue, and white was applied in the form of frit or as a paste made with ground glass, pressed into the hollows or cavities prepared on the bronze

item before heated to 650-750 degrees Celsius to soften the glass until it flooded the area and attached itself to the metal surface.[345] By the 1st c. BCE, the technique of enameling had been mastered by Iron Age artisans both in southern Britain and the continent, and the practice continued in Britain without interruption based on archaeological evidence.

There are no Romano-British workshops where evidence of enameling can be positively identified, as there are no traces of enamel on crucibles.[346] Pieces of opaque red glass, the most common color used for enameling, have been found in workshops in such as Heybridge in Essex, Castleford in Yorkshire, Fish Street Hill in London, and Tara Hill in Ireland. All pieces of opaque red glass have similar compositions, suggesting a common source for the original glass ingot.[347] Based upon the evidence presented by archaeological excavation, there is no definitive proof that enamellers owned fixed workshop spaces or were itinerant craftspeople. Their technical skills, however, connect them to another industry which was often connected to itineracy: bronze casting.

As both enameling and casting required similar technical skills such as manual dexterity and high temperature work to create a specific type and style of good, the two industries were deeply entwined in the production of indigenous objects.[348] Hunter argued for three styles of Romano-British art based on their production technique and artistic style:[349]

1. "Frontier art," found in the zone north of the Humber and south of the Forth. Metal objects are decorated with polychrome enamel and do not have a three-dimensional

[345] Johns 1996: 199
[346] Bayley 2005: 184
[347] Bayley 2005: 185
[348] Bayley 2005: 187
[349] Hunter 2008

character, as seen in earlier periods of indigenous art. These objects are made from cast metals.

2. Boss styles, which exist in other places outside of the northern fort areas of Britain. Boss art is decorated with opaque red glass and is made from cast metals.
3. A wide variety of art with sinuous floral trumpets, berried rosettes, swash-N motifs, broken-back scrolls, and die stamping. These styles decorate sheet metal.

In the earlier Iron Age, a distinction between the decoration of cast metals and sheet metals was also visible, wherein sheet metals were not decorated with enamel. "Frontier art" marked the fusion of local and new traditions of decoration into a stylistically identifiable and relatively datable typology. The decoration of cast metal and sheet metal objects may take different paths, but these object types – and the enamel decorations on the cast metal types, in particular – are the epitome of local variability seen in other aspects of Romano-British lifeways. The use of glass as a decorative material for personal and portable cast metalworks of the Iron Age and Roman periods of Britain – showing no break in production post-conquest, but rather a mix of tradition and invention – suggests certain local attachments to Iron Age styles and opaque red glass, which cannot be overlooked.

In Table 3, there are fifteen objects that belong to six categories of horse harness or equipment types: mounts, studs, strap fittings, terrets, linch pins, and strap unions.

Table 3 Objects studied at the British Museum.

OBJECT TYPE	**FIND LOCATION**	**OBJECT NUMBER(s)**	**COUNTY, COUNTRY**	**DATE**
Mount	Farnsfield (?)	2008,8026.1	Nottingham, England	50 BCE – 75 CE

Studs (7)	Hertford Heath	1958,0704.73 1958,0704.77 1958,0704.79 1958,0704.76 1958,0704.80 1958,0704.75 1958,0704.82	Hertfordshire, England	30 – 15 BCE
Strap fitting	Westhall	1855,0519.9	Suffolk, England	1 – 150 CE
Terret	Westhall	1855,0519.1	Suffolk, England	1 – 150 CE
Linch pin	Kings Langley	1940,0203.1	Somerset, England	1 – 100 CE
Strap fitting	Westhall	1855,0519.10	Suffolk, England	50 – 150 CE
Strap union	Canterbury	1876,0707.4	Kent, England	50 – 150 CE
Strap union	Polden Hill	1889,0706.77	Somerset, England	50 – 150 CE
Mount	Polden Hill	1889,0706.78	Somerset, England	50 – 150 CE

The mount from Farnsfield (Figure 25) cannot be dated accurately to either the pre-Roman Iron Age or post-Roman invasion; the strap-fitting and terret from Westhall (Figures 26 and 27), along with the linch pin from Kings Langley (Figure 28), also date somewhere between the periods and up to 150 CE. Four other objects – a strap fitting from Westhall (Figure 26), a strap union from Canterbury (Figure 29), and a strap union and mount from Polden Hill (Figures 30 and 31) – date post-Claudian invasion, 50 CE to 150 CE. All of these objects are decorated with opaque red glass applied in curvilinear designs, with limited use of blue and white opaque glasses as circular or dot-like accents in the strap-fitting from the Westhall Hoard (Figure 26). Another type of horse equipment called the button-and-loop fastener, however, complicates a possible argument for the preference of red over blue in horse equipment. When enameled with a single color, button-and-loop fasteners appear decorated with blue; if two colors were applied, then red and blue appeared in combination frequently.[350] Geography might complicate this

[350] Bateson 1981: 47

matter further, as the button-and-loop fasteners discussed by Bateson were found commonly in northern England, while objects in Table 3 were discovered in the south. None of these objects can be dated far into the 2nd c. CE; perhaps the artisans are following different traditions of enameling or the objects are not dated well enough to determine a trend in color over time.



Figure 25 Copper alloy mount with opaque red glass, from Farnsfield, Nottinghamshire, England. British Museum. Accession number 2008,8026.1. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 26 Copper alloy strap-fitting decorated with opaque red, blue, and white enamels, from the Westhall Hoard, Suffolk, England. British Museum accession number 1855,0519.9. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 27 Copper alloy terret decorated with opaque red, blue, and white enamels, from Westhall Hoard, Suffolk, England. British Museum accession number 1855,0519.1. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 28 Copper alloy linch pin decorated with opaque red glass, from Kings Langley, Hertfordshire, England. British Museum accession number 1940,0203.1. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 29 Copper alloy strap union decorated with opaque red glass, from Canterbury, Kent, England. British Museum accession number 1876,0707.4. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 30 Copper alloy strap union decorated with opaque red glass, from Polden Hill, Somerset, England. British Museum accession number 1889,0706.77. Photo by Rachel Wood. © The Trustees of the British Museum.



Figure 31 Copper alloy mount decorated with opaque red glass, from Polden Hill, Somerset, England. British Museum accession number 1899,0706.78. Photo by Rachel Wood. © The Trustees of the British Museum.

A more in-depth study of other objects decorated with a combination of colored enamels may provide insight into this phenomenon. In other enameled metals, opaque red glass appears in combination with blue – either the two colors share the space equally or, in many cases, red is the accent color to a dominant opaque blue glass background. Bateson's study of seal-boxes, miniature stools, vessels, circular mounts (a circular plate with a single rivet or stud at the center or back), and miscellaneous studs and mounts (no means of support visible upon inspection) shows that they are predominately decorated with blue glass; red can be present, but it is not the main color; these objects date variously to the late 1st c. CE to the 4th c. CE. The preference for blue glass in these objects shares similarity with brooches. Following the arguments of Bateson, Johns, Hunter, and McIntosh,[351] there are groups of enameled brooches worn by any gender and produced in Roman Britain, many of which are influenced by indigenous art traditions:

1. Bow brooches: various typologies exist, such as the Nauheim derivates, Aucissa, Hod Hill, Colchester, Aesica, headstud, trumpet, and waist molding types. Various parts of these brooches were enameled. The pin could hold a substantial fold of fabric in place.
2. Penannular brooches: various typologies exist based on the terminals, such as bulbous, rolled, flattened, and animal-head types. These are sometimes inlaid with enamel. The pin could hold a substantial fold of fabric in place.
3. Plate brooches: Most of these brooches were decorative in nature rather than functional, as the space between the plate and the pin was too close to hold much more than a very thin fabric in place. The dragonesque group, however, could hold a thick piece of fabric in place due to its strongly curved pin.

[351] Bateson 1981; Johns 1996; Hunter 2008; McIntosh 2009

Johns designates the dragonesque as a separate class of pin due to its stylistic and functional abilities, which are not present in the case of other highly decorative plate brooches.[352] The trumpet brooch, the dragonesque (Figure 32), and other plate brooches – though decorated with various animals and objects, such as shoes – do demonstrate attachment to curvilinear scrolled decoration influenced by Iron Age styles. The dragonesque and other plate brooches can be considered hybrids of late Pre-Roman Iron Age and Roman styles, though the dragonesque in particular is a brooch influenced by earlier S-shaped brooches but an entirely new form, dating to the latter half of the 1st c. CE and most of the 2nd c. CE.[353] Hunter designates this style of material culture as "frontier art": late Pre-Roman Iron Age production techniques and styles persisted in the areas around and north of Hadrian's Wall and to the west in Ireland. Continued production of familiar goods using longstanding production practices in the frontier zones coupled with active trade routes north of the Roman *limes* made it possible for artisans in the Roman provinces or trading with it to evade the pressures that impacted this traditional art on the continent.

[352] Johns 1996: 151
[353] Bateson 1981: 35



Figure 32 Copper alloy dragonesque brooch decorated with opaque red and blue enamels, from the British Isles. British Museum accession number POA.201. © The Trustees of the British Museum.

Fraser bases his argument on Johns' analysis of objects such as brooches, horse equipment, weaponry, and feasting paraphernalia decorated in traditional late Pre-Roman Iron Age styles. Johns argues that these Roman-period objects belong to a longstanding artistic practice because these types continue to be needed by locals and military personnel.[354] She also suggests that objects such as rings and necklaces – often made from gold – fall under the purview of goldsmiths who work for the wealthiest people in society, and the goldsmiths of the late 1st c. BCE and early 1st c. CE in Britain would have needed to adapt quickly to Roman techniques of production in order to survive while bronzeworkers who produced brooches, for example, could continue to use their same skillset. Her argument will be addressed further in a later section on traditions of manufacture.

[354] Johns 1996: 184

In this section, I have demonstrated that stylistic dating suggests the continued use of opaque red glass in the production of enameled objects from the Iron Age into the Roman period. Opaque red glass is used more sparingly in the production of objects such as brooches, seal-boxes, and studs found across Roman Britain, either sharing the spotlight or taking a "backseat" to opaque blue. The proposed dates for horse equipment complicates this trend, as objects found in southern Roman Britain and dating to the 1st to mid-2nd c. CE are decorated predominately with opaque red glass while the button-and-loop fasteners found in the northern Roman Britain are decorated with opaque blue glass. The relationships between artisans, consumers, and objects are complex, yet I would argue that blue becomes the preferred main color of decoration as local traditional associations with red – the connection to horse warriors and leaders of the Iron Age and their ties to local and northwestern continental populations – shifted with changes in religion, society, politics, and culture in the northwestern area of the empire.[355]

6.5 Verifying Value and Navigating Networks in "The Final Frontier"

The populations of Britain and the continent were in contact with each other and shared similarities in material culture and social structure. Insular-style art developed in the 1st c. BCE while styles from the continent, which had once influenced artisans in southern Britain, were less preferred after the Roman conquest of the Three Gauls. Through its contacts with northwestern Gaul and the establishment of client kingdoms in southeast Britain, indirect trade occurred with the Mediterranean world and ideas, materials, styles, and objects were adopted and adapted into

[355] Blue glass is used in the production of beads which are commonly found as deposits in female graves from the Bronze Age forward. The significance of the color blue to indigenous populations of Britain needs to be studied further, as beads and body paint (perhaps woad) are simply two examples of its appearance in the archaeological record and texts, respectively.

local customs and traditions. After the conquest of Britain by Claudius, then the suppression of the Boudican revolts by Nero, military presence increased substantially, and Roman institutions slowly crept into the lifeways of city-goers over the course of the next 40 years. The political structure and landscape of Roman Britain differed from most of the northwestern continental zone under study, as a standing army was present throughout its duration as a Roman province and the military played a significant role in local control.[356] Though soldiers would have been visible building structures, making roads, and protecting trade caravans and boats, their physical presence was not structural – scattered forts and their *vici* would have been visible across the landscape in the 1st c. CE and into the 2nd c. CE. The territory was also further away from Rome, and any contact between the continent/Rome, the standing army, and local institutions required the right weather conditions – travel was seasonal. Though military personnel moved in and out of this frontier region, we cannot be sure how common it was to find non-locals – or individuals who were not from the northwestern provinces – as permanent residents of the territory.

I argue that people living in Roman Britain – non-military and military personnel from Britain and northwestern continental provinces – retained interest in indigenous art styles and opaque red glass as a decorative element on metalworks due to the province's unique position on the edges of the Roman Empire. Furthermore, a group of fringe artisans – bronzeworkers who were also enamellers – maintained their practice and extended their local networks to the non-elite social classes as: 1) the materials necessary for enameling entered Britain in greater quantities at cheaper prices due to increased trade contact with the Mediterranean, where glass was made; 2) certain goods, such as brooches, continued to be a significant part of everyone's

[356] Studies on production and trade in the Rhineland on the Upper Germanic-Rhaetian *limes* may present similar trends in Iron Age traditional metal arts and styles into the Roman period on both sides of the *limes*, though this topic is outside the scope of the current study.

costume and different styles became markers of specific populations; and 3) the local elites instead demonstrated their wealth through gold and silver objects in Roman styles and types, which were rarely enameled due to technical difficulties. I will support this argument and the above statements as I address them through the lenses of value theory (following Crook's definitions[357]), Actor Network Theory (influenced predominately by Latour and van Oyen[358]), and traditions of manufacture (borrowed from Lemke[359]).

6.6 Variances in Valuation Amongst Elites

In the first section of this chapter, I presented evidence for the strong military character of Roman Britain in all periods. The client kingdoms of southeast England and local forms of control across the rest of Britain fell under the control of a Roman military commander, then a provincial governor who relied upon military personnel. Roman Britain had a larger standing military than any other province when compared to the size of the territory, which influenced goods traded into and produced in the province.[360] The archaeological record demonstrates differences between the material records of the rural settlements and the urban centers (*coloniae, municipia,* and *civitas*-capitals), where there are more local and indigenous goods and architecture in rural areas.[361] Even the urban centers, however, developed more slowly than perhaps might have been expected; forum-basilica complexes, which represented and established symbols of Roman *imperium* in colonized lands, were not built in stone until the mid-2nd c.

[357] Crook 2019
[358] Latour 2005; van Oyen 2013
[359] Lemke 1998
[360] Mattingly 2006
[361] Wallace 2016

CE.[362] It is probable that these structures would have been funded by the Roman state in the *coloniae*, while stone architecture had to be funded by local elites in lower-level urban centers, meaning change was slower in *civitas*-capitals and *municipia*.[363] Overall, the archaeological evidence paints a picture of a landscape – social, political, and religious – which was not uniform and was influenced by local tastes, traditions, and symbolism. Individuals in positions of power may have incorporated Roman ideas, styles, and practices into their daily lives, but the position of Roman Britain as a frontier province separated by the Channel (traveled, but not mastered as the Mediterranean had been) created complex elite, military, and non-elite citizen cultures.

Elites in Roman Britain did not practice enduring forms of euergetism (e.g., stone working) to maintain wealth and power, or to demonstrate their support for the Roman state; instead, we see power maintained through local traditions of symbolism and display practices. Many elites may have entered the army and, as military personnel, displayed their prowess, wealth, power, and significance through practices related to the horse – a tradition from earlier periods. The increase in brooches – in types and numbers – across Britain in the 1st c. CE relates to this broadly painted picture, though the evidence is present for multiple social classes as artisans produced enameled brooches in styles tailored for local tastes.

Johns suggests that gold became the main metal to demonstrate connections between elites, both Roman and Romano-British, which aligns favorably with Creighton's arguments on the significance of gold to elites of the client kingdoms. As gold continued to be a symbol of elites and connections to Rome, gold artisans in southern England adapted quickly to the new customer base and their demands.[364] The Roman influences on gold jewelry such as rings and

[362] Gardner 2016
[363] Rogers 2016
[364] Johns 1996: 184-185

necklaces (and the disappearance of the torque and arm rings, sometimes produced in gold in the Iron Age) encouraged goldsmiths to produce jewelry in one way, while the necessity of other objects (with familiar forms) for most populations allowed increased space for creativity and hybridity of styles.

Enameled objects – usually produced in copper alloys – connected people in the province (and other northwestern provinces) to each other, rather than to the Roman state. Brooches were products necessary for everyone, but multiple classes gained access to enameled goods as perhaps the measure value decreased from Iron Age to Roman period, while the moral and esteem values imbued in these objects by artisans and consumers became symbolic of diverse frontier societies. The following sections will break down two main categories of objects – brooches and horse harness equipment – in relation to moral, esteem, and measure values as outlined by Crook.[365] I will consider both elites and non-elites, since enameled brooches no longer were only part of the elite costume.

6.6.1 The Moral Value of Opaque Red Glass in the Romao-British System

When determining the moral value of opaque red glass in Roman Britain, the morals of individuals in contact with the material is of concern – we are attempting to understand how people communicated their responsibilities to others through costume, elements of which could be used to garner and demonstrate respect. There are subsets of individuals to consider, including military personnel and non-military locals of various genders, in relation to two main sets of material culture: horse equipment and brooches. The owners of these objects overlap since

[365] Crook 2019

military personnel who were equestrians decorated their horses in parade gear which borrowed from earlier Iron Age styles, and these individuals wore heavy cloaks which required a brooch (often a hybrid of Iron Age and Roman styles) to hold the fabrics in place. All of these pieces drew the eye of a viewer to the object and body which was adorned, catching attention more dramatically than an undecorated or incised object.

There was a longstanding respect for horses and horse equipment in Britain before the installation of the Roman military, forts, and roadways. As discussed in this chapter and Chapter 4, horses were a symbol of the power and authority of warrior elites in the Iron Age. Across the Roman Empire, cavalry units continued to be a major part of the military. Finds of horse trappings in Roman Britain, usually discovered at military sites or nearby hoards, suggests that the horse and rider were still a notable and symbolic presence. Significant aspects changed, however, as the horse and rider became representative of Roman imperial control and protection from northern, unconquered forces through the power and efficiency of frontier cavalry units from southern England and beyond.

Enameled horse equipment would have been worn by horses during ceremonial displays, such as parades.[366] The horse gear from the Polden Hill (Somerset) and Westhall (Suffolk) hoards dating c. 50-150 CE was discovered in southwest and southeast England, respectively, and was predominately decorated with opaque red glass, which contrasts with the opaque blue glass button-and-loop fasteners predominately found in northern areas of England in the Roman period. Due to the difficulty in dating these objects, many of which were recovered without archaeological contexts, I cannot say with confidence that opaque red glass held the same moral

[366] Mattingly 2006: 166

values of earlier periods when used in horse equipment. There is a tradition, however, that continues to influence the practice of enameling and the use of red – as either the main block of color, sharing color dominance with a second color, or as a minute decoration. Opaque red glass remained a visual symbol of power, though its application varied depending upon the artisan and the desire of their clientele. The Polden Hill and Westhall gear, if ever worn in public or meant to be worn in parades, would have been a statement of power and authority which drew upon earlier recognizable traditions.

As mentioned previously, there is a general shift in color preferences to blue across all enameled object types, such as brooches. The dragonesque brooch, which appears most commonly at military sites in the north, was a marker of the wearer's military connection based upon the shape itself – a symbol of power which garnered the respect of others in and of itself, these brooches acted as visual symbols of differentiation between military and citizen. The enameled dragonesque brooches could be worn by a number of individuals with military connections who did not have to be native to Roman Britain; perhaps anyone who served time in the north would purchase a brooch in remembrance of their service at the northwesternmost edge of the empire. As these individuals traveled by foot – or, perhaps, by horse richly decorated in enameled gear – the vibrant and contrasting reds and blues drew the eyes of onlookers and communicated their military responsibilities garnering their respect.

Other enameled brooches found in settlements in Roman Britain present a mix of Roman and indigenous styles, and also represent a frontier society. There is also a purposeful connection to the past through the use of enameling on these brooches. As these objects became more accessible to local populations, these brooches took on new meanings: as gifts from father or mother to daughter, or from husband to wife, or vice versa. Penannular brooches and bow

brooches of all types held clothing in place as needed and demonstrated care, respect, and connections to the local community while the plate brooches were statement pieces (symbolic in nature) due to their lack of functionality. The moral value of opaque red glass in these objects could reflect personal and community responsibilities, but I would argue that esteem and measure values were more often communicated and read into the pieces.

6.6.2 The Esteem Value of Opaque Red Glass in the Romano-British System

An object's desirability within its social system, and the respect and admiration an individual gains from possessing certain objects, is esteem value. Based on the sheer number of enameled brooches, we can determine there was an extensive market across Roman Britain for these products. While some objects, such as dragonesque brooches and horse harness equipment, were desired predominately by military personnel and their networks, many others were spread across settlements in Roman Britain. Opaque red glass continued to be desirable, along with other colors such as opaque blue, to populations who wished to purchase decorative and/or functional objects for costume.

As discussed in the moral value section, enameled objects garnered respect and admiration from viewers. A cavalry officer who adorned his horse with opaque red or polychrome enamel (with red as an included color) chose to do so in order to draw the attention of others. These large pieces of harness equipment were functional, but the primary purpose was to draw the eye – as all these objects were meant to do with their vibrant tones. Polychromy would attract more attention, as the viewer was enchanted by the metal design and the patterns enhanced by different colors of glass. A visual sign of accessibility, opaque red and other glasses

added a visual reminder of a person's ability to spend extra money on decoration for objects which were, first and foremost, meant to be functional.

It is possible that opaque red glass became an accessory to opaque blue across most of Roman Britain because the value systems of local populations changed with their social system, and opaque red lost its broader associations with warriors and their entourage. Roman auxiliary units gained a new, shared identity across the northwestern provinces – not everyone maintained their connection to Iron Age values associated with red, or perhaps some culture groups never had the symbolic connections embedded in their metalworking practices to begin with. Instead, blue may have represented crossings and connections across seas and under skies regardless of cultural and geographic differences. Perhaps this also connected to the measure value of the glass and object combined, as options and availability increased under Roman control.

6.6.3 The Measure Value of Opaque Red Glass in the Romao-British System

Measure value is the monetary value of a material or object. Coinage was used for most market transactions in the Roman period, though we do not have any record of prices for enameled objects from the provinces. However, the number of enameled metal objects increased by thousands from the Iron Age to the Roman period, mostly in the form of brooches, based upon data gathered by Bateson and McIntosh.[367] Based on the increase in numbers of enameled objects, it is possible that this decorative technique became more accessible to multiple populations in the Roman period due to increased supplies. Bronze artisans who specialized in enameling may have been able to increase their supplies, as their work no longer fell under the

[367] Bateson 1981; McIntosh: 2009

purview and control of a specific and smaller subset of the population – warrior classes of the later Iron Age – and more supplies entered southern England with larger Roman trading vessels.

Nevertheless, enameled goods would have been more costly than simpler horse harness equipment and brooches made of copper alloy or iron. The market value of these goods was higher than ones sharing similar shapes and base metals. To build upon the monetary cost further, opaque red glass was an expensive material to work due to its temperament – under the wrong conditions, oxygenation could change the color to dark blue-green or deep green. Working with smaller quantities of this glass saved costs to the business even if the enameller continued to use opaque red as an addition to other colors on brooches. The quantity of their material in the early Roman period instead went to the production of horse harness equipment, which maintained connection to Iron Age stylistic traditions and was commissioned by a specific subset of the overall population. Overall, the enamellers' working costs decreased as their compensation increased by increasing the number of enameled objects while limiting the use of opaque red.

6.7 Changed Systems, Changed Values, Changed Networks

Although local populations adjusted their value systems and networks to fit new socio-political expectations under the Roman Empire, there is evidence for the continued presence of certain ideals, traditions, techniques, and styles. Opaque red glass continued to enter southern England from the continent through Roman networks, though the types of objects decorated with opaque red glass decreased. A limited set of enameled object types were produced in the late 1st and early 2nd c. CE, predominately cast copper alloys as seen in the Iron Age. The once

predominant presence of red dwindled, sharing space with blue or becoming included as minute decoration to an opaque blue base enamel. The warrior society of the later Iron Age and the client kingdoms of the southeast were replaced first by the dominating presence of the Roman army, then slowly came under the power of a governor who was closely connected to and relied upon military units for power and control.

Blue and red became the dominant colors symbolizing the peoples who lived in the northwestern edges of the empire and represented their connections to each other across Roman Britain – the networks between soldiers and their various relations, and those between non-military citizens. Opaque red glass enameling – and other colors included over time – on personal and portable objects continued to mark relationships between locals and acted as a clear visual symbol of their personal and social values (power, wealth, access) within the system under which they fell.

6.8 Mixed Materials: Hybrid Objects and Traditions of Manufacture

Unlike the evidence which has been presented and recorded by archaeologists and art historians on The Three Gauls, there is no significant break in the traditions of manufacture of enameled personal and portable objects in Roman Britain. As a reminder, Lemke defines a tradition of manufacture as a social institution that regulates variation in the production of goods made within a specific social context, including knowledge of recipes, furnace conditions, and melt times to produce certain finished products.[368] I feel it is significant to specify that some aspects of the traditions of manufacture present in Iron Age southern Britain *did* change during

[368] Lemke1998: 270

the later Iron Age, as coral then opaque red glass were added to the decorative repertoire of arms, armament, and jewelry, and again as gold entered the southeast client kingdoms.

Lemke argues that a tradition of manufacture will only survive if it is continuously practiced within the same social context – technologies cannot change, access to resources must be maintained, and ideals of consumption and object use and maintenance must be followed by the local peoples.[369] When Johns argued that bronzeworkers who produced brooches continued to use their same skillset – including the materials, technical know-how, and technologies necessary for enameling – this was a statement on the continuation of a tradition of manufacture from the Iron Age into the Roman period.[370] I take this argument a step further and suggest that the artisans continuing to produce enamelwork were part of a fringe group. These individuals had access to the trade of glasses which could be used for enameling – in particular, glasses that fall under the category of opaques and are best for enameling because the color would not be affected by the metal to which the glasses was applied – and they continued to practice and pass on their knowledge to later generations. Though colors may have shifted over time and polychromy may have become the dominant rather than the occasional decorative style, these artisans were combining known practices with new materials to address the increased needs of flourishing and diverse markets.

The artisans could also take advantage of the growing popularity of blue – or, perhaps, these individuals were the instigators for its flourishing in the late 1st c. and 2nd c. CE. Blue glasses were easier to work than opaque reds, and that may be one of the reasons why blue was better for artisans. Traditionally, blue glass was used in the production of beaded necklaces in

[369] Lemke 1998: 270-271
[370] Johns 1996

combination with white; opaque red was rarely, if ever, used to make beads and was instead a replacement for coral in metalworks. As artisans began to experiment with new styles and materials in the pre-Roman Iron Age and early Roman provincial period, blue glass was used at first sparingly and then predominately in the production of portable and personal metal objects. The two traditions of manufacture – beadmaking and bronze casting – overlapped in the production of horse harness equipment, brooches, and other objects as new styles and materials entered southern England. A major advantage of opaque blue glass rested in its colorants, which would not change color drastically when worked – in contrast, opaque red glass could change color. Changes in the needs of the population, including a rapid growth for demand of enameled products, may have influenced enamellers to rely on more stable colors. This idea needs further research and analysis, however.

6.9 Finishing Touches: Some Final Notes

During the later Iron Age and early Roman provincial period, Britain was socio-culturally and politically complex. Its location across the Channel did not hinder the trade of goods and ideas from the continent (whether from northwestern Gaul or Rome), but the experiences of locals and military personnel reflected the region's designation as a frontier. Roman styles and materials entered southern Britain through client kingships, then the standing military, and finally the governor, his entourage, and the diverse body of veterans who settled across the province. Frontier culture was a mix of the local indigenous populations, non-Roman military personnel and settlers from across the northwestern provinces, and Roman ideals and styles. This combination of people, ideas, imposed expectations, and local traditions was reflected in the rural and urban landscapes and in material culture. The enamel artisans Britain relied upon a mix

of traditional practices and new ideas introduced through Roman-style goods to produce glass-decorated cast metal objects consumed by a large percentage of the population, especially when compared to earlier periods.

The needs of the population changed in the Roman period, but we still see a connection to traditional artistic styles and object types. Artisans did not exist within a vacuum, but their tradition of manufacture did not disappear after the conquest. The value of opaque red glass shifted over time as other colors, such as blue, were chosen as the main color – this is a change which must be part of a larger shift in color preferences. Perhaps this was affected by new cultural associations with the color blue, which no longer belonged to the production of beads but became the most commonly used color for enameled brooches. As accessibility to enameled copper alloy personal objects increased and various populations could purchase such objects – and as enameled brooches, for example, no longer were consumed solely by the warrior class and their closest relations – perhaps blue became the color of a shared frontier identity. Also, blue glass may have been a better color for enamellers to use in the production of larger volumes of goods since it was not as easily affected by oxygen as opaque red. Though its value shifted as the local society changed, opaque red glass never disappeared; during the first 50 to 100 years of Roman control, it became a color used most in polychrome rather than monochrome.

Chapter 7

Researching Refuse: Incorporating Archaeometric Data from Mont Beuvray

7.1 Introduction

In this dissertation project, I have explored the value of opaque red glass and the social networks created and maintained through its use in the production of glass-decorated portable and personal metal objects. I hope to have demonstrated that opaque red glass was not only a reliable replacement in Iron Age temperate Europe for coral and amber – used in the decoration of metal vessels for drinking and feasting and some jewelry, arms, and armament. It also encouraged growth in the quantity of object types and styles decorated with red insets. As socio-political structures and access to goods changed within communities, the value of opaque red glass shifted in kind. Copper-alloy objects that decorated chariots and horse harnessing appeared in greater numbers during the later Iron Age as the horse and warrior became a symbol of protection and power, both on the continent and in southern Britain. Then, according to scholarly interpretations of the archaeological record, we see a supposed divergence wherein artisans in temperate continental Europe stop producing opaque red glass-decorated objects; enameling, by contrast, continues to be practiced in Britain, albeit with blue as the primary color and red used secondarily by the end of the 1st c. CE.

This image of the Roman provincial period, however, may oversimply complexities in the archaeological record. There are copper-alloy brooches decorated with opaque red glass on display at the Musée du Pays Châtillonnais, dated somewhere between the 1st c. CE and the 3rd c. CE because these cannot be more securely dated through stylistic analysis. At the archaeological site of Mont Beuvray, meanwhile, Nathalie Brun and Michel Pernot have dated opaque red glass

samples to the post-Roman invasion period based upon the chemical composition.[371] In their study, however, glass samples at Mont Beuvray presented compositional differences from other Celtic/insular glasses; these scientists suggested the glass they tested was of a Roman type due to its manganese content. They argue that it is representative of Romanization at the site. François Farges' 2013 study of opaque red glass at Mont Beuvray also complicates previous research at the site through his use of multiple analytical tools. In this report, Farges argued that opaque red glass at the site was colored by metallic copper in the form of dispersed nanoparticles.[372] Two recent studies – Mario Bandiera's dissertation and joint publication – on opaque red glasses in Iron Age and Roman Europe has brought forth new questions about the glass at Mont Beuvray, though theses authors did not analyze samples from this site. In these publications, copper nanoparticles can be present in the glass matrix of sealing-wax red glass, but the color is caused by dendritic copper.[373] Glass which is colored by copper nanoparticles is classified as another type of opaque red glass, termed as red brown glass. Both types of opaque red glasses can be colored by the addition of copper metal which can precipitate to cuprite or cuprous oxide. Based on these four studies, the glass identified by Brun and Pernot and Farges at Mont Beuvray must be red brown glass, which is colored by copper nanoparticles.

In this chapter, I will address Brun and Pernot, and Farges' initial assessment of opaque red glass working at Mont Beuvray through an in-depth discussion and analysis of opaque red glass samples from the archaeological site. The purpose of this chapter is to argue that multiple types of opaque red glass were used in production at Late Iron Age and early Roman settlements such as Mont Beuvray in the 1st c. BCE, and that the type of glass did not matter as long as the

[371] Brun and Pernot 1992
[372] Farges 2013
[373] Bandiera 2021; Bandiera et al. 2019

color was red and the composition allowed for the glass to be worked as necessary to produce the desired final product. Due to the complicated nature of opaque red glass and the overlap of formulas which existed in Mediterranean and non-Mediterranean Europe in the late 1st c. BCE and 1st c. CE, it is impossible to date objects precisely to a pre-Roman or post-Roman period based solely on composition or typology when used to decorate a metal object – many fibula types, for example, were produced for two or three centuries. Ultimately, I aim to illustrate – first through the analysis of glass at Mont Beuvray, then through a second case study discussing the brooches on display at Musée du Pays Châtillonnais, – that we cannot say for sure when or if artisans ever stopped working with opaque red glass, changing traditions of manufacture to meet only Roman tastes.

By comparing the evidence for glass composition at Mont Beuvray to objects found at this site and others in the post-conquest period, I argue for a more complex picture of opaque red glass working in Roman Gaul: the existence of fringe artisans in continental Europe who, similar to those present in Britain, continued to produce a small number of opaque red glass objects regardless of the colorant used to produce the glass. Some artisans in Roman-controlled temperate Europe continued to apply sealing-wax red or red brown glass – both of which are opaque reds and could have been imported in either the pre-Roman or Roman period since both glasses were produced by the 3rd c. BCE and found in contexts dating to the 2nd c. CE – to specific categories of metal objects, such as fibulae. Developing a more nuanced picture of enamel arts in the post-Roman period in northwestern continental Europe is challenging because the enameled objects which have been dated to the 1st c. CE could also have been produced in the 2nd or 3rd c. CE. Based on the data presented in this chapter, though, I present the possibility

that some artisans that chose to live in rural settlements produced specific types of enamel-decorated metalworks for a subset of the population in the late 1st c. BCE and early 1st c. CE.

I begin with an overview of major archaeometric studies of opaque red glass in the Iron Age and Roman periods and divide opaque red glass into two major categories: sealing wax and duller reddish brown. I assess the benefits and shortcomings of scientific analysis for dating and sourcing opaque red glass before discussing glass working at the site of Mont Beuvray and analyses of samples I received from the archaeological site, including results from electron probe micro analysis (EPMA) and laser ablation inductively-coupled plasma mass spectrometry (LA-ICP-MS). In the final sections of the chapter, I reflect on the benefits of combining archaeometric data with anthropological and theory-driven studies of material culture and complicate scholars' previous interpretations of opaque red glass working – and, more generally, traditions of manufacture – in Late Iron Age and early Roman provincial Gaul through the archaeological record at the Late Iron Age and early Roman settlement of Mont Beuvray and the objects on display at Musée du Pays Châtillonnais. Ultimately, I suggest that the epistemicide of indigenous practices was not immediate amongst the elite populations of the Three Gauls. Artisans continued to produce enameled metalworks at indigenous sites such as Mont Beuvray after the Roman invasion, but imperial encouragement of locals to adopt of Roman technologies, objects, styles, and display practices led to the discontinuation of production except in frontier zones.

7.2 Decoding Data: Previous Analyses of Opaque Red Glass

Opaque red glass in the ancient Mediterranean was a soda-lime-silica type with a copper-containing ingredient which could dissolve easily into the melt. Litharge or scale from copper, bronze, brass, or silver metallurgical workshops was added to the base glass either during the making of the batch (metal litharge or scale is added to the original recipe to produce a glass ingot), during fritting (a clear glass ingot is colored with finely ground and colored glass from another ingot), or possibly to the melt (the base glass ingot is melted and scale or litharge are added directly).[374] Scholars divide opaque red glass into two broad categories based upon the colorant and three categories based upon composition. Opaque red glass can either be very brilliant deep red, called sealing-wax red, or reddish brown, referred to as red brown glass, in color.

7.2.1 Compositions of Opaque Red Glass

To make opaque red glass in the 4th c. BCE to the 2nd c. CE, a craftworker needed natron, a sodium carbonate-rich mineral, along with soda and lime. Various other elements are also present in glass, such as potassium, aluminum, calcium, lead, antimony, magnesium, titanium, iron, and manganese in oxide forms. The color of the glass is affected by three elements: copper (main colorant), lead (enhances shine, promotes growth of copper during melting and cooling phases), and antimony (reducing agent, opacifier, and decolorizer). Glass with higher lead and copper contents produce sealing-wax red, while lower contents produce the duller reddish-brown

[374] Direct addition of the copper-based additive to the melt is unlikely, based upon previous experiments. For more information on colorants, see Brill and Cahill 1988: 19; Stapleton et al. 1999; Freestone et al. 2003.

glass.[375] In his 1987 study, Freestone divided red glass into three categories based upon these two elements:[376]

1. High copper (3-12 wt%) with no lead, a dull red glass
2. High copper (CuO >5 wt%) and high lead (PbO >15 wt%), or sealing-wax red
3. Low copper (CuO <5 wt%) and low lead (PbO <15 wt%), or red brown

Stead borrowed from Freestone yet simplified the categories to two:[377]

1. Low copper (>4 wt%) and low lead (< 10 wt%), or red brown
2. High copper (5-12 wt%) and high lead (20-40 wt%), or sealing-wax red

The dull red glass with high levels of copper and no lead which Freestone categorized will not be addressed further in this dissertation, as the main categories of glasses found archaeologically in the regions under study are low copper and low lead red brown glass and high copper and high lead sealing-wax red glass.

There were multiple formulae of sealing-wax red glass from the 4th c. BCE to the 2nd c. CE, according to Bandiera's study of samples from across the ancient Mediterranean (see Table 1 under section "Dating Opaque Red Glass").[378] Areas of concern for this dissertation are Bandiera's categories of La Tène (continental Iron Age), Celtic (insular Iron Age and Roman period), and Hellenistic/Roman glasses (beginning in the 3rd c. BCE). Bandiera gathered data from 128 analyses of sealing-wax red glass and compared the compositions of these samples in his dissertation. Through comparison of the data, he determined that sealing-wax red glass from

[375] Hughes 1972: 99; Brill and Cahill 1998: 19; Henderson 2013: 80
[376] Freestone 1987
[377] Stead 2006: 115
[378] Bandiera 2021: 52-69

Hellenistic/Roman period sites and insular Iron Age (La Tène) sites shared the most similarities, particularly in their copper and lead values (H/R: CuO 7.8 wt%, PbO 33.7 wt%; LT: CuO 7.4 wt%, PbO 34.5 wt%). The percentage of iron, however, was higher in La Tène/continental samples (Fe_2O_3 1.8 wt%) than Hellenistic/Roman or Celtic (insular) (Fe_2O_3 0.92 wt% and 0.70 wt% Fe_2O_3, respectively). He suggested that variation in glass compositions reflected the production of opaque red glass in different regions: continental glass was traded from the eastern Mediterranean or Italy, and the increased iron level may reflect local recipes for raw glass from the Levant which were then colored locally across continental Europe.[379]

7.2.2 Coloration of Opaque Red Glass

According to archaeometric studies, copper acted as the colorant for both red brown and sealing-wax red glasses; it activated when heated and turned red as it cooled.[380] Lead assisted in the dissolution of copper into the melt and prevented the oxidation of copper, promoted devitrification or crystallization in the glass melt, and lowered the melting temperature of the glass.[381] With the addition of antimony, these three elements in the correct combination could cause opaque red glass to strike without the need of a reducing atmosphere. The color of the glass is affected by either the growth of dendritic crystals when copper precipitates to Cu_2O, or the appearance of copper nanoparticles when it precipitates to CuO.[382]

[379] Bandiera 2021: 67
[380] This process is called striking in modern glass production. In the case of red glass, the material changes color due to the growth of crystals or colloidal particles containing metals such as copper. Personal conversation with Facility Manager Harry Seaman at The Studio (Corning Museum of Glass).
[381] Hughes 1972; Brill and Cahill: 19; Henderson 2013
[382] Bandiera et al. 2019: 2598

When copper dendrites grow in the glass matrix, sealing-wax red glass is created. Cuprite crystals form in high copper (5-12 wt%) and high lead (15-40 wt%) glasses and usually measure between 10-300 micrometers (μm), though smaller crystals measuring less than 500 nanometers (nm) are present in Roman-period enamels.[383] As lead oxide decreases the working temperature of glass and reduces the viscosity of the matrix, copper can slowly grow into large branching dendrites as it shifts from Cu^{2+} or Cu^{+} towards Cu_2O.[384] Red brown glass is colored by copper nanoparticles, which appear due to strong reducing conditions, and no copper dendrites are present in the glass matrix.[385] These glasses have low copper (0.6-5 wt%) and lead oxide (0.1-15%). Copper-rich nanoparticles appear in small cubic (100-400 nm), spherical (60-200 nm), and hexagonal and cubic (>1 μm) shapes.[386] Copper nanoparticles can appear also in sealing-wax red glasses colored primarily by dendritic crystals, as proven by Bandiera et al.[387] For example, the opaque red glass sample in this 2019 study (R9) was identified as sealing-wax red colored by copper dendrites, but copper nanoparticles were present in the glass matrix. This is a significant point to consider when discussing the opaque red glass from the archaeological site of Mont Beuvray, which will be addressed later in this chapter.

7.2.3 Dating Opaque Red Glass

There is overlap in the use of opaque red glass types in temperate Europe and Britain. La Tène/continental, Celtic/insular, and Hellenistic/Roman opaque reds were used from the 4th c. BCE to the 2nd c. CE (Table 4). Freestone suggested that sealing-wax red found in continental

[383] Bandiera 2021: 54
[384] Bandiera 2021: 160
[385] Bandiera et al. 2019: 2598
[386] Bandiera et al. 2019: 2604
[387] Bandiera et al. 2019: 2605

temperate Europe dated to 4th c. BCE to the 1st c. CE, though he suggested these dates were artificial borders as high lead and high copper glasses have been found post-1st c. CE. Bandiera et al. provided proof of concept during investigations of the red *sectilia* from the mosaics at the Lucius Verus Villa in Rome, where sample R9 was identified as sealing-wax red glass.[388] Red brown glass (4th c. BCE to 2nd c. CE) overlaps with the production of sealing-wax red glass and can be used in the production of the same material culture, such as mosaics.

Table 4 Sealing-wax red glass formulae. After Bandiera 2021.

Period	Region	Century	Copper (wt %)	Lead (wt %)
Assyrian	Iraq and Iran, Western Asia	7th to 4th c. BCE	12.8	17.7
La Tène/Continental	Belgium, France, Hungary, North Italy, Switzerland (temperate Europe)	4th to 1st c. BCE	7.4	34.5
Celtic/Insular	Scotland and southern Britain	2nd c. BCE to 2nd c. CE	9.3	27.7
Hellenistic/Roman	Mediterranean Basin	4th c. BCE to 2nd c. CE	7.8	33.7

Because production of sealing-wax red and red brown glass overlap, dating objects through glass analysis can prove challenging. There is a line of inquiry which may be similarly though-provoking: when opaque red glass and glass-decorated objects can be dated within a century, can we analyze glass samples found *in situ* to determine if two types of glass were used at the same site to produce similar objects with no cultural differentiation between the two formulae? In this chapter, I address this question through the case study of Mont Beuvray.

[388] Bandiera et al. 2019: 2609

When studying glass samples at Mont Beuvray in the early 1990s, Brun and Pernot suggested that the composition of opaque red glass at the site, present in the forms of glass waste and decoration added to metal objects, was more similar to Roman red glass than La Tène/continental glass because indigenous groups adopted Roman preferences for glass colors after the Roman invasion.[389] However, Bandiera et al. observed almost 30 years later that sealing-wax red glass cannot easily be distinguished from duller reds by visual analysis – and was still used to produce mosaics as late as the 2nd c. CE.[390] Through new analyses of opaque red glass at Mont Beuvray, I determine that the chemical composition which we study today is significant for understanding the artisans' techniques of production and the extent of the glass trade. In the following sections, I provide an overview of previous analyses of opaque red glass from Mont Beuvray before explaining the processes and results of my own study of glass samples. Then, I conclude by explaining how the results of my study benefit our understanding of glass production and consumption at Mont Beuvray in the Late Iron Age and early Roman period before suggesting future possibilities for archaeometric studies of enameled metals from the same periods at other archaeological sites in continental temperate Europe.

7.3 Retesting Red: Previous Data and Recent Analyses of Opaque Red Glass at Mont Beuvray

As mentioned in the introduction chapter, Mont Beuvray was an Iron Age fortified settlement inhabited from the mid-2nd c. BCE to the 1st c. CE. The settlement has become significant for the history and archaeology of modern Europe, and scholarship on opaque red glass and the enameller's workshop at the site have been affected by its association with Julius

[389] Brun and Pernot 1992
[390] Bandiera et al. 2019: 2609

Caesar and the Gallic Wars, and the modern political climate of France. Amateur excavations at the archaeological site began in 1867 under the direction of wine merchant Jacques-Gabriel Bulliot, who had convinced Napoleon III to fund the project to uncover Bibracte, the site of a famous early battle during the Gallic Wars.[391] Work at the site continued under the supervision of Bulliot's nephew, Joseph Déchelette, until 1914 when work at the site was discontinued. New excavations by university-trained archaeologists began again in 1984 at the request of President François Mitterrand, wished to renew excavations and bring scientific teams from across Europe to Mont Beuvray due to identification by Bulliot and Déchelette as Bibracte in the *Bellum Gallicum*.[392] Many of the architectural features and artifacts discovered during excavations piqued the interests of scholars, including objects related to the subject of this dissertation: red enamel and opaque red glass.

Archaeological excavations at Mont Beuvray have uncovered many opaque red glass and red enameled iron and bronze objects, particularly in the form of nails/rivets and studs.[393] These objects, which scholars have suggested were decorative elements meant to be attached to shields, horse harnesses, and chariot pieces, are relatively short in length and have either bronze or iron shanks and enameled heads.[394] Similar objects appear across much of continental Europe in the Late Iron Age, including at Manching (Germany), Stradonitz (Bohemia/Czech Republic), and Velem St. Veit (Hungary). Similarities between the material culture of these regions suggest

[391] At this time, Napoleon III was writing a biography of Julius Caesar and funding excavations at possible battle sites of the Gallic Wars. Excavations also began at Alesia and Gergovia with the support of Napoleon III.
[392] Mitterrand monumentalized the site of Mont Beuvray as a 'national site' in 1985 and inaugurated a pan-European archaeological research center and museum in 1995. This is part of a larger nationalist and pan-European nationalist project supported by the former French president, as he intended to turn the site into a 'memory factory' for collective French identity. See Dietler 1998.
[393] Brun and Pernot 1992, Guillaumet et al. 2008
[394] Personal communication with Dr. Vincent Guichard

similar values and social networks rather than a single location for production, as discussed in earlier chapters of this dissertation.[395]

Opaque red glass and enamel-decorated metal objects such as fibulae and nails/rivets were excavated in numerous contexts, including the ritual site of Fontaine Saint-Pierre, the necropolis, and domestic areas such as Pâture du Couvent, Parc aux Chevaux, Pâture des Grangerands, Theurot de la Wivre, and Theurot de la Roche (Figure 33). Two areas of the archaeological site, La Côme Chaudron and La Champlain, present evidence of iron, bronze, and enameling in the workshop spaces and waste pits in the embankments located nearby.

[395] Brun and Pernot 1992 correctly wrote that Mont Beuvray is the only Celtic site to have evidence of an enameller's workshop. Today, there is still an absence of evidence for enameling in this period in temperate Europe due to the differing nature of excavations – Mont Beuvray is one of the most well-excavated and preserved sites in temperate Europe. If other Iron Age sites received similar treatment, there would probably be more evidence of enamellers' workshops.

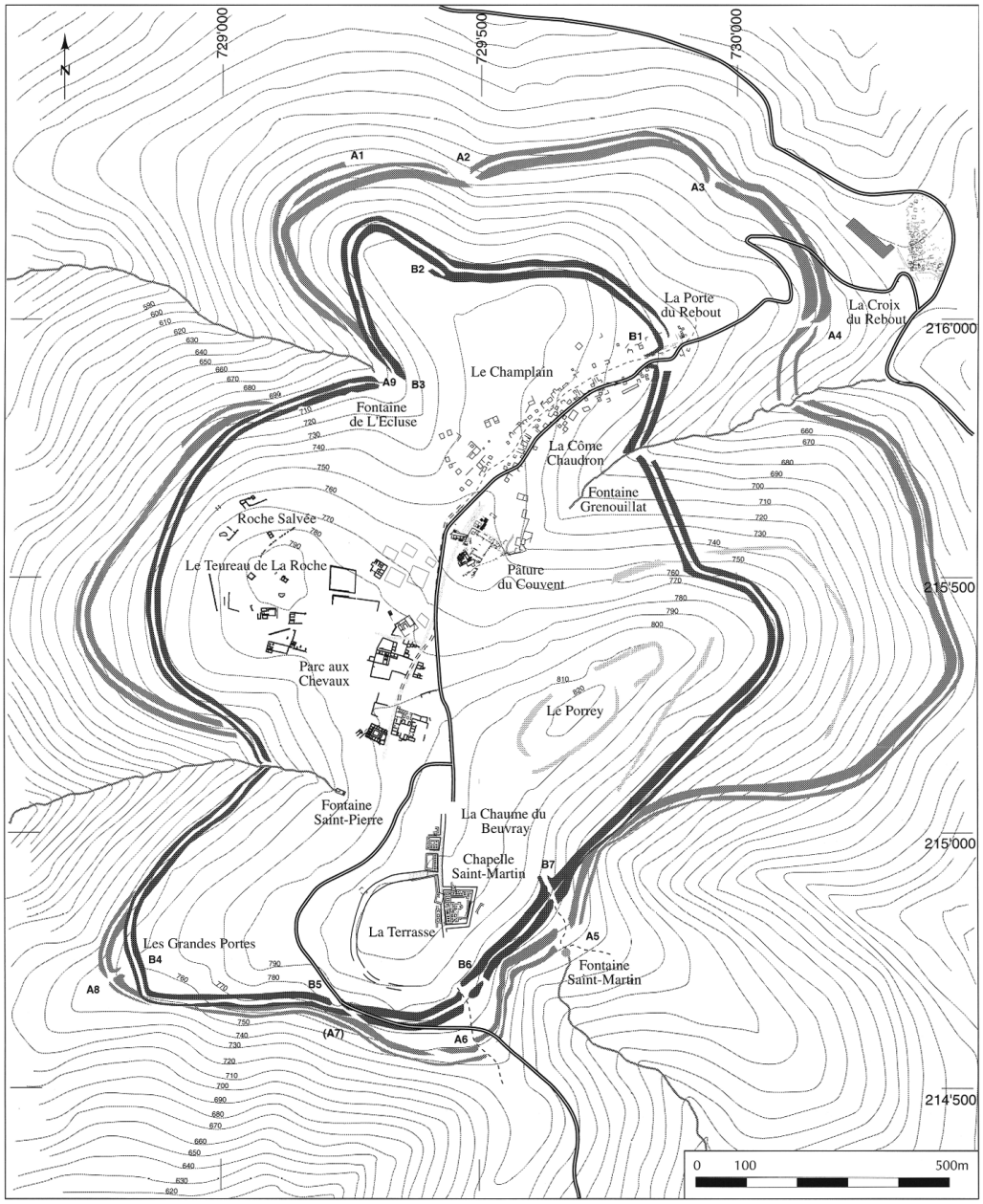

Figure 33 Archaeological map of Mont Beuvray with toponyms. After Buchsenschutz et al. 1998: 11.

During excavations of Room 1012 at Côme Chaudron a cluster of over 300 iron objects was discovered, which included some nails with bronze and red enamel heads.[396] Evidence of bronze and brass working on site was determined from casting cones, bronze drips, fragments of

[396] Guillaumet et al. 2008: 75

crucibles, and slag, all of which are found in Room 1014 at Champlain.[397] Excavators uncovered fibulae, harness pieces, nail/rivets, and belt clips in embankments at Côme Chaudron and Champlain and direct evidence of enameling in Room 1014 at Champlain and possibly in Room 1889 at Côme Chaudron. Also found were the negatives of enamel in shell-like shapes, seemingly the waste products from molds. According to the evidence collected over years of excavations, mostly studs and the extremities of harnesses and yokes were enameled with opaque red glass.[398] Rooms 1012, 1977, 1014, and 1889 date to the Late Iron Age and early Augustan periods (c. 60 to 1 BCE). If the dates assigned to these areas of the site is correct, it is likely that opaque red glass working and enameling at Mont Beuvray continued until the late 1st c. CE or early 1st c. CE; it was not simply discontinued after the Roman conquest. Scholarly interest in the site for its significance to Iron Age, Roman, and contemporary French and European heritage led to interest in analyzing the opaque red glass found at the site.

In 1992, Brun and Pernot used Scanning Electron Microscopy/Energy-Dispersive X-ray Spectrometer (SEM-EDS) and SEM photomicrography (the process of capturing high-resolution images of a sample's surface) to analyze forty samples of opaque red glass excavated at Iron Age sites in France, including opaque red glass from Mont Beuvray. The data suggested two formulas for red enamel at the settlement: one formula is similar to Bandiera's category of La Tène/continental Iron Age glass. The other formula differs in the amount of manganese, which is higher than other Iron Age glasses, and photomicrographic images showed the glass had heterogeneous and streaky appearance which included metallic iron flakes.[399] Photomicrography also suggested differences in production, as the grooves of the enamel shells were radiant and

[397] Guillaumet et al. 2008: 77
[398] Brun and Pernot 1992; Guillaumet et al. 2008
[399] Brun and Pernot 1992: 249

close to 5cm deep in the high manganese glass while the enamel shells of similar composition to Bandiera's La Tène/continental type had crossed grooves divided into four quarters measuring less than 1cm deep. Due to the differences in composition and production techniques, Brun and Pernot suggested that a Roman manganese base glass was colored on site at Mont Beuvray after the Roman invasion and was used by local artisans to produce opaque red glass and enameled metal objects with a Roman glass type and a new technique which would attract Roman settlers at the site.

Recent analyses of opaque red glass published by Farges in 2013, Bandiera et al. in 2019, and Bandiera in 2021 provide new insights into opaque red glass working and enameling in the ancient world and, more specifically, at Mont Beuvray. As stated by Bandiera in his dissertation, Brun and Pernot tested La Tène/continental-period glass samples with an uncalibrated SEM-EDS. When equipment is uncalibrated, it has not been standardized against known standards and measurements; in the case of glass, Brun and Pernot did not calibrate the SEM-EDS with glass standards which have known compositions, a common practice in glass studies to receive the most accurate data possible. When analyzing their opaque red glass samples, this error led to slight over-estimations of heavy elements such as lead and under-estimations of light elements such as sodium.[400] He claims that the final data for these La Tène/continental samples needed to be retested to clarify the over-estimations for future comparisons.[401] In his 2013 study, Farges examined a new set of four samples from Mont Beuvray using microscopy and x-ray microfluorescence spectrometry.[402] His results did not include information on the composition of

[400] Bandiera 2021: 53
[401] Much to my dismay, I was unable to test these original samples, as Michel Brun did not have them and was unsure of where the samples had found their final home. Personal communication with Dr. Michel Brun.
[402] Microscopy uses microscopes to visualize objects and details too small to be seen with the naked eye. X-ray microfluorescence spectrometry is a non-destructive technique used to determine the elemental composition of materials on the micro-scale by exposing a sample to an x-ray beam, causing the elements in the sample to emit

the glass, but did suggest a different colorant than previously suspected – rather than detecting the presence copper dendrites, Farges found copper nanoparticles in the glass matrices and determined that copper metal was the colorant used for 1st c. BCE glasses at Mont Beuvray.[403] According to his results, the opaque red glass at the site should be red brown glass rather than sealing-wax red.[404] Both Farges' and Bandiera et al.'s analyses are useful comparisons for gauging the complicated nature of opaque red glass, but lead to a variety of new questions:

1. Can new analyses of opaque red glass discovered at Mont Beuvray provide clarity on the composition of the glass?
2. After analyzing new samples, how does the composition of the glass – including the heavy elements – compare to the previous study by Brun and Pernot?
3. Is all glass at Mont Beuvray colored by copper nanoparticles, as Farges 2013 suggests, or are there multiple glass formulas found on site?
4. If some of the glass is colored by copper nanoparticles, then the glass should be a red brown glass rather than sealing-wax red. Do techniques for coloring the glass change, are there multiple types of red glass in use at the settlement simultaneously, and would the type/color of the glass – red brown or sealing wax – have mattered to artisans or consumers?

Ultimately, these questions lead to the following "big picture" question: if Iron Age peoples across continental temperate Europe and Britain were using sealing-wax red glass and red brown was traded into these regions in later periods – perhaps by the late 2nd or 1st c. BCE – do the

fluorescent X-rays with unique energies characteristic to each element. The elemental composition of a material can be determined by measuring the intensity of the X-rays.

[403] Farges 2013: 273-277

[404] Farges also argued that artisans at Mont Beuvray colored the glass on site using cassiterite refractory powder – tin oxide possibly from Spain – to obtain the matte texture of the glass. See Farges 2013 for more information.

different varieties of red glass have equivalent moral, esteem, and measure values for the production of personal and portable metal objects? Can we reliably implement concepts such as "Romanization" and "artisans met Roman preferences" into enameling practices of the late 1st c. BCE or early 1st c. CE, as Brun and Pernot suggested for the use of "Roman manganese glass" in production at Mont Beuvray, post-conquest? To answer these questions, I turn to the archaeometric data I have collected through sample analysis of glass waste from Mont Beuvray.

In this study, I tested 20 glass samples from the areas of Côme Chaudron, Le Champlain, and Le Porrey, and La Chaume using LA-ICP-MS and 19 samples with EPMA.[405] Due to the nature of my analyses – which required sampling of the glass waste for EPMA – I prepared samples by breaking off small pieces of glass with metal pliers, applying the broken side face-down on double sided tape to keep the samples in place during the mounting process in epoxy resin. Two mounts were created, each including the following glass standards (SRMs) for analytical instrument calibration and validation of chemical and instrumental methods: Corning A, B, C, and D; NIST 610, 612, and 614.[406] The epoxy resin mounts were polished in multiple steps until a final polish was applied using <2μm diamond powder.

7.4 Analytical Technique: LA-ICP-MS

LA-ICP-MS, or laser ablation inductively-coupled plasma mass spectrometry, is an analytical technique used to determine different glass groups and their provenance through the

[405] This discretion was not purposeful. Two glass samples seemed to overlap and appear as one. This mistake was corrected for LA-ICP-MS testing, but not possible to correct for EPMA due to time constraints. On a positive note, the results of both studies provided such similar data that this issue does not affect the quality of the dissertation.
[406] These standards are the most common used for glass analyses. Other standards, such as Sheffield, are also used. Corning standards were created by Dr. Robert Brill at the Corning Museum of Glass; NIST SRMs were created by the National Institute of Standards and Technology.

major, minor, and – in the special case of LA-ICP-MS – trace elements of a glass sample. Major elements are the primary elements which make up the majority of a glass's composition (sodium, silica, and calcium, in the case of the glass under study), while minor elements are the secondary or tertiary elements in a glass (for example antimony, iron, manganese, and magnesium). Trace elements are elements which appear in very low quantities, many of which can only be found in specific regions of the world. For example, Brems and Degryse suggested that Ti, Cr, Sr, Zr, and Ba are diagnostic for providing information about the silica source of a glass, while Freestone et al. determined that strontium concentrations can distinguish between the use of coastal sands and non-coastal limestone-bearing sand.[407] LA-ICP-MS analysis is a non-destructive technique, allowing for any glass to be tested as long as the sample can fit into the machine's chamber. In the case of this study, the samples were already prepared and mounted in resin.

SRMs, or glass standard reference materials, with soda-lime-silica matrices with concentrations of major oxides closest to the matrix of opaque red glass and most other ancient glasses from the Mediterranean, were used to calibrate the equipment and counteract possible issues with the ablation which could lead to inaccurate results.[408] The glass samples were tested by Dr. Liam Richards while a graduate student at the UCL Institute of Archaeology's Wolfson Archaeological Science Laboratories. Table 5 provides instrument information and parameters followed by Richards on the Applied Spectra J200 Tandem LA/LIBS housed in the laboratory. The beam diameter was set to 40 μm and spot ablation was performed in order to ablate fresh,

[407] Brems and Degryse 2014; Freestone et al. 2003

[408] As mentioned earlier regarding the uncalibrated SEM-EDS used by Brun and Pernot in 1992, glass standards are needed to calibrate the machine. These glass standards are made by major companies, such as Corning, and have a known formula. The elements present within the glass are analyzed by the machine first. Once those standards are analyzed, the data is used to calibrate the machine and act as "standards" by which to measure the "unknowns" present within ancient glass samples. Personal communication with Dr. Liam Richards.

uncorroded material beneath the surface of the glass matrix every time and to decrease the visibility of holes in the glass surface. 3 ablation spots were chosen for each sample, set 0.2mm apart. Acquisition time per point was 70 seconds, with a period of 45 seconds left between each ablation to ensure that material from previous ablations did not influence subsequent ablations. A cooldown period of 60 seconds was left after each experiment to remove any leftover material before continuing with the procedure. The calibration procedure followed Charlton et al. 2024 using SRMs Corning A, Corning D, NIST 610, NIST 614, and Sheffield 3. NIST 612 and Corning B were used as secondary standards.

Table 5 Table of instrument parameters (LA-ICP-MS). After Occari et al. 2019.

Laser Ablation System	Applied Spectra J200 Tandem LA/LIBS
Laser-nm	Nd:YAG – 213
Ablation mode	Spots
Number of spots	3
Warmup shots	100
Spot size (µm)	40
Pre-ablation delay (s)	15
Washout delay (s)	60
Experiment delay (s)	45
Acquisition time per point (s)	70
ICP-MS system	Agilent 7900 quadrupole ICP-MS
Carrier gas flow rate (1/min)	0.7 (Ar), 0.7 (He)
Plasma gas flow rate (1/min)	0.7 (Ar)

7.4.1 Reading Results: Composition of Opaque Red Glass using LA-ICP-MS

The average composition of each glass sample was determined after calculating the average of the three ablation spots taken per glass sample (Table 6). It is almost impossible to determine the location of production for opaque red glasses, though it is most probable that the base glass was produced in Egypt (Table 7): the group composition of opaque red glass samples

from Mont Beuvray showed concentrations of magnesium (MgO) and potassium (K_2O) lower than 1.5 wt%, which would suggest the use of natron as a fluxing agent.[409] Sodium (Na_2O) and silica (SiO_3) concentrations within the base glasses are also most comparable to Celtic/insular glasses; as reported by Bandiera,[410] these values may differ from the La Tène/continental samples studied by Brun and Pernot due to their use of an uncalibrated SEM-EDS. It is possible, if tested again, Brun and Pernot's samples might be more similar in composition to the samples I have tested.

[409] Natron is a naturally occurring mineral primarily composed of sodium carbonate. A flux is a substance that lowers the melting temperature of the primary glass-forming materials. Natron glasses were produced using sands from the area around the Egyptian site of Wadi el Natrun. See Scott and Degryse 2014: 16

[410] This was suggested also through personal communication with Dr. Ian Freesone

Table 6 LA-ICP-MS results of 20 opaque red glass samples from Mont Beuvray, France.

Sample	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TiO_2	MnO	Fe_2O_3	CuO	Sb_2O_3	PbO
2011.32.3730.9	9.305	0.417	1.698	46.411	0.076	0.281	0.512	5.580	0.052	0.500	0.454	8.084	1.018	25.375
2017.19.1765.19	10.462	0.472	1.702	48.235	0.103	0.274	0.615	5.766	0.058	0.621	0.483	8.926	1.130	20.926
2017.19.1765.15	10.253	0.460	1.681	47.113	0.109	0.260	0.626	5.647	0.058	0.614	0.483	9.751	1.138	21.582
2018.12.204.10	8.782	0.518	1.797	45.331	0.107	0.323	0.536	5.013	0.095	0.680	0.850	9.960	1.607	24.149
2017.19.1765.14	9.714	0.406	1.580	46.118	0.133	0.312	0.707	5.469	0.057	0.599	0.487	9.409	1.256	23.506
2017.19.1765.13	9.910	0.398	1.620	46.206	0.103	0.252	0.619	5.506	0.060	0.619	0.483	10.308	1.213	22.487
2016.19.1439.60	8.769	0.320	1.421	44.387	0.064	0.241	0.421	5.056	0.047	0.423	0.425	7.653	1.324	29.237
2011.32.3730.10	8.683	0.322	1.566	45.426	0.068	0.242	0.546	4.899	0.057	0.472	0.470	10.191	0.941	25.908
2017.19.1765.16	9.556	0.391	1.596	45.967	0.108	0.292	0.611	5.634	0.057	0.622	0.494	9.300	1.269	23.866
2016.19.1439.59	10.349	0.360	1.747	52.404	0.083	0.407	0.529	5.629	0.055	0.502	0.419	8.859	0.649	17.808
2014.19.1135.39	9.939	0.334	1.549	50.392	0.079	0.435	0.502	5.447	0.043	0.688	0.377	9.044	1.196	19.732
2011.32.3584.2	9.386	0.405	1.592	49.518	0.087	0.617	0.541	5.267	0.049	0.543	0.530	9.040	1.278	20.920
2018.12.204.9	9.782	0.328	1.620	50.202	0.079	0.527	0.509	5.112	0.049	0.704	0.431	11.087	1.537	17.786
2014.19.1126.40	8.889	0.324	1.496	47.265	0.080	0.518	0.439	4.897	0.051	0.688	0.451	10.208	1.574	22.888
2011.32.3730.12	10.817	0.451	1.746	51.260	0.129	0.323	0.707	5.781	0.060	0.598	0.468	6.680	0.979	19.769
2017.19.1765.17	9.921	0.357	1.662	48.355	0.076	0.468	0.540	5.419	0.051	0.520	0.540	8.918	1.314	21.639
2017.19.1765.12	9.999	0.402	1.602	49.089	0.136	0.586	0.634	5.976	0.061	0.626	0.476	9.442	1.202	19.526
2017.19.1765.21	8.886	0.356	2.500	47.795	2.088	0.520	0.589	4.992	0.068	0.547	0.566	8.388	1.178	21.277
2017.19.1765.20	8.750	0.310	1.487	47.189	0.075	0.431	0.436	4.913	0.043	0.481	0.334	10.923	1.223	23.189
Average	**9.587**	**0.386**	**1.666**	**47.824**	**0.199**	**0.387**	**0.558**	**5.368**	**0.056**	**0.581**	**0.485**	**9.272**	**1.212**	**22.188**

Table 7 Average chemical composition in wt % of sealing wax red glass base composition from Mont Beuvray using LA-ICP-MS.

Sample	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TiO_2	MnO
2011.32.3730.9	14.353	0.643	2.619	71.58	0.118	0.434	0.790	8.606	0.081	0.771
2017.19.1765.19	15.320	0.691	2.492	70.612	0.151	0.401	0.900	8.441	0.085	0.910
2017.19.1765.15	15.344	0.689	2.516	70.507	0.163	0.388	0.937	8.451	0.088	0.919
2018.12.204.10	13.900	0.820	2.845	71.743	0.170	0.511	0.849	7.935	0.150	1.077
2017.19.1765.14	14.923	0.624	2.428	70.846	0.204	0.480	1.09	8.401	0.088	0.921
2017.19.1765.13	15.180	0.610	2.481	70.780	0.158	0.386	0.937	8.431	0.089	0.948
2016.19.1439.60	14.340	0.533	2.324	72.587	0.105	0.394	0.689	8.268	0.077	0.692
2011.32.3730.10	13.941	0.518	2.515	72.937	0.109	0.389	0.877	7.869	0.091	0.758
2017.19.1765.16	14.739	0.603	2.461	70.899	0.166	0.450	0.943	8.690	0.089	0.959
2016.19.1439.59	14.360	0.500	2.424	72.718	0.115	0.564	0.734	7.810	0.077	0.697
2014.19.1135.39	14.320	0.481	2.232	72.602	0.113	0.627	0.724	7.848	0.062	0.991
2011.32.3584.2	13.803	0.595	2.341	72.819	0.127	0.907	0.796	7.742	0.072	0.798
2018.12.204.9	14.195	0.475	2.351	72.851	0.114	0.765	0.737	7.418	0.071	1.021
2014.19.1126.40	13.751	0.501	2.318	73.122	0.123	0.820	0.666	7.576	0.079	1.062

2011.32.3730.12	15.050	0.627	2.430	71.320	0.180	0.450	0.984	8.043	0.084	0.832
2017.19.1765.17	14.726	0.530	2.468	71.775	0.113	0.694	0.802	8.043	0.076	0.772
2017.19.1765.12	14.469	0.582	2.318	71.027	0.197	0.848	0.917	8.647	0.089	0.906
2017.19.1765.21	13.002	0.521	3.658	69.938	3.059	0.760	0.862	7.304	0.099	0.800
2017.19.1765.20	13.648	0.484	2.320	73.598	0.117	0.672	0.681	7.663	0.069	0.751
Averages	14.387	0.580	2.502	71.803	0.293	0.576	0.837	8.062	0.085	0.873

The average concentration of lead (PbO 9.3 wt%) and copper (CuO 22.1 wt%) in the Mont Beuvray samples studied in this dissertation are comparable to Celtic/insular glasses (PbO 9.3 wt%, CuO 27.7 wt%). Since micrometric cuprite crystals are formed in copper- and lead-rich glasses (CuO 5-12% and PbO 15-40%, respectively), the samples tested in this dissertation are colored by dendritic copper and not nanoparticles of metallic copper, which color glasses with low copper and lead oxide contents (CuO 0.6-5% and PbO 0.1-15%).[411] This proves that the glass is a type of sealing-wax red.

The weighted percentage of magnesium in the samples I have tested and in Bandiera's La Tène/continental and Celtic/insular glasses fall below 1 wt%; the same can be said of the phosphorous, as concentrations fall below 0.50 wt% in all samples (Table 8). The iron levels are most dissimilar, where the average falls below 1% in the samples I have tested and range above 1% for La Tène/continental, Celtic/insular, and Hellenistic/Roman glasses recorded by Bandiera (Tables 9 and 10). Manganese levels are higher slightly than the other glass types, though all concentrations within the compared samples fall below 1 wt%.

[411] Bandiera et al. 2019: 2598

Table 8 Compositional comparisons of sealing-wax red glass recorded by Bandiera 2021 compared to LA-ICP-MS results from Mont Beuvray samples.

Period	Century	Copper (wt %)	Lead (wt %)
La Tène/ Continental	4th to 1st c. BCE	7.4	34.5
Celtic/Insular	2nd c. BCE to 2nd c. CE	9.3	27.7
Hellenistic/Roman	4th c. BCE to 2nd c. CE	7.8	33.7
Mont Beuvray (dissertation)	1st c. BCE/1st c. CE	9.3	22.1

Table 9 Average chemical composition in wt % of the base glass (sealing wax red) from different regions recorded by Bandiera 2021 and compared to glass composition from Mont Beuvray.

	Oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	K_2O	CaO	TiO_2	MnO	Fe_2O_3	Cl
La Tène/Continental		8.4	0.81	2.7	74.8	n.d.	0.78	8.0	n.d.	0.21	3.3	0.90
Celtic/Insular		16.8	0.70	2.6	67.8	0.47	0.93	7.7	0.16	0.56	1.2	0.99
Hellenistic/Roman		16.4	1.1	2.8	68	0.20	1.1	6.9	0.10	0.36	1.7	1.0
Mont Beuvray		14.7	0.47	2.4	71.6	0.11	0.74	7.6	0.08	0.85	0.63	n.d.

Table 10 Average chemical composition in wt % of the sealing wax red glass from different regions. La Tène/Continental, Celtic/Insular, and Hellenistic/Roman and including dissertation data (Mont Beuvray). After Bandiera 2021: 52.

	Oxide	SiO_2	Al_2O_3	Na_2O	K_2O	CaO	MgO	P_2O_5	TiO_2	Fe_2O_3	MnO	Sb_2O_3	SnO_2	CuO	PbO
La Tène/ continental		42.4	1.5	4.8	0.44	4.54	0.44	n.d.	n.d.	1.8	0.14	n.d.	n.d.	7.4	34.5
Celtic/ insular		42.2	1.6	10.5	0.59	4.8	0.44	0.32	0.1	0.7	0.35	0.92	0.5	9.3	27.7
Hellenistic/ Roman		39.6	1.7	9.4	0.62	3.9	0.64	0.16	0.11	0.92	0.28	0.71	0.64	7.8	33.7
Mont Beuvray		47.81	1.66	9.58	0.55	5.35	0.38	0.19	0.056	0.48	0.58	1.21	n.d.	9.29	22.19

The opaque red glass from Mont Beuvray is most comparable to Celtic/insular glasses from Britain, dating from the 2nd c. BCE to 2nd c. CE. Based on the results of the analyses, as demonstrated through the following two tables (11 and 12), the composition of the glass samples specifically from Mont Beuvray tested by Brun and Pernot in 1992 are relatively similar. The

concentrations of sodium and silica in Brun and Pernot's samples are lower, which could be attributed to the uncalibrated SEM-EDS used to test the glass.

Table 11 Base compositions of 8 samples from Mont Beuvray from Brun and Pernot 1992.

Sample	**Na_2O**	**MgO**	**Al_2O_3**	**SiO_2**	**K_2O**	**CaO**	**MnO**	**Fe_2O_3**	**Cu_2O**	**PbO**
18343	5.5	0.3	1.5	52.4	0.5	6.0	0.6	0.4	7.5	21.3
18546	5.4	0.4	1.6	48.7	0.5	5.5	0.6	0.5	8.1	25.1
19646	5.6	0.4	1.8	48.2	0.6	6.1	0.3	0.7	8.1	24.0
19648	5.4	0.4	1.6	49.8	0.5	5.9	0.7	0.3	8.5	23.3
19649	5.5	0.4	1.6	49.8	0.7	6.2	0.7	0.6	7.7	22.7
19650	5.5	0.4	1.7	50.9	0.6	6.1	0.7	0.4	6.6	22.8
19651	5.7	0.4	1.7	50.4	0.6	5.9	0.7	0.5	8.2	21.7
19652	5.5	0.4	1.8	52.9	0.7	6.1	0.5	0.6	7.7	19.1

Table 12 Average compositional comparisons of sealing-wax red glass samples at Mont Beuvray recorded by Brun and Pernot 1992 (8) compared to dissertation study samples (20).

Publication	Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	MnO	Fe_2O_3	Cu_2O	PbO
Brun and Pernot 1992	5.5125	0.3875	1.6625	50.3875	0.5875	5.975	0.6	0.5	7.8	22.5
Wood 2025 (diss.)	9.58	0.38	1.66	47.81	0.55	5.35	0.58	0.48	9.29 *CuO	22.19

The samples from Mont Beuvray under study in this dissertation and the Celtic/insular glasses in Bandiera's study were produced using a similar formula for the base composition. The base glass could be a type predominately traded into this region of France and into southern Britain beginning sometime in the 2nd c. BCE; coloring of the glass could have followed similar procedures, where the averages of elements added to the batch – copper metal or cuprous oxide/cuprite as the colorant, lead as a super flux which lowers the melting point of the glass and lowers viscosity to make the copper more soluble within the matrix, and antimony as an opacifier and reducing agent – varied depending upon the facility and composition of the materials, such as litharge, on hand. The similarity in the weighted percentage of copper in Bandiera's study of insular Celtic glasses and the samples I tested from Mont Beuvray is surprising, since Bandiera's

study would suggest that the Mont Beuvray glass would have higher levels of lead – previously tested samples of La Tène/continental glass have an average of 34.5 wt%. The weighted percentage of copper is also too similar to ignore. It is possible that opaque red glass was colored on site at Mont Beuvray with litharge that had a similar copper level as that used to color glass in southern Britain. The lower percentage of lead could be a difference in how much copper is added to produce copper alloy objects in Britain versus at Mont Beuvray. Future comparisons between the levels of copper and lead used to produce objects at both sites or testing of litharge found in continental temperate Europe and Britain could prove fruitful to understanding the glass coloring processes and metalworking traditions in these regions during the Iron Age and Roman periods.

Overall, any differences in composition between sealing-wax red glasses are due to minor differences in the glass batches. When compared to the data collected by Bandiera, the glass samples from Mont Beuvray tested for this dissertation present the most similarities to Celtic/insular sealing-wax red glass, as it is not comparable to red brown glasses, the other category of opaque red glasses studied and recorded by Bandiera (Table 13).

Table 13 Average chemical composition in wt % of red brown samples from the 3rd c. BCE to 4th c. CE. From Bandiera 2021, pg. 56-59.

Period	**n. analyses**	**Fe_2O_3**	**MnO**	**Sb_2O_3**	**SnO_2**	**CuO**	**PbO**
3rd to 1st c. BCE	36	2	0.6	0.6	0.7	2	7.8
1st to 4th c. CE	112	2.3	0.5	0.4	0.4	1.9	4.4
Mont Beuvray	20	0.48	0.58	1.21	n.d.	9.29	22.19

7.5 Analytical Technique: EPMA

The Electron Probe MicroAnalyzer (or microprobe analyzer) is an electron microscope used for micro-compositional analysis.[412] There are two types of Electron Probe Microanalysis (EPMA): 1) qualitative analysis, wherein the user is attempting to identify the elements present in a sample with an unknown composition, and 2) quantitative analysis, a method for when the user knows the elements present in the composition and then uses EPMA to find the weighted percentages of elements present in each sample. There are two important parts for analysis: the electron beam (also called the probe) which irradiates samples and the crystals which the electron beam hits. Each crystal within the microprobe analyzer can detect a specific element. The user of the equipment chooses the elements which need to be detected in a sample. When the electron beam hits the crystals, the electron beam diffracts at certain wavelengths and generate a variety of signals which characterize a sample's chemical composition and microstructure.

Standard Reference Materials or SRMs which have soda-lime-silica matrices with concentrations of major oxides closest to the matrix of opaque red glass and most other ancient glasses from the Mediterranean (i.e. soda-lime-silica base glasses with similar minor elements) were used as reference standards to detect the elemental composition of samples from Mont Beuvray.[413] The glass samples were tested by Dr. Brian Damiata and myself in Electron MicroProbe Laboratory housed in the Department of Earth, Planetary and Space Sciences at UCLA. Table 14 provides instrument information and parameters followed by Damiata on the JXA-8200 Superprobe housed in the laboratory. Mounts were carbon coated before EPMA analysis and images were taken of each sample. The electron beam/probe diameter was set to 10 μm for each sample. 10 spots were chosen for each sample after analyzing the BSE (backscatter

[412] Kulkarni et al. 2022
[413] Personal communication with Dr. Brian Damiata

electrons[414]) images, which showed lighter and darker streaks in most glass samples. Spots were chosen within different colored streaks. Recording times for silica (Si), iron (Fe), titanium (Ti), magnesium (Mg), manganese (Mn), calcium (Ca), phosphorous (P), antimony (Sb), aluminum (Al), copper (Cu), and lead (Pb) were 20 seconds on peak and 10 seconds for upper and lower background. Recording times for sodium (Na) and potassium (K) were 10 seconds on peak and 5 seconds on upper and lower backgrounds. The SRMs used were Corning C and A, Smithsonian standards, and in-house standards.

Table 14 Table of instrument parameters (EPMA). Personal email communication with Dr. Brian Damiata.

Electron Probe MicroAnalyzer	JXA-8200 Superprobe
Accelerating voltage	15 kV
Beam current (nA/nanoAmps)	5
Probe diameter (μm)	10
Crystal types	TAP, PETJ, PETH, LIF, LIFT, LDE1, LDEB, LDEC
Number of spots	10
Recording times for Si, Fe, Ti, Mg, Mn, Ca, P, Sb, Al, Cu, and Pb	20 seconds on peak and 10 seconds for upper and lower background
Recording times for Na and K	10 seconds on peak and 5 seconds on upper and lower backgrounds

7.5.1 Reading Results: Composition of Opaque Red Glass using EPMA

The average composition of each glass sample was determined from the average of the ten electron probe spots taken per glass sample. The EPMA results are similar to the LA-ICP-MS results (Table 15). The group composition of opaque red glass samples from Mont Beuvray showed concentrations of magnesium (MgO) and potassium (K_2O) lower than 1.5 wt%, suggesting the use of natron as a fluxing agent. Sodium (Na_2O) and silica (SiO_3) concentrations

[414] BSEs are high-energy electrons used to obtain high-resolution images which reveal the compositional difference in a sample. Personal communication with Dr. Briain Damiata

within the base glasses are comparable to the Group 4 Celtic/insular glasses discussed by Bandiera in 2021 and Bandiera et al. 2019.

Table 15 EPMA results of 19 opaque red glass samples from Mont Beuvray, France in wt %.

Sample	TiO_2	P_2O_5	Na_2O	FeO	K_2O	Sb_2O_5	SiO_2	MgO	MnO	CaO	Al_2O_3	CuO	PbO
2011.32.37 30.9	0.070	0.038	10.034	0.527	0.422	1.580	47.040	0.488	0.706	5.442	1.781	5.634	26.145
2017.19.17 65.19	0.058	0.114	11.270	0.418	0.555	1.169	49.069	0.484	0.620	5.925	1.799	6.016	22.224
2017.19.17 65.15	0.656	0.073	11.451	0.438	0.596	1.128	48.959	0.486	0.646	5.727	1.765	6.697	21.419
2018.12.20 4.10	0.049	0.066	10.013	0.407	0.481	1.009	46.052	0.419	0.523	5.616	1.595	7.182	26.339
2017.19.17 65.14	0.085	0.0766	11.022	0.448	0.555	1.1485	49.361	0.496	0.642	5.717	1.779	6.784	21.317
2017.19.17 65.13	0.074	0.055	10.310	0.422	0.517	0.887	47.767	0.435	0.471	5.286	1.718	7.237	24.704
2016.19.14 39.60	0.100	0.049	10.105	0.351	0.390	1.217	46.587	0.405	0.403	5.243	1.550	5.751	27.502
2011.32.37 30.10	0.087	0.087	11.343	0.447	0.592	1.160	48.924	0.505	0.666	6.023	1.758	5.368	22.888
2017.19.17 65.16	0.072	0.091	11.225	0.411	0.628	1.121	48.780	0.501	0.596	5.821	1.799	7.096	21.631
2016.19.14 39.59	0.060	0.057	10.484	0.431	0.431	1.590	47.482	0.424	0.758	5.554	1.610	3.790	27.055
2014.19.11 35.39	0.064	0.056	11.444	0.398	0.487	1.709	50.706	0.473	0.765	5.786	1.790	4.763	21.347
2011.32.35 84.2	0.068	0.106	11.122	0.309	0.478	1.236	49.091	0.421	0.706	5.686	1.657	5.808	23.002
2018.12.20 4.9	0.080	0.044	11.402	0.361	0.492	0.737	50.226	0.448	0.488	5.794	1.777	6.922	20.794
2014.19.11 26.40	0.076	0.098	10.558	0.359	0.534	1.194	47.785	0.475	0.575	5.631	1.667	6.752	24.257
2011.32.37 30.12	0.081	0.058	11.157	0.401	0.640	1.179	48.460	0.504	0.612	5.793	1.741	7.491	21.614
2017.19.17 65.17	0.077	0.089	11.079	0.409	0.651	1.127	48.224	0.505	0.623	5.636	1.714	8.370	21.324
2017.19.17 65.12	0.058	0.047	10.828	0.463	0.556	1.348	48.061	0.465	0.530	5.486	1.724	6.923	23.082
2017.19.17 65.21	0.636	0.946	11.795	0.395	0.661	1.086	49.598	0.525	0.625	5.936	1.845	5.349	21.389
2017.19.17 65.20	0.061	0.079	10.646	0.390	0.481	1.278	47.077	0.403	0.586	5.165	1.678	8.299	23.596
Averages	**0.132**	**0.117**	**10.910**	**0.409**	**0.534**	**1.205**	**48.381**	**0.466**	**0.607**	**5.645**	**1.723**	**6.433**	**23.243**

Though no values were taken for SO_3 during EPMA testing, the average composition of the base glass is similar to the results of LA-ICP-MS testing, as seen below in Table 16.

Table 16 Comparison of average composition of base glass according to EPMA and LA-ICP-MS, in wt %.

	Oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TiO_2	MnO
EPMA		15.9472	0.6818	2.5194	70.7197	0.1061	n.d.	0.7807	8.2522	0.1043	0.8818
LA-ICP-MS		14.41172	0.57531	2.50004	71.816125	0.28573	0.57627	0.832935	8.046225	0.084545	0.872475

EPMA data also suggest that the glass under study is a soda-lime-silica glass with the addition of copper, antimony, and lead used in the coloring process. The major oxides tested by both EPMA and LA-ICP-MS resulted in similar values (Table 17), though the copper values are slightly higher in the LA-ICP-MS results. Metallic copper was suggested as the colorant for the glass after the reviewing the microprobe data, though SEM-EDS illustrated the presence of copper nanoparticles or dendrites in the matrices of the samples.

Table 17 Comparison of major oxides in wt% of sealing-wax red samples from Mont Beuvray using EPMA and LA-ICP-MS.

EPMA													
Oxide	**TiO_2**	**P_2O_5**	**Na_2O**	**FeO**	**K_2O**	**Sb_2O_5**	**SiO_2**	**MgO**	**MnO**	**CaO**	**Al_2O_3**	**CuO**	**PbO**
Average 19 samples	0.07	0.07	10.91	0.41	0.53	1.21	48.38	0.47	0.61	5.65	1.72	6.43	23.24
LA-ICP-MS													
Oxide	**TiO_2**	**P_2O_5**	**Na_2O**	**Fe_2O_3**	**K_2O**	**(Sb_2O_3**	**SiO_2**	**MgO**	**MnO**	**CaO**	**Al_2O_3**	**CuO**	**PbO**
Average 20 samples	0.056	0.19	9.58	0.48	0.55	1.21	47.81	0.38	0.58	5.35	1.66	9.29	22.19

7.6 Complicating Colonialism: Fringe Artisans in the Three Gauls

Based on the LA-ICP-MS and EPMA data, it is certain that sealing-wax red opaque red glass of the Celtic/insular type was used in the decoration of copper- and iron-based goods at Mont Beuvray. Before this study, the results published by Brun and Pernot suggested that there were two types of glass on site:

1. Brun and Pernot suggested the presence of a "Continental Celtic" glass group from the pre-Roman period with low levels of manganese. Enamel shells of this glass type had crossed grooves divided into four quarters measuring less than 1cm deep.

2. Brun and Pernot also determined the presence of a "Mont Beuvray" type glass with high manganese, associated to the period of the post-Roman conquest. The enamel shells had radiant grooves close to 5cm deep.

Another publication on the microstructure of opaque red glass suggested a major difference between "Celtic" glass and Gallo-Roman glass of the 4th c. CE:[415]

1. Pre-Roman "Celtic" opaque red glass was colored by copper dendrites while
2. Gallo-Roman glass was colored by metallic copper dispersed in the form of nanoparticles rather than copper dendrites

Farges' publication on the microstructure of glass from Mont Beuvray suggested that in the 1st c. BCE opaque red glass was colored by copper metal, which appeared in the form of copper nanoparticles within the glass matrix.

After comparing the compositions of the glass samples tested in this dissertation to the results recorded in Bandiera and Bandiera et al.'s publications, it can be determined that there was glass colored by copper metal which formed into copper dendrites at Mont Beuvray. The compositions of the glass samples are most similar to Celtic/insular glasses of the 2nd c. BCE to 2nd c. CE, which overlaps with the beginning of Mont Beuvray's foundation in the last half of the 2nd c. BCE. Brun and Pernot's identification of a glass type present at the site which was dissimilar to opaque red glasses in other parts of continental temperate Europe is substantiated by the current study, though this glass type can be identified now as closest to glasses decorating metal objects in Britain. Though it is difficult to date glass waste beyond the range of 150/140 BCE to the early 1st c. CE, the proliferation of this composition across the site (ex. Le Port du

[415] Brun et al. 1991

Rebout, Le Champlain, Le Porrey, La Chaume, Parc aux Chevaux) and found in contexts dating up to the end of the 1st c. BCE suggests that sealing-wax red glass ingots could have been used by indigenous populations to decorate portable and personal metal objects at Mont Beuvray at least in the last few decades of the 1st c. BCE.

Two publications – Bandiera's dissertation and an earlier joint publication with Lehuédé, Verità, Alves, Biron, and Vilarigues – proved that sealing-wax red was produced and consumed into at least the 2nd c. CE and red-brown glass was in use simultaneously from the 2nd c. BCE, corresponding to the beginning and the height of Rome's dominance as a trading partner across the Mediterranean and beyond its borders.[416] As I argued in Chapters 3 and 4, opaque red glass was traded into the Three Gauls through northern Italy; based on Rome's swift rise in power and conquest of the Mediterranean Basin in the 2nd and 1st c. BCE, Rome having a level of control over the trade of glass ingots into northwestern Europe is likely. The two types of opaque red glass may have been traded simultaneously into the region by the late 2nd/early 1st c. BCE and 1st c. CE, while Roman control over mineral resources and the extensive use of lead for aqueducts, bath complexes, and other infrastructural and engineering needs could have led most facilities to produce glasses with lower or no lead contents. The transition to red-brown glass across the territory later controlled by the Roman Empire may have far less to do with "Roman tastes" than Roman control of mineral resources for highly specific projects.

We are left with a few other major observations. First, if there was red brown glass at Mont Beuvray, as suggested by Farges, this glass would have been visually indistinguishable from sealing-wax red to indigenous populations living in settlements such as Mont Beuvray and

[416] Bandiera 2021; Bandiera et al. 2019

it could have been used to decorate the same portable and personal objects. Differences in composition between sealing-wax red and red brown glasses, however, would have been obvious to the glass artisan, particularly the lower lead levels which affected viscosity of the glass. Perhaps this is one reason why opaque red glass decorated metalworks are fewer in number for at least 100 years on the continent; new techniques were needed to apply the glass. In Britain, blue was added relatively soon after the introduction of opaque red glass decoration to metalworks and so processes for applying glasses with lower lead levels and different compositions were in place by the time red brown grass became the prominent type in the 2nd c. CE.

When artisans living in the Three Gauls purchased opaque red glass ingots, they may not have known that ingots of sealing-wax red glass with slightly lower levels of copper and lead were a different composition because the glasses are visually similar to the naked eye. Only when the glass was melted could the artisan have noticed differences in the melt and application. Potential failures in production and a sharp reduction in market needs due to the destruction of Iron Age socio-cultural systems in temperate continental Europe would have led to fewer object types being produced. It is possible that some fibulae were decorated with simple opaque red glass decoration in the 1st c. CE since there is overlap in fibula types of the 1st to 3rd c. CE. Fibulae produced at the end of the 1st c. BCE or beginning of the 1st c. CE, however, could be invisible in the archaeological record due to technical issues in production, the elite adoption of other goods into their display practices in order to survive under Roman imperialism, and/or excavation bias.

I will return to the questions I posed earlier in this chapter:

1. New analyses of opaque red glass discovered at Mont Beuvray provide clarity on the composition of the glass, proving that multiple types of glass were present at the site

in the late 1st c. BCE or very early 1st c. CE and used in the production of a small number of objects for a subset of the local population.

2. The compositions of the glass samples are similar to the glasses tested by Brun and Pernot, though their assumption that the glass was a Roman type may or may not be true. As I was unable to test their original samples, I may only say with certainty that the composition of the glass I studied most closely resembles Celtic/insular glass.
3. The opaque red glass at Mont Beuvray is colored by copper dendrites and copper nanoparticles, suggesting the use of glass ingots with different formulae on site.
4. It is probable that there is overlap between the uses of sealing-wax red and red brown glasses at the settlement at the end of the 1st c. BCE or beginning of the 1st c. CE, and the color of the glass would not have mattered to artisans or consumers. The levels of lead, on the other hand, would have been significant since the viscosity and melting point of red brown glass differs from sealing-wax red. New techniques for enameling would have been developed to adjust to the formula.
5. Both sealing-wax red and red brown glasses were acceptable to use in the production of personal and portable metal objects.
6. We cannot say that artisans willingly chose to use red brown glass in order to meet Roman preferences; rather, these artisans were never meeting Roman practices but had attempted to produce a small number of object types using the technical skills that they and their mentors had developed using the red glass available to them.
7. The presence of three formulae for opaque red glass in temperate Europe at the end of the Iron Age – the insular and the continental sealing-wax reds and the red brown

types – present proof of a complicated system of trade and experimental applications of colorants.

To Late Iron Age and early Roman populations, red glass was red glass – the ultimate issue was not that the glass formula changed, but that the people who had once purchased the glass had to adjust to new display practices and value systems. Some artisans on the fringes of imperialism attempted to continue the tradition in the 1st c. CE, but it barely survived due to the disappearance of the warrior lifestyle; in Roman Britain, this lifestyle was still present due to the significant military presence and its spatial separation from the rest of the empire. Because of the presence of fringe artisans practicing their craft in Roman Britain and soldiers' appreciation for enameled brooches in particular, artisans crafting fibulae decorated with opaque red glass in the late 1st and early 2nd c. CE – who learned their skills from earlier generations of artisans – were able to successfully participate in the rebirth of enameled arts in the northwestern provinces in the 2nd c. CE and in the centuries to come.

7.7 Finishing Touches: Some Final Notes

In the Three Gauls, opaque red glass did not disappear, nor did the formula for the glass change to meet a Roman market. It is most probable that multiple formulas of sealing-wax red and red brown glasses were in use simultaneously at sites such as Mont Beuvray; the use of both glass types in the mosaics from the Villa of Lucius Verus in the 2nd c. CE. The colors of the glasses were visually similar to glass artisans and consumers, so either composition could serve the same purpose; any problems with the glass rested with production since red brown glass had a lower viscosity and higher melting point, and because the types of goods traditionally made

were no longer desired by elite populations. The Roman conquest of temperate Europe led to the silencing and devaluation of Iron Age socio-cultural and political systems while the massive influx of Roman goods into the Three Gauls adapted into the daily lives of the new Gallo-Roman aristocratic class led to a lower demand for glass-decorated metal objects. Fibulae were always a necessity, though, particularly for women whose garments required at least one or two fibulae to hold their Gallic cloaks in place. It might be speculated that some women on the fringes of Gallo-Roman society were responsible for the continuation of enameling practices after the conquest. Their demands for objects of personal display, such as fibulae with opaque red glass decoration, could have been worn to demonstrate their connections to a world and culture lost but not forgotten. The small workshops which produced some of these goods survived due to a small number of individuals tied to more traditional lifeways, and through this connection to traditional methods of manufacture, enamel artisans were able to survive and pass their knowledge down until the 2nd c. CE – and new artisans could actively participate in a rebirth of the production and consumption of personal and portable decorated metalworks for hundreds of years to come.

Chapter 8

Crosssing Chronologies: Opaque Red Glass in Temperate Europe

8.1 Introduction

As the previous chapters have demonstrated, there is no single evolutionary line for opaque red glass. In Iron Age temperate Europe, both on the continent and in Britain, there are various procedures and formulas followed to produce an opaque red glass ingot. There are also multiple techniques used to apply broken, powdered, and melted glass to metal objects, and several object types to decorate. A divide is placed between the continent and Britain at the end of the Iron Age and the early Roman period, as the imperial conquest of Britain occurred 50 to 90 years after the conquest of multiple regions of western continental temperate Europe. In this concluding chapter, I aim to 1) argue that Roman imperialism led most members of the indigenous aristocratic class of continental Europe to devalue of traditional crafts, such as the application of opaque red glass to metal objects, 2) demonstrate that the rebirth of enameled metal arts in the late 1st and early 2nd c. CE was motivated by auxiliary soldiers stationed at the *limes* of the northwestern provinces who commissioned the work of fringe artisans knowledgeable in the enameling arts.

I approach the first goal by readdressing indigenous epistemicide and resistance in the northwestern provinces and the similarities in glass compositions from Mont Beuvray and Britain, exploring the global connections between peoples of the Mediterranean, temperate Europe, and Britain. To address the second goal, I discuss the connections between the movement of auxiliary soldiers, the practices of fringe artisans, and the needs of soldiers and locals in Britain and the continent, as these groups propelled the survival and artistic "rebirth" of indigenous traditional crafts across northwestern provincial Europe.

8.2 Observing the Opaque: Opaque Red Glass Decoration and Epistemicide

In Chapter 5, I discussed epistemicide and the devaluation of opaque red glass decoration on personal and portable metal objects after the Roman conquest the (future) northwestern continental provinces. Archaeological approaches to epistemicide in the field of Classics, specifically in northwestern temperate Europe, is a field which needs to still be explored. Katherine Blouin and Ben Akrigg's edited volume includes articles which approach classics through anticolonial theory, and Nicola Terrenato's research on non-Roman indigenous cultures of the Italic peninsula also sought inspiration in postcolonial and anticolonial thought. Recent works by scholars such as Dan-el Pedilla-Peralta have brought epistemicide to the forefront of classical studies as scholars address Eurocentrism and erasure of certain populations, both ancient and modern.[417] As Pertierra summarized, epistemicide is "a milder form of genocide but ultimately as threatening to the continuation of alternative approaches to life."[418] Traditional archaeological and historical approaches to early Roman imperial temperate Europe do not consider this anticolonialist approach, instead focusing on local choice and hybridity.

Evidence for hybridity – a more positive approach to the violence of conquest and colonialism – has been argued through such cases as the Roman colony of Lugdunum, given its common name by the amalgamation of Roman and Gaulish languages; or, perhaps, the presence of Gallo-Roman temples, or *fana*, which have a character unseen in the Italic peninsula; or even the construction of early rural mansions, which were aristocratic private building projects using Roman materials to create Gaulish forms.[419] The experimentation in rural mansions, however, dissolves by the early 1st c. CE and villas take their place. *Fana* are located outside of urban

[417] Blouin and Akrigg 2024; Terrenato 2019; Pedilla-Peralta 2024
[418] Pertierra 1998: 85
[419] Woolf 2002; Slofstra 2002; Goodman 2006

centers; these are peripheral religious locations whose forms may be based on indigenous models, but have lost their indigenous building materials.[420] Indigenous names and their meanings have been lost through time as Mediterranean forms of knowledge were privileged over indigenous systems, and so linguists today must attempt to reconstruct languages which were never recorded.

The Roman practice of epistemicide is betrayed by the material record, particularly when we consider production, consumption, and deposition. The dramatic drop in metal objects decorated with opaque red glass is evident in the archaeological record of temperate European territories conquered by Rome in the second half of the 1st c. BCE and early 1st c. CE. The shift from pre-Roman indigenous styles of art, such as glass-decorated metalworks, and increase in Roman goods in temperate Europe after conquest and provincialization should be interpreted as the devaluation and death of a pre-Roman practice.

Portable and personal metal objects decorated with opaque red glass – torques and belts worn by humans and chariot and harness pieces associated with horses, for example – were valuable and symbolic objects to elite and warrior classes. From the 4th to 1st c. BCE, these objects were produced, consumed, displayed, and deposited in highly visible and public spaces in indigenous social worlds: religious, political, and social spaces. The internalized and externalized messages of the objects may have shifted over time and interpretation relied on the viewer's social position and relationship to the owner or gift-giver, but the significance of the glass to captive audiences (human and divine) did not wane for almost over 350 years. Roman socio-cultural, religious, and political systems, however, were dissimilar to indigenous social systems

[420] Goodman 2006

and networks, and the same values could not be maintained, especially in public spaces. Roman Traditional knowledge, networks, and value systems of Iron Age elites and warriors were devalued, and these groups were forced to participate in the death of their public display and consumption practices.

Britain is placed as a case in direct opposition to the continental northwest provinces. There is no doubt that epistemicide occurred – the loss of indigenous languages south of Hadrian's Wall and the political and religious structures set in place after the Roman conquest which replaced various socio-political and kinship systems, and the suppression and death of Druidism as witnessed in the Three Gauls, also is evidence of the practice. Nevertheless, Britain is treated differently in scholarship. Its isolation from the continent is cited as one reason for its differences; the province was surrounded by unconquered populations, so regional authority was not solely in the hands of the provincial governor or an aristocratic class accepted and placed in power by Roman authorities, but in those of soldiers who were present in the northern and western areas in particular, where danger of invasion was most possible.[421] The province was separated from easy trading and fresh batches of troops by waters which could be safely traveled only from March to October, leading to a high number of troops present in the province in relation to its size.[422]

A similar fate befell the Lower Rhine – the permanent presence of the army along the *limes* led to a strong military character, and the region was neither rich nor urbanized, and did not develop the villa culture which was present in central Gaul.[423] In a region which was administered similarly to Roman Britain, we might expect continuous evidence for the

[421] Mattingly 2006: 129
[422] Mattingly 2006: 24
[423] Slofstra 2002: 34

consumption of enameled metal objects. Definitive proof, however, does not exist in the form of datable objects. According to Vincent Van Der Veen's research on brooches at the Augustan military base and Flavio-Trajanic fortress at Nijmegen, the Netherlands, the only datable enameled disc brooch is from the Flavio-Trajanic period.[424] A similar pattern presents itself in Stefanie Hoss's dissertation on Roman military belts, as almost all examples of enameled belts date to the Flavio-Trajanic period and later.[425] The examples of pressed plate belt fittings with central bosses, categorized as Variant B.3.1, that Hoss describes cannot be accurately dated beyond the Augustan, Tiberian, or Claudian periods; the type, which is decorated with opaque red glass enamel, flourished in the Claudian period but had its beginnings in earlier. The red enameled belts of Variant B.3.1 recorded in their dissertation (B.459, 460, 461, 462, and 463) remind one of the women's belts common in the Late Iron Age in temperate Europe; these objects may have been found in graves between Rheingönheim and Altrip, which is south of modern Frankfurt and in the heart of distribution for opaque red glass enameled belts in the Late Iron Age. If these belt plates are Roman rather than Iron Age and were not heirlooms, then these objects are indicative of a small red glass enameling industry on the edges of Roman Gaul.[426]

Practices of resistance through traditional craftworking and display practices, and perhaps the continuation of a belt type with a shift in the gendered display from male to female, should be read into anticolonial epistemicide approaches to archaeology. We should be encouraged to read resistance to epistemicide in craft production; the presence of a small number of metal objects inlaid with opaque red glass in the Three Gauls which date to the 1st c. CE and the possible continuation of opaque red glass working at sites such as Mont Beuvray for a brief

[424] Van Der Veen 2021: 91
[425] Hoss 2014
[426] See Chapter 7 of this dissertation on fibulae in the Three Gauls for similar evidence of this phenomenon.

period after the post-conquest period, suggests some local resistance to the death of traditional arts and values. The archaeological evidence for enameling in the post-conquest period suggests resistance as subversion, a model that Homi Bhabha envisioned as the creation of a hybrid in-between space where pre-existing cultural codes are redefined.[427] It is in this space, where the colonized can redefine personal and communal selfhood objects, that new styles and types of enameled objects are created. The divide in treatments of Iron Age and Roman, of continental and insular, are artificial – nuances, similarities, and connections are present if the archaeological material is approached by ignoring the imaginary borders set in place and perpetuated through scholarship.

8.3 Combining Colors: Polychrome Enameling in the Roman Northwestern Provinces

Archaeological evidence from Britain, interior Gaul in the region of Burgundy, and the Lower Rhine suggests that personal and portable enameled metal objects were valued in the military zones of the empire by Roman auxiliaries soldiers from the northwestern provinces and their families. The works of Hunter, Mattingly, and Ivleva argue for the unique position of Britain in the production of a distinctive set of "frontier art" and its transmission across the northwestern provinces by auxiliaries, some of whom took the objects to their home territories as souvenirs.[428] Though these are well-supported arguments for the transmission of enameled objects of Romano-British production, there are classes of objects which are not part of the tradition such as the disc brooches from Nijmegen and the belt plates from Germany. Based on the evidence presented in this dissertation – the presence of (sometimes dubiously dated)

[427] Bhabha 1994: 1-2
[428] Mattingly 2006: 213; Hunter 2008: 136-138; Ivleva 2014: 256-257

enameled objects, artisans' experiments with mold-blowing opaque red glass, and the multiple formulas of glass at Mont Beuvray which seem to date to the end of the Iron Age and beginning of the Roman period – it is probable that enameled metal objects continued to be produced in the northwestern continental provinces from the late 1st c. BCE to at least the mid-1st c. CE. Production was driven by commissioned fringe artisans who experimented with indigenous and Roman technologies, techniques, styles, and materials.

Auxiliary soldiers and their families needed a variety of metal objects. While some objects such as decorative metal horse gear was commissioned for ceremonies and parades, brooches and belts were everyday objects. The quantity and distribution of enameled brooch types in military and non-military zones of Britain suggest the accessibility and affordability of these objects in the Roman period while object expansion onto the continent in the 2nd c. CE was driven by the movement of soldiers, their families, and the settlement of veterans. Though it is possible that craftworkers moved with specific legions, it is more probable that most of these individuals lived in nearby *vici* and supplied the needs of the forts.

Enamellers were not uncommon in the Late Iron Age; there was no single location of production, as proven through the various formulas for opaque red glass. Though Mont Beuvray is the only archaeological site with an enamellers' workshop in continental Europe, it must not have been the only; crafting traditions are too variable. Though certain knowledge systems of certain elites may have been silenced and devalued by Roman aristocrats, these systems were not dismantled in all populations. Some fringe or resistance craftspeople, and some consumers who did not concede wholly to Roman values, kept certain artistic traditions and cultural symbols alive. The Batavians are an example of a culture group that were encouraged by the Roman system to maintain their warrior traditions. Nico Roymans argues that the warrior elites who

lived near in the militarized zones on the edges of the empire, such as in the Rhineland, were established as local military elites.[429] If this social class continued to perpetuate certain practices and values of the pre-Roman warrior lifestyle along the frontier zones of the empire, then this could be one reason for the spread of enameling into non-militarized zones from the 2nd c. CE onward.

Another reason for the spread of enameled metal object production and consumption is increased access to materials and affordability, respectively. The increased exploitation of natural resources in conquered territories, such as those used to make glass and metals objects, would permit artisans to obtain a steadier flow of materials, particularly in small amounts and various colors needed to decorate belts, brooches, and other goods.[430] Increased demand by soldiers and locals for these objects and better accessibility to materials created a space for artisans to expand upon their practices and profit. Large-scale opaque red glass working dwindled in the interior Roman provinces due the spread of the imperial project, but the practice spread from the *limes* to the interior of the continent in the 2nd c. CE due to the movement and settlement of military and military-associated populations. Soldiers, artisans, and local groups aided in the survival of indigenous traditional crafts which became part of the display practices of their frontier identity across northwestern provincial Europe.[431]

8.4 Finishing Touches: Some Final Notes

[429] Roymans 1996: 27
[430] For example, see Pagès et al. 2022 on the exploitation of metal resources.
[431] Ivleva 2014; Hunter 2008

Though a single material used to decorate objects in a vast world of art, opaque red glass maintains an important space in our understanding of ancient crafts, value, networks, and the agents who embedded it in their socio-cultural and politico-religious systems. Humans and objects were agents that embodied and communicated personal and group esteem, moral, and measure values within and between communities. The spaces in which personal and portable metal objects inlaid with opaque red glass were present – worn or deposited, exchanged in ceremonies and rituals, given as gifts to the gods, humans, or the deceased, worn by humans or animals, or carefully added to chariots – relayed a variety of messages in the Iron Age. On the continent and in southern Britain, indigenous elites and a warrior class demonstrated their glocal and global connections within and between communities. The opaque red glass enhanced legibility and viewership experience through its use in complicated designs, its gem-like brilliance, and its deep color which captured the audience's attention. As objects and materials in motion and agents within the indigenous objectscapes of Iron Age temperate Europe,[432] opaque red glass and its associated metalworks shared local vocabularies which could connected communities within and across territories.

After the Roman conquest of parts of northwestern continental Europe, the new aristocratic class formed a society shaped around Roman displays of power and wealth. Indigenous knowledge systems were marginalized and devalued and, in turn, opaque red glass – a material which had been used to institute and promulgated these systems – became part of the fringe. A small demand for this material as a decorative element for brooches, belt plates, horse harnesses, and chariot equipment kept the traditions and meanings alive in the frontier zones – the Lower Rhine and Britain in particular – as some warrior elites were used by the Roman

[432] Pitts and Versluys 2021: 368-369

system as a tool of its defense. Exchange along the *limes* and experimental enameling practices in Roman Britain, however, led to the use of new colors and polychrome decoration, perhaps connected to the glassblowing industry and interest in mosaic glasses and millefiori.

I hope to have demonstrated the benefits of interdisciplinary approaches to a single material type across scholarly chronological and geographical divides through this dissertation project. Our scholarly understanding of opaque red glass is enhanced best through the cautious balance of scientific analyses and anthropological and art historical approaches. Through these lenses, we can visualize the significance of a material to societies and challenge the assumptions presented through studies which only direct attention to the science or the humanities. There are innumerable entanglements of human and non-human agents within and between communities and classes, colonizing power and colonized peoples, typologies and styles, and techniques and technologies to address through interdisciplinary projects. I am optimistic that our understanding of the past will grow positively through similar future studies.

In my own future projects, I aim to expand my sample size of opaque red glass objects and include further scientific analyses, such as neodymium and strontium isotope, to clarify the connection between the glass industries at Mont Beuvray and in pre-Roman and Roman period Britain. The similarities in their coloring processes cannot go unnoticed and must be investigated further. It is my goal to find and reanalyze the samples tested by Brun and Pernot in 1992 and Farges in 2013 with LA-ICP-MS to verify the compositions. Multiple future projects will account for the variability of object types, styles, and glass compositions present within the regions under study, culminating in a larger public database through which the trade of ideas, materials, and techniques of production can be visualized by other interested parties. Through an expansion of the data and crossing the divides between fields, I see a bright future for

interdisciplinary postcolonial and anticolonial archaeological studies in classics and classics-adjacent fields – and, perhaps someday, a fruitful space for those of us whose research challenges traditional divisions in academia.

BIBLIOGRAPHY

Aldhouse-Green, M. 2018. "Formal Religion." In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P. Wells, 1283-1304. Oxford: Oxford University Press.

Ando, C. 2000. *Imperial Ideology and Provincial Loyalty in the Roman Empire*. Berkeley: University of California Press.

---------- 2006. "The Administration of the Provinces." In *A Companion to the Roman Empire,* edited by D.S. Potter, 177-192. Malden: Blackwell.

Angelini, I., G. Artioli, P. Bellintani, and A. Polla. 2003. "Protohistoric vitreous materials of Italy: from early faience to final bronze age glasses." *16e Congrès de l'Association Internationale pour l'Histoire du Verre, 32*-36.

Anthoons, G. 2021. *Iron Age Chariot Burials in Britain and the Near Continent. Networks of mobility, exchange and belief in the third and second centuries BC*. BAR British Series 666. Oxford: BAR Publishing.

Appadurai, A., ed. 2014. *The social life of things. Commodities in cultural perspective.* Cambridge: Cambridge University Press.

Arletti, R., A. Ciarallo, S. Quartieri, G. Sabatino, and G. Vezzalini. 2006. "Archaeometric analyses of game counters from Pompeii." *Geological Society London Special Publications* 257(1): 175–186.

Arnold, B. 1999. "'Drinking the Feast': Alcohol and the Legitimation of Power in Celtic Europe." *Cambridge Archaeological Journal* 9(1): 71-93.

---------- 1991. "The Deposed Princess of Vix: The Need for an Engendered European Prehistory." In *The Archaeology of Gender: Proceedings of the Twenty-Second Annual Conference of the Archaeological Association of the University of Calgary,* edited by D. Walde and N.D. Willows, 366-374. Calgary: The University of Calgary Archaeological Association.

Arnold, B. and Wicker, N.L., editors. 2001. *Gender and the Archaeology of Death*. Walnut Creek: AltaMira Press.

Azéma, A., B. Mille, F. Pilon, J.-C. Birolleau, and L. Guyard. 2012. "Archaeometallurgical Study of the Large Bronze Hoard Discovered at the Gallo-Roman Sanctuary of Le Vieil-Evreux (Eure)." *ArchéoSciences* 36: 153-173.

Bakhtin, M.I. 1982. *The Dialogic Imagination: Four Essays*, translated by C. Emerson and M. Holquist. Austin: University of Texas Press.

Bamford, C.R. 1977. *Colour generation and control in glass.* Amsterdam: Elsevier.

Bandiera, M. 2021. *Technological study and chemical-archaeometric characterization of Roman*

opaque red glass from opus sectile decoration in the Lucius Verus Villa, 2nd c. AD. PhD dissertation, Conservação e Restauro do Património, Especialidade em Ciências da Conservação, Universidade NOVA de Lisboa.

Bandiera, M., P. Lehuédé, M. Verità, L. Alves, I. Biron, and M. Vilarigues. 2019. "Nanotechnology in Roman Opaque Red Glass from the 2nd Century AD. Archaeometric Investigation in Red Sectilia from the Decoration of the Lucius Verus Villa in Rome." *Heritage 2*: 2597-2611.

Barndon, R., A. Engevik and I. Øye, eds. 2010. *Archaeology of Regional Technologies: Case Studies from the Palaeolithic to the Age of the Vikings*. Lewiston: Edwin Mellen Press.

Bass, G. 1986. "A Bronze Age Shipwreck at Ulu Buru (Kas): 1984 Campaign." *American Journal of Archaeology* 90(3): 269-296.

Bateson, J.D. 1981. *Enamel working in Iron Age, Roman and Sub-Roman Britain. The Products and Techniques*. BAR British Series 93. Oxford: Oxbow.

Batigne-Vallet, C. 2001. "Note sur les choix techniques attestés dans quelques ateliers de céramiques communes de Gaule du Nord pendant la période romaine. Élements pour une synthèse sur les faciès micro-régionaux de la céramique dans le nord de la Gaule romaine." *Actes du congrés de Lille-Bavay, 24-27 mai 2001*. Société Française d'Étude de la Céramique Antique en Gaule.

Bauvais, S. and F. Fluzin. 2007. "Archaeological and Archaeometrical Approaches of the Chaîne Opératoire in Iron and Steelmaking: Methodology for a Regional Evolution Study." In *Techniques and People: Anthropological Perspectives on Technology in the Archaeology of the Protohistoric and Early Historic Periods in the Southern Levant*, edited by S.A. Rosen and V. Roux, 159-178. Paris: De Boccard.

Bayley, J. 2005. "Roman enamel and enamelling: new finds from Castleford, Yorkshire." *Annales du 16e Congrès de l'Association Internationale pour l'Histoire du Verre*: 45-48.

---------- 2015. "Roman enamels and enamelling." In *Glass of the Roman World,* edited by J. Bayley, I. Freestone, and C. Jackson, 178-189. Oxford: Oxbow.

Bell, J. 1992. "On capturing agency in theories about prehistory." In *Representations in Archaeology*, edited by J.G. Gardin and G. Peebles, 30-55. Bloomington: Indiana University Press.

Belvedere, O. and J. Bergemann, eds. 2021. *Imperium Romanum. Romanization between Colonization and Globalisation*. Palermo: Palermo University Press.

Berranger, M. 2012. "From raw iron to semi-products: quality and circulation of materials during the iron age in France." *Archaeometry* 4(54): 664-684.

Berruto, G., E. Costa, N. Curetti, E. Diana, R. Giustetto. 2023. "Archaeometric investigation of bronze Iron Age fibulae with nestled coral insets from three archaeological sites of the Piedmont region (Northwestern Italy)." *Journal of Archaeological Science: Report 51*: 1-14.

Bhabha, H.K. 1994. *The Location of Culture*. London: Routledge.

Biavati, A. and M. Verità. 1989. "The glass from Frattesina, a glassmaking center in the late Bronze Age." *Rivista della Staz. Sper. Ventro* 4: 259-299.

Bimson, M. 1987. "Opaque red glass: a review." In *Early Vitreous Materials*, edited by M. Bimson and I. Freestone, 167-171. London: British Museum Publication.

Bimson, M. and I.C. Freestone. 1988. "Some Egyptian glasses dated by royal inscriptions." *Journal of Glass Studies* 30: 11-15.

Bittel, K., W. Kimmig, and S. Schiek, eds. 1981. *Die Kelten in Baden-Württemberg.* Stuttgart: Konrad Theiss Verlag GmbH.

Blagg, T.F.C. 1990. "Architectural Munificence on Britain: The Evidence of the Inscriptions." *Britannia* 21: 13-31.

Blouin, K. and B. Akrigg, eds. *The Routledge Handbook of Classics, Colonialism, and Postcolonial Theory*. Routledge. New York: Routledge.

Blázquez, J.M. 1989. *Nuevos estudios sobre la Romanización*. Madrid: Ediciones Istmo.

Bonnet, C. 2022. "Ceramic Studies in Funerary Contexts from Roman Gaul." In *The Routledge Handbook of Archaeothanatology*. *Bioarcheology of Mortuary Behavior*, edited by C.J. Knüsel and E.M.J. Schotsmans, 456-471. London: Routledge.

Borgers, B., P. Quinn, P. Degryse, M. de Bie, and K. Welkenhuysen. 2020. "Roman Pottery Production in Civitas Tungrorum, Central Belgium, during the First – Third Centuries CE." *Archaeometry* 62(2): 267-284.

Borgers, B., S. Willems, C. Dupuis, and R. Clotuche. 2021. "Technological knowledge and transfer of Roman pottery production in *Civitas Nerviorum* (northern France, central Belgium) during the 1st-3rd centuries CE." *Journal of Archaeological Science: Reports* 38:1-16.

Boschetti, C. 2011. "Vitreous Materials in Early Mosaics in Italy: Faience, Egyptian Blue, and Glass." *Journal of Glass Studies* 53: 59-91.

Boschetti, C., G. Furlan, N. Schibille, R. Raja, and J. Bonetto. 2024. "Glass working and recycling in Pompeii: New evidence from the landfill of the Sarno Baths (VIII 2, 17-23)." *Archaeological and Anthropological Sciences* 16(115): 1-16.

Boschetti, C., J. Henderson, and J. Evans. 2017. "Mosaic tesserae from Italy and the production of Mediterranean coloured glass (4th century BCE-4th century CE). Part II: Isotopic provenance." *Journal of Archaeological Science: Reports* 11: 647-657.

Boschetti, C., J. Henderson, J. Evans, and C. Leonelli. 2016. "Mosaic tesserae from Italy and the production of Mediterranean coloured glass (4th century BCE-4th century CE). Part I: Chemical composition and technology." *Journal of Archaeological Science: Reports* 7: 303-311.

Bourdieu, P. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.

---------- 1984. *Distinction: A Social Critique of the Judgement of Taste*, translated by R. Nice. Cambridge: Harvard University Press.

Bradley, R. 2013. "Hoards and the Deposition of Metalwork." In *The Oxford Handbook of the European Bronze Age,* edited by H. Fokkens and A. Harding, 121-139. Oxford: Oxford University Press.

---------- 1990. *The Passage of Arms: An archaeological analysis of prehistoric hoards and votive deposits.* Cambridge and New York: Cambridge University Press.

Brandt, R. and J. Slofstra, eds. 1983. *Romans and Natives in the Low Countries. Spheres of interaction.* BAR International Series 184. Oxford: BAR Publishing.

Brems, D. and P. Degryse. 2013. "Trace Element Analysis in Provenancing Roman Glass-Making." *Archaeometry* 56(S1): 116-136.

Brice, L. and E. Greene. 2024. *Women and the Army in the Roman Empire.* Cambridge: Cambridge University Press.

Brill, R.H. 1992. "Chemical Analyses of Some Glasses from Frattesina." *Journal of Glass Studies* 34: 11-22.

Brill, R.H. and N.D. Cahill. 1988. "A Red Opaque Glass from Sardis and Some Thoughts on Red Opaques in General." *Journal of Glass Studies* 30: 16-27.

Brück, J. and D. Fontijn. 2013. "The Myth of the Chief: Prestige Goods, Power, and Personhood in the European Bronze Age." *The Oxford Handbook of the European Bronze Age*, edited by H. Fokkens and A. Harding, 197-215. Oxford: Oxford University Press.

Brun, P. 2018. "Funerary Practice." In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P.S. Wells, 1237-1260. Oxford: Oxford University Press.

Brun, N., L. Mazerolles, and M. Pernot. 1991. "Microstructure of opaque red glass containing copper." *Journal of Material Science Letters* 10: 1418-1420.

Brun, N. and M. Pernot. 1992. "The opaque red glass of Celtic enamels from continental Europe." *Archaeometry* 34(2): 235-252.

Buchsenschutz, O. 2007. *Les Celtes.* Paris: Armand Colin.

Buchsenshutz, O., H. Richard, J.-P. Guillaumet, V. Guichard, P. Beck, B. Saint Jean Vitus, K. Gruel, C. Canat, C. Sapin, W. Berry, and J. Laszlovszky. 1998. "L'occupation du site et son context environnemental." *Gallia* 55: 8-18.

Bucsek, N., M. Pernot, V. Challet, and A. Duval. 1990. "Etude de l'émail rouge du Mont Beuvray." *Revue Archéologique de l'Est et du Centre Est* 41(I): 149-157.

Bulliot, J.G. 1872. "Memoire sur l'émaillerie gauloise à l'oppidum du Mont Beuvray." *Memoires de la Société national des Antiquaires de France* 33: 2-37.

Bulliot, J.G. and H. de Fontenay. 1875. *L'art de l'émaillerie chez les Éduens avant l'ère chrétienne*. Paris: Honoré Champion, Libraire.

Buchsenschutz, O. 2015. *L'Europe celtique à l'âge du Fer (VIIIe-1e siècles).* Paris: PUF.

Butcher, S. 1976. "Enamelling." In *Roman Crafts*, edited by D. Strong and D. Brown, 42-51. London: Duckworth.

---------- 1997. "Enamels from Roman Britain." In *Ancient Monuments and their Interpretation. Essays presented to A.J. Taylor*, edited by M.R. Apted, R. Giyard-Beer, and A.D. Saunders, 41-69. West Sussex: Phillimore and Co. Ltd.

Butler, J. 1988. "Performative Acts and Gender Constitution: An Essay in Phenomenology and Feminist Theory." *Theatre Journal* 40(4): 519-531.

---------- 1990. *Gender Trouble: Feminism and the Subversion of Identity*. London and New York: Routledge.

Cassibry, K. 2018. "Spectacular Translucence: The Games in Glass." *Theoretical Roman Archaeology Journal* 1(5): 1-20.

Causey, F., J. Maish, H. Khanjian, and M.R. Schilling. 2019. *Ancient Carved Ambers in the J. Paul Getty Museum.* Los Angeles: Getty Publications.

Challet/Defente, V. 1991. "Les débuts de la technique de l'émaillerie: premiers objets émaillés en Gaule dans leur contexte européen," *Bulletin de l'Association française pour l'étude de l'âge du fer*, AFEAF 9: 68-70.

---------- 1992. *Les Celtes et l'émail*. Aubervilliers: Éditions du CTHS.

---------- 2019. "Art and gender: the case study of enamelling in continental Europe (4th-3rd century BCE)." In *Gender Transformations in Prehistoric and Archaic Societies*, edited by Julia K. Koch and Wiebke Kirleis, 403-415. Leiden: Sidestone Press.

Champion, S. 1977. *The Use of Coral and Other Substances to Decorate Metal Work in Central and Western Europe in the Middle and Later Centuries of the First Millennium B.C.* Ph.D. Thesis, Oxford University, Oxford, UK.

---------- 1982. "Exchange and Ranking. The Case of Coral." In *New Directions in Archaeology*. Edited by Colin Renfrew and Stephen Shennan. Cambridge: Cambridge University Press.

Champion, T.C. 1989. *Centre and Periphery: Comparative Studies in Archaeology.* London: Unwin Hyman.

---------- 2016. "Britain Before the Romans." In *The Oxford Handbook of Roman Britain*, edited by M. Millett, L. Revell, and A. Moore, 150-178. Oxford: Oxford University Press.

Charleston, R.J. 1963. "Glass cakes as raw material and articles of commerce." *Journal of Glass Studies* 5: 54-68.

Charlton, M. and M. Miše. 2024. "Application of LIBS and LA-ICP-MS analysis to Hellenistic tableware." *The European Physics Journal Plus* 139: 945.

Chaume, B. and W. Ney. 2015. "Les fibules de type Heuneburg." *Archäologisches*

Korrespondenzblatt 45: 61-69.

Chaume, B. and W. Ney. 2015. "Les fibules de type Heuneburg." *Archäologisches Korrespondenzblatt* 45: 61-69.

Chimier, J.P. 2007. "L'artisanat antique durant le Haut Empire (1er-3e s.)." In *Atlas Archéologique de Touraine*, 53e Supplément à *la Revue Archéologique du Centre de la France*, 2014, edited by É. Zadora-Rio, 1-5. Tours: FERACF.

Chrisomalis, S. and B. Trigger. 2003. "Reconstructing Prehistoric Ethnicity: Problems and Possibilities." In *A Passion for the Past, Papers in Honour of James F. Pendergast*, edited by J.V. Wright and J.-L. Pilon, 1-21. Archaeological Survey of Canada Mercury Series Paper No. 164. Gatineau: Canadian Museum of Civilization.

Clavel-Lévêque, M. 2005. "Le territoire colonial: image et métaphore de l'Empire." In *Hommage à Pierre Lévêque*, edited by J. Annequin, 251-264. Besançon: Pr. Universitaires de Franche-Comté.

Cleland, L., K. Stears, and G. Davies. 2004. *Colour in the Ancient Mediterranean World*. Oxford: BAR Publishing.

Coles, D. 2018. *Chromatopia: an illustrated history of color*. New York: Thames and Hudson.

Collingwood, R.G. 1932. *Roman Britain*. Oxford: Clarendon Press.

Collis, J. 1984. *The European Iron Age.* London and New York: Routledge.

---------- 2003. *The Celts: Origins, Myths, & Inventions.* Stroud: Tempus.

Costin, C.L.1991. "Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production." *Archaeological Theory and Method* 3: 1-56.

------ editor. 2016. *Making Value, Making Meaning: Techné in the Pre-Columbian World*. Washington, D.C.: Dumbarton Oaks Research Library and Collections.

Cottam, S.E. 2019. *Developments in Roman Glass Vessels in Italy, France, Britain, and the Lower Rhineland - c. A.D. 40 – A.D. 110.* PhD Thesis. King's College London.

Crawford, M.H. 1981. *The Roman Republic*. London: Fontana.

Creighton, J. 2000. *Coins and Power in Late Iron Age Britain*. New Studies in Archaeology. The Press Syndicate of the University of Cambridge: Cambridge.

Crook, P. 2019. "Approaching the archaeology of value: a view from the modern world." *Post-Medieval Archaeology* 53(1): 1-20.

Cunliffe, B. 1995. *Danebury: An Iron Age hillfort in Hampshire. Vol. 6: A hillfort community in perspective. Council in British Archaeology Research Reports 102.* York: Council for British Archaeology.

Dananai, A. and X. Deru. 2018. "Pottery Function, Dining and Funerary Assemblages. A comparative study from northern Gaul." *Internet Archaeology* 50.

Davies, J.L. and M.G. Spratling. 1976. "The Seven Sisters hoard: a centenary study." In *Welsh*

Antiquity: Essays mainly on Prehistoric Topics Presented to H.N. Savory upon his Retirement as Keeper of Archaeology, edited by G.C. Boon and J.M. Lewis, 121-147. Cardiff: National Museum of Whales.

Deyts, S.-A. 1971. "The Sacred Source of the Seine." *Scientific American* 225(1): 65-73.

Díaz-Andreu, M., S. Lucy, S. Babić, and D.N. Edwards. 2005. *The Archaeology of Identity: Approaches to gender, age, status, ethnicity, and religion*. London and New York: Routledge.

Dietler, M. 1994. "Our Ancestors the Gauls": Archaeology, Ethnic Nationalism, and the Manipulation of Celtic Identity in Modern Europe." *American Anthropologist,* New Series 96(3): 584-605.

---------- 1996. "Greeks, Etruscans and thirsty barbarians: early Iron Age interaction in the Rhone Basin of France." In *Centre and Periphery: Comparative Studies in Archaeology*, edited by T.C. Champion, 127-141. New York: Routledge.

---------- 1998. "A Tale of Three Sites: The Monumentalization of Celtic Oppida and the Politics of Collective Memory and Identity." *World Archaeology* 30(1): 72-89.

---------- 2001. "Theorizing the feast: Rituals of consumption, commensal politics, and power in African contexts." In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics and Power*, edited by M. Dietler and B. Hayden, 65-114. Tuscaloosa: University of Alabama Press.

---------- 2006. "Celtism, Celtitude, and Celticity: the consumption of the past in the age of globalization." In *Celtes et Gaulois dans l'histoire, l'historiographie et l'idéologie moderne*. *Actes de la table ronde Leipzig, 16-17 juin 2005*, edited by S. Rieckhoff, 237-248. Glux-en-Glenne: Bibracte, Centre Archéologique Européen (Bibracte 12/1).

---------- 2010. *Archaeologies of Colonialism: Consumption, Entanglement, and Violence in Ancient Mediterranean France*. Berkeley: University of California Press.

Dobres, M.A. 2000. *Technology and Social Agency: Outlining a Practice Framework for Archaeology*. Oxford and Malden: Blackwell Publishers.

Dobres, M.-A. and J. Robb. 2005a. "'Doing' Agency: Introductory Remarks on Methodology." *Journal of Archaeological Method and Theory* 12: 159-166.

---------- 2005b. *Agency in Archaeology*. London and New York: Routledge.

Domínguez, A.J. 2002. "Greeks in Iberia: Colonialism without Colonization." In *The Archaeology of Colonialism*, edited by C.L. Lyons and J.K. Papadopoulos, 65-95. Los Angles: Getty Publications.

Dornan, J.F. 2000. "Agency and Archaeology: Past, Present, and Future Directions." *Journal of Archaeological Method and Theory* 9(4): 303-329.

Drinkwater, J.F. 1983. *Roman Gaul: the three provinces, 58 BC-AD 260*. London: Croon Helm.

Durkheim, E. 1982. *The Rules of Sociological Method and Selected Texts on Sociology and its Methods*, translated by W.D. Halls. New York: The Free Press.

Duval, A. 1988. “Des chars processionnels aux chars de combat.” In *Les princes celtes et la mediterranée, mai 1988*, 303-322. Paris: Recontres de l’École du Louvre.

Duval, A., J.-P. Morel, and Y. Roman, eds. 1990. *Gaule interne et Gaule méditerranéenne aux IIe et 1er siècles avant J.-C.: confrontations chronologiques: actes de la table ronde de Valbonne, 11-13 novembre 1986*. Paris: Editions du Centre national de la recherche scientifique.

Elliott, S. 2020. *Empire State: How the Roman Military Built an Empire*. Oxford: Oxbow Books.

Emberling, G. 1997. “Ethnicity in Complex Societies: Archaeological Perspectives.” *Journal of Archaeological Research* 5(4): 295-344.

Exner, K. 1939. “Die provinzialrömischen Emailfibeln der Rheinlande.” *Bericht der Römisch-Germanischen Kommission des Deutschen Archäologischen Instituts* 29: 31–121.

Farges, F. 2013. “Analyse d’échantillons de verre.” In *Programme quadriennal 2013-1016 de recherche sur le mont Beuvray, rapport intermédiaire [Rapport de recherche]*, edited by V. Guichard, 273-277. Bibracte: Centre archéologique européen.

Farley, J. and F. Hunter, eds. 2016. *Celts: art and identity.* London: British Museum Press.

Fentress, E. 2021. “Coercive Urbanism: the Roman impact on North African towns.” In *Imperium Romanum. Romanization between Colonization and Globalisation*, edited by O. Belvedere and J. Bergemann, 165-179. Palermo: Palermo University Press.

Ferdière, A. 2008a. “La place de l’artisanat en Gaule romaine du Centre, Nord-Ouest et Centre-Ouest (province de Lyonniase et cités d’Aquitaine septentrionale).” *Revue archéologique du Centre de la France* 45-46: 1-35.

---------- 2008b. “Base documentaire sur les artisanats gallo-romains en Lyonnaise et dans les cités du nord et de l’est de l’Aquitaine: Corpus de données. Presentation.” *Revue archéologique du Centre de la France* 47: 1-10.

Ferdière, A., C. Gandini, P. Nouvel, and J.-L. Collart. 2010. “Les grandes *villae* « à pavillons multiples alignés » dans les provinces des Gaules et des Germanies: répartition, origine et fonctions.” *Revue archéologique de l’Est* 59(2): 357-446.

Fernández-Götz, M. 2014. “Identity and Power: The Transformation of Iron Age Societies in Northeast Gaul.” *Amsterdam Archaeological Studies* 21. Amsterdam: Amsterdam University Press, Amsterdam.

---------- 2017. “Urbanization in Iron Age Europe: Trajectories, Patterns, and Social Dynamics.” *Journal of Archaeological Research* 26: 117-149

Fernández-Götz, M., D. Maschek, and N. Roymans. 2020. “The dark side of the Empire: Roman expansionism between object agency and predatory regime.” *Antiquity* 94(378): 1630-1639.

Feugère, M. 1989. *Le verre préromain en Europe occidentale*. Montagnac: Ed. Mergoil.

---------- 2000. “Le corail à l’époque romaine.” In *Corallo di ieri – Corallo di oggi*. *Scienze e*

materiali del patrimonio culturale 5, edited by J.-P. Morel, C. Rondi Costanzo, and D. Ugolini, 205-210. Puglia: EDPUGLIA.

Fichtl, S. 2009. "La villa gallo-romaine, un modèle gaulois? Réflexions sur un plan canonique." In *ARTeFACT. Festschrift für Sabine Reickhoff zum 65*, edited by S. Grunwald, J.K. Koch, D. Mölders, U. Sommer, S. Wolfram, 439-448. Bonn: Universität sforschungen zur prähistorischen Archäologie.

Fitzpatrick, A.P. 1991. "'Celtic (Iron Age) religion': traditional and timeless?" *Scottish Archaeological Review* 8: 123-129.

Fleming, S.J. 1997. *Roman Glass: Reflections of Everyday Life*. Philadelphia: University of Pennsylvania Museum of Archaeology and Anthropology.

Flouest, J.-L. and K. Gruel. 1998. "La reprise des fouilles depuis 1984." In *L'oppidum de Bibracte: Un bilan de onze années de recherche (1984-1995)*, edited by K. Gruel and D. Vitali, 6-8. *Gallia* 55. Revue Gallia: CNRS Editions.

Foy, C., ed. 2003. *Coeur de verre: Production et diffusion du verre antique*. Infolio éditions: Gollion.

Fulford, M. and E. Durham, eds. 2013. *Seeing Red. New Economic and Social Perspectives on Gallo-Roman* Terra Sigillata. Bulletin of the Institute of Classical Studies Supplement 102. School of Advanced Study. London: University of London.

Frankenstein, S. and M.J. Rowlands. 1978. "The internal structure and regional context of early Iron Age society in south-western Germany." *Bulletin of the Institute of Archaeology of the University of London* 15: 73-112.

Freestone, I.C. 1987. "Composition and microstructure of opaque red glass." In *Early Vitreous Materials: British Museum Occasional Paper* 56, edited by M. Bimson and I.C. Freestone, 173-191. London: British Museum.

Freestone, I.C., C.P. Stapleton, and V. Rigby. 2003. "The production of red glass and enamel in Late Iron Age, Roman and Byzantine periods." In *Through a Glass Brightly: Studies in Byzantine and Medieval Art and Archaeology presented to David Buckton*, edited by C. Entwistle, 142-154. Oxford: Oxbow.

Fürst, S., K. ler, L. Gianni, C. Paris, L. Bellot-Gurlet, C.F.E. Pare, and I. Reiche. 2016. "Raman Investigations to Identify *Corallium rubrum* in Iron Age Jewelry and Ornaments." *Minerals* 6(56): 1-23.

Gandini, C. 2008. *Des campagnes gauloises aux campagnes de l'Antiquité tardive: la dynamique de l'habitat rural dans la cite des Bituriges Cubi (IIe s. av. J.-C. – VIIe s. ap. J.-C.)*. Tours: Fédération pour l'édition de la Revue archéologique du Centre de la France (*Supplément à la Revue archéologique du centre de la France,* 33).

Gardner, A. 2013. "Thinking about Roman Imperialism: Postcolonialism, Globalisation and Beyond?" *Britannia* 44: 1-26.

---------- 2016. "Changing Materialities." In *The Oxford Handbook of Roman Britain*,

edited by M. Millett, L. Revell, and A. Moore, 481-509. Oxford: Oxford University Press.

Garrow, D. and C. Gosden. 2012. *Technologies of Enchantment? Exploring Celtic Art: 400 BC to AD 100.* Oxford: Oxford University Press.

Gebhard, R. 2018. "Raw Materials, Technology, and Innovation." In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P. Wells, 797-818. Oxford: Oxford University Press.

Gebhard, R., G. Kossack, J. Riederer, R. Schwabe, and U. Wagner. 1989. "Colouration of Celtic glass from Manching." *Archaeometry: proceedings of the 25th international symposium*, edited by Y. Maniatis, 207-215. Amsterdam: Elsevier Science Publishers B.V.

Gell, A. 1994. "The Technology of Enchantment and the Enchantment of Technology." In *Anthropology, Art, and Aesthetics*, edited by J. Coote, 40-63. Oxford: Clarendon Press.

Giddens, A. 1984. *The Constitution of Society: Outline of the Theory of Structuration*. Berkeley: University of California Press.

Giles, M. 2007. "Making Metal and Forging Relations: Ironworking in the British Iron Age." *Oxford Journal of Archaeology* 26(4): 395-413.

---------- 2008. "Seeing red: the aesthetics of objects in the British and Irish Iron Age." In *Rethinking Celtic Art*, edited by Duncan Garrow, Chris Hosden, and J.D. Hill, 59-77. Oxford: Oxbow.

---------- 2012. *A Forged Glamour: Landscape, Identity, and Material Culture in the Iron Age.* Oxford: Oxbow.

Giles, M., V. Green, and P. Peixoto. 2020. "Wide connections: women, mobility and power in Iron Age East Yorkshire." In *The Arras Culture of Eastern Yorkshire: Celebrating the Iron Age*, edited by P. Halkon, 47-66. Oxford: Oxbow.

Ginoux, N. 2020. "Visual memory and perception in ancient Celtic art." In *Art in the Eurasian Iron Age: Context, Connections and Scale,* edited by. C. Nimura, H. Chittock, P. Hommel, and C. Gosden, 127-150. Oxford: Oxbow.

Girão, A.V. and G. Caputo. 2017. "Application of Scanning Electron Microscopy-Energy Dispersive X-ray Spectroscopy (SEM-EDS)." In *Comprehensive Analytical Chemistry* Vol. 75, 153-168. Elsevier B.V.

Goláňová, P., M. Hajnalová, L. Lisá, P. Milo, L. Petr, M. Fránková et al. 2020. "Investigating the complex story of one ditch—A multidisciplinary study of ditch infill provides insight into the spatial organisation within the oppidum of Bibracte (Burgundy, France)." *PLoS ONE* 15(4).

Gomez de Soto, J., G. Querré, H. Lepaumier, S. Marion, and G. Seguin. 2017. "Corail et objets de lux de La Tène Moyenne en Gaule non méditerranéenne. La tombe d'Orval (Manche), les fibules du type de Pleurs, l'enclos de Châteaubernard (Charente)." *Etudes Celtiques* 43: 35-59.

González-Ruibal, A. 2010. “Colonialism and European Archaeology.” In *Handbook of Postcolonial Archaeology*, edited by J. Lydon and U. Rizvi, 39-50. Walnut Creek: Left Coast Press.

Goodman, P. 2007. *The Roman City and its Periphery: From Rome to Gaul*. London and New York: Routledge.

Gosden, C. 2004. *Archaeology and Colonialism*: *Cultural Contact from 5000 BC to the Present.* New York and Cambridge: Cambridge University Press.

---------- 2005. “What do objects want?” *Journal of Archaeological Method and Theory* 12(3): 193-211.

---------- 2018. “Trade and Exchange.” In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P.S. Wells, 871-886. Oxford: Oxford University.

Gosselain, O. 1992. “Technology and Style: Potters and Pottery among Bafia of Cameroon.” *Man* 27(3): 559-586.

Graeber, D. 2001. *Toward an Anthropological Theory of Value: The False Coin of Our Own Dreams.* New York: Palgrave.

Grose, D.F. 1977. “Early Blown Glass: The Western Evidence.” *Journal of Glass Studies* 19: 9-29.

Guggisberg, M.A. 2018. “Art on the Edge of the Mediterranean world.” In *The Oxford Handbook of the European Iron Age,* edited by C. Haselgrove, K. Rebay-Salisbury, and P.S. Wells, 1305-1136. Oxford: Oxford University Press.

Guillaumet, J.P. 1984. “La signification de Bibracte dans la cite des Eduens.” *Archéologie et rapports sociaux en Gaule: Protohistoire et Antiquité. Table ronde de CNRS de Besancon mai 1982*, 69-76. Besançon: Université de Franche-Comte.

Guillaumet, J.P., L. Dhennequin, and M. Szabó, eds. 2008. *L’oppidum de Bibracte (Mont Beuvray, France). Bilan de 10 Années de Recherches (1996-2005)*. Acta Archaeological Academiae Scientiarum Hungaricae 59(1): 1-152.

Guillaumet, J.-P., K. Gruel, P.P. Bonenfant. 1998. “Introduction. L’oppidum de Bibracte. Un bilan de onze anneés de recherche (1984-1995).” *Gallia* 55: 1-6.

Hales, S. and T. Hodos. 2009. *Material Culture and Social Identities in the Ancient World*. Cambridge and New York: Cambridge University Press.

Halkon, P. 2020. “Setting the scene – landscape and settlement in Iron Age eastern Yorkshire.” In *The Arras Culture of Eastern Yorkshire: Celebrating the Iron Age*, edited by P. Halkon, 1-16. Oxford: Oxbow.

Halkon, P., J. Lyall, J. Deverell, T. Hunt, and M-F. Götz. 2019. “Arras 200: revisiting Britain’s most famous Iron Age cemetery.” *Antiquity* 93 (368): 1-7.

Hall, S. 1996. “Cultural Identity and Diaspora.” In *Contemporary Postcolonial Theory: A Reader*, edited by P. Mongia, 110-121. London: Arnold.

Hamilakis, Y. and S. Sherratt. 2012. “Feasting and the consuming body in Bronze Age Crete and Early Iron Age Cyprus.” In *Parallel Lives: Ancient Island Societies in Crete and Cyprus*, BSA Studies 20, edited by G. Cadogan, M. Iacovou, K. Kopaka, and J. Whitley, 187-205. London: British School at Athens.

Hanut, F. 2010. “Les Faciès Céramique de la Cité de Tongres: Les principa énérale tsnt’ d’un repertoire.” *Société Français’ d’étude Céramique Antique en Gaule, Actes du congrès de Chelles, 13-16 mai 2010,* edited by L. Rivet, 331-346. Marseille: SFECAG.

Harden, D.B. 1958. “Glass.” In *Roman Colchester,* edited by M.R. Hull, 157-157. Reports of the Research Committee of the Society of Antiquaries of London No. XX. Oxford: Oxford University Press.

Harrison-Buck, E. 2018. “Relational Matters of Being: Personhood and Agency in Archaeology.” In *Relational Identities and Other-than-Human Agency in Archaeology*, edited by E. Harrison-Buck and J.A. Hendon, 263-282. Boulder: University Press of Colorado.

Hauschild, M. 2012. “Quer durch Europa. Die keltischen Wanderungen.” In *Die Welt der Kelten. Zentren der Macht – Zostbarkeiten der Kunst*, edited by Archäologischen Landesmuseum Baden-Württemberg, Landesmuseum Württemberg, Landesamt für Denkmalpflege in Regierungspräsidium Stuttgart, and Historischen Museum Bern, 257-263. Baden-Württemberg: Jan Thorbecke Verlag.

Haverfield, F. 1915. *The Romanization of Roman Britain*. Oxford: Clarendon Press.

Hayden, B. 2001. “Fabulous feasts: a prolegomenon to the importance of feasting.” In *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics and Power*, edited by M. Dietler and B. Hayden, 23-64. Tuscaloosa: University of Alabama Press.

Helms, M.W. *Access to Origins: Affines, Ancestors and Aristocrats.* Austin: University of Texas Press.

Hemelrijk, E. and G. Woolf, eds. 2013. *Women and the Roman City in the Latin West*. Leiden: Koninklijke Brill NV.

Henderson, J. 1985. “The raw materials of early glass production.” *Oxford Journal of Archaeology* 4(3): 267-291.

---------- 1988a. “Electron Probe Microanalysis of mixed-alkali glasses.” *Archaeometry* 30: 77-91.

---------- 1988b. “Glass production and Bronze Age Europe.” *Antiquity* 62: 435-51.

---------- 1989. “The use of colorants in mixed-alkali and soda-lime-silica prehistoric glass.” In *Archaeometry: proceedings of the 25th international symposium*, edited by Y. Maniatis, 217-229. Amsterdam and New York: Elsevier.

---------- 2009. “The provenance of archaeological plant ash glasses.” In *From mine to*

microscope, advances in the study of ancient technology, edited by A.J. Shortland, I.C. Freestone, and T.H. Rehren, 129-138. Oxford: Oxbow Books.

---------- 2013. "Glass and Faience." In *The Oxford Handbook of the European Bronze Age*, edited by H. Fokkens and A. Harding, 492-500. Oxford: Oxford University Press.

Henig, M. 1983. "The Luxury Arts: Decorative Metalwork, Engraved Gems and Jewellery." In *A Handbook of Roman Art*, edited by M. Henig, 139–65. Oxford: Phaidon.

Hess, C. and K. Wight. 2005. *Looking at Glass: A Guide to Terms, Styles, and Techniques*. Los Angeles: The J. Paul Getty Museum.

Hill, J.D. 1997. "The end of one kind of body and the beginning of another kind of body? Toilet instruments and 'Romanization'." In *Reconstructing Iron Age Identities*, edited by A. Gwilt and C. Haselgrove, 96-107. Oxford: Oxbow.

Hingley, R. 2005. *Globalizing Roman Culture: Unity, Diversity, and Empire*. London and New York: Routledge.

Hjärthner-Holdar, E. 2010. "Technological choices and changes and the concept of innovation – Reflections on the introduction of iron in areas with different power systems." In *The Archaeology of Regional Technologies: Case Studies from the Palaeolithic to the Age of the Vikings*, edited by R. Barndon, A. Engevik and I. Øye, 165-176. Lewiston: Edwin Mellen Press.

Hodges, H. 1970. *Technology in the Ancient World*. London: Allen Lane.

Hoppe, T. 2012. "Das Sofas des Fürsten – Die 'Kline' von Hochdorf." In *Die Welt der Kelten. Zentren der Macht – Kostbarkeiten der Kunst*, edited by Archäologischen Landesmuseum Baden-Württemberg, Landesmuseum Württemberg, Landesamt für Denkmalpflege in Regierungspräsidium Stuttgart, and Historischen Museum Bern, 222-226. Baden-Württemberg: Jan Thorbecke Verlag.

Hoppe, T. and B. Schorer. 2012. "Die Welt der Kelten. Kunst und Kultur." In *Die Welt der Kelten. Zentren der Macht – Kostbarkeiten der Kunst*, edited by Archäologischen Landesmuseum Baden-Württemberg, Landesmuseum Württemberg, Landesamt für Denkmalpflege in Regierungspräsidium Stuttgart, and Historischen Museum Bern, 22-25. Baden-Württemberg: Jan Thorbecke Verlag.

Hoss, S. 2014. "Cingulum Militare: Studien zum römischen Soldatengürgel des 1. bis 3. Jh. N. Chr." PhD dissertation, Faculty of Archaeology, Universiteit Leiden.

Howgego, C., V. Heuchert, and A. Burnett, eds. 2005. *Coinage and identity in the Roman provinces.* Oxford: Oxford University Press.

Hubert, H. 1900. "La sépulture à char de Nanterre." In *Les comptes-rendus du Congrès international d'anthropologie et d'archéologie préhistoriques,* XIIe session, 410-417. Paris.

Hughes, J. 2017. *Votive Body Parts in Greek and Roman Religion*. Cambridge: Cambridge University Press.

Hughes, M.J. 1972. “A technical study of opaque red glass of the Iron Age in Britain.” *Proceedings of the Prehistoric Society* 38: 98–107.

Hunter, F. 2007. *Beyond the Edge of Empire: Caledonians, Picts, and Romans.* Rosemarkie: Groam House Museum Trust.

---------- 2008. “Celtic art in Roman Britain.” In *Rethinking Celtic Art*, edited by D. Garrow, C. Gosden, and J.D. Hill, 129-145. Oxford: Oxbow.

---------- 2018. “Material Worlds.” In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P. Wells, 819-842. Oxford: Oxford University Press.

Hüssen, C.-M. 1983. “A rich Late la Tène burial at Hertford Heath, Hertfordshire.” *British Museum Occasional Paper No. 44.* London: British Museum.

Irby, G.L. 1999. “Introduction: The Roman Army in Britain.” In *Military Religion in Roman Britain*, 3-9. Leiden: Brill.

Israeli, Y. 1991. “The Invention of Blowing.” In *Roman Glass: Two Centuries of Art and Invention*, edited by M. Newby and K. Painter, 46-55. Volume XIII of Occasional Papers from The Society of Antiquaries of London. London: The Society of Antiquaries of London.

Ivleva, T. 2014. “Britons on the Move: Mobility of British-Born Emigrants in the Roman Empire.” In *The Oxford Handbook of Roman Britain,* edited by M. Millett, L. Revell, and A. Moore, 245-261. Oxford: Oxford University Press.

Jackson, C.M. 2005. “Making Colourless Glass in the Roman Period.” *Archaeometry* 47(4): 763-780.

James, S. and V. Rigby. 1997. *Britain and the Celtic Iron Age.* London: British Museum Press.

Jiménez, A. 2010. “Reproducing Difference: Mimesis and Colonialism in Roman Hispania.” In *Material Connections: Mobility, Materiality, and Mediterranean Identities*, edited by B. Knapp and P. van Dommelen, 38-63. London and New York: Routledge.

---------- 2011. “Pure hybridism: Late Iron Age sculpture in southern Iberia.” *World Archaeology* 43(1): 102-123.

Johns, C. 1996. *The Jewellery of Roman Britain. Celtic and Classical Traditions*. Ann Arbor: The University of Michigan Press.

Jope, E.M. 2000. *Early Celtic Art in the British Isles*. Oxford: Oxford University Press.

Joy, J. 2014. “Brit-Art: *Celtic* Art in *Roman* Britain and on its Frontiers.” In *Celtic Art in Europe: Making Connections. Essays in honour of Vincent Megaw on his 80th birthday*, edited by C. Gosden, S. Crawford, and K. Ulmschneider, 315-324. Oxford and Philadelphia: Oxbow.

------- 2015. “9. Connections and separation? Narratives of Iron Age art in Britain.” In

Continental Connections: Exploring Cross-Channel Relationships from the Mesolithic to the Iron Age, edited by H. Anderson-Whymark, D. Garrow, and F. Sturt, 1455-165. Oxford and Philadelphia: Oxbow.

------- 2016. "Hoards as collections: re-examining the Snettisham Iron Age hoards from the perspective of collecting practice." *World Archaeology* 48(2): 239-253.

-------- 2018. "Feasting and Commensal Rituals." In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P. Wells, 1213-1236. Oxford: Oxford University Press.

Jundi, S., and J. D. Hill. 1998. "Brooches and Identities in First Century AD Britain: More Than Meets the Eye?" In *TRAC 97: Proceedings of the Seventh Annual Theoretical Roman Archaeology Conference*, edited by C. Forcey, J. Hawthorne, and R. Witcher, 124–37. Oxford: Oxbow Books.

Kaenel, G. 1990. "The End of Celtic Art on the Continent: Later Celtic Art in the Southern Region." In *Celtic Art*, edited by B. Raftery and P.-M. Duval, 85-100. Paris: Unesco: Flammarion.

Knapp, A.B. and P. van Dommelen. 2008. "Past Practices: Rethinking Individuals as Agents in Archaeology." *Cambridge Archaeological Journal* 18(1): 15-34.

Knüsel, C.J. 2002. "More Circe than Cassandra: The Princess of Vix in Ritualized Social Context." *European Journal of Archaeology* 5(3): 275-308.

Kruta, V. 1977. "Le casque d'Amfreville-sous-les-Monts (Eure) et quelques problems de l'art celtique du IVe siècle avant notre ère." *Etudes Celtiques* 15(2): 405-424.

---------- 1986. "Le corail, le vin et l'Arbre de vie: observations sur l'art et la religion des Celtes du Ve au Ier siècle avant J.-C." *Etudes Celtiques* 23: 7-32.

---------- 1990. "The Rise of Celtic Art." In *Celtic Art,* edited by B. Raftery and P.-M. Duval, 15-32. Paris: Unesco: Flammarion.

Kulkarni, K.N., Ap. Tripathi, A. Varshney, J. Chandra, S. Kumar, S. Sangal, D. Paul, and K. Mondal. 2022. "Electron Probe Micro-Analyzer: An Equipment for Accurate and Precise Micro-Composition Analysis." In *Electron Microscopy in Science and Engineering*, IITK Directions 6, edited by K. Biswas, S. Sivakumar, and N. Gurao, 71-93. Singapore: Springer.

Lambot, B., ed. 2019. *Conducteurs de char et cavaliers Gaulois en Champagne aux Ve et IVe s. avant J.-C. découvertes récentes. Société archéologique champenoise, Bulletin de la Société archéologique champenoise* 1954 (111/2). Reims: Société archéologique champenoise.

Lapatin, K, ed. 2014. *The Berthouville silver treasure and Roman luxury.* Los Angeles: The J. Paul Getty Museum.

Latour, B. 2005. *Reassembling the Social: An Introduction to Actor-Network Theory.* Oxford: Oxford University Press.

Leblond, C. 2017. “Glass of the Gallo-Roman Period from Northeastern France.” *Journal of Glass Studies* 59: 23-46.

Lechtman, H., A. Erlij, and E.J. Barry, Jr. 1982. “New Perspectives on Moche Metallurgy: Techniques of Gilding Copper at Loma Negra, Northern Peru.” *American Antiquity* 47(1): 3-30.

Lee, C.J. 2018. “Anti-colonialism: origins, practices, and historical legacies.” In *The Oxford Handbook of the Ends of Empire*, edited by M. Thomas and A.S. Thompson, 436-452. Oxford: Oxford University Press.

Lejars, T. 2015a. “Image et langage, l’art des IVe et IIIe siècles.” In *L’Europe Celtique à l’âge du Fer, VIIIe-Ier siècles*, edited by O. Buchsenschutz, 270-280. Paris: PUF.

---------- 2015b. “Des élites guerrières.” In *L’Europe Celtique à l’âge du Fer, VIIIe-Ier siècles*, e edited by O. Buchsenschutz, 222-228. Paris: PUF.

---------- 2015c. “Un monde aux dimensions de l’Europe.” In *L’Europe Celtique à l’âge du Fer, VIIIe-Ier siècles*, edited by O. Buchsenschutz, 186-215. Paris: PUF.

Lejars, T. and K. Gruel. 2015. “Paraître et modes vestimentaires, femmes et enfants.” In *L’Europe Celtique à l’âge du Fer, VIIIe-Ier siècles*, edited by O. Buchsenschutz, 229-242. Paris: PUF.

Lemaire, F. 2012. “A l’origine de la villa romaine: l’exemple du site exceptionnel du “Fond de la Commanderie” à Conchil-le-Temple (Pas-de-Calais): Etablissements ruraux antiques, Espaces funéraire et atelier saunier, Habitat du haut Moyen-Âge.” *Nord-Ouest archéologie* 15: 3-473.

Lemke, C. 1998. “Reflections on the Roman Empire: the first century glass industry as seen through traditions of manufacture.” In *The Prehistory and History of Glassmaking Technology*, edited by P. McCray, 269-291. Proceedings of the Prehistory and History of Glassmaking Technology Symposium, held at the 99th Annual Meeting of the American Ceramics Society in Cincinnati, Ohio, May 4-7, 1997. Westerville: The American Ceramic Society.

Lemonnier, P. 1993. *Technical Choices: Transformations in Material Cultures since the Neolithic*. London: Routledge.

Leroy, M., M. Mangin, H. Laurent, M. Boukezzuola, and B. Raïssouni. 2000. “La sidérurgie dans l'est de la Gaule: L'organisation spatiale de la production de l'âge du fer au haut Moyen Âge.” *Gallia* 57: 11-21.

Lewis, A. 2020. “Perpetual motion.” In *The Arras Culture of Eastern Yorkshire: Celebrating the Iron Age*, edited by P. Halkon, 111-121. Oxford: Oxbow

Livarda, A. 2017. “Tastes in the Roman provinces: An archaeobotanical approach to socio-cultural change.” In *Taste and the Ancient Senses*, edited by K.C. Rudolph, 179-196. London: Routledge.

Lomas, K. and T. Cornell, eds. 2003. *“Bread and Circuses”: Euergetism and Municipal*

Patronage in Roman Italy. New York: Routledge.

Occari, V., L. Richards, I.C. Freestone, M. Charlton, and C. Fenwick. 2014. "Composition of Glass Tesserae from the Church of San Nicolò (Lido): Origins and Technology." *Musiva & sectilia: an international journal for the study of ancient pavements and wall revetments in their decorative and architectural context* 21: 117-177.

Lourdaux-Jurietti, S. 2003. "L'utilisation du Corail sur Le Casque de La Grotte des Perrats à Agris (Charente)." In *Décors, Images et Signes de L'âge du Fer Européen, Xxvie Colloque de L'afeaf, Thème Spécialisé*. Edited by O. Buchsenschutz, A Bulard, M-B Chardenoux, and N. Ginoux. Supplément à La Revue Archéologique du Centre de la France vol. 24. Tours: Fédération pour l'édition de la Revue archéologique du Centre de la France.

Luley, B.P. 2014. "Cooking, Class, and Colonial Transformations in Roman Mediterranean France." *American Journal of Archaeology* 118(1): 33-60.

MacLaury, R.E., G.V. Paramei, and D. Dedrick eds. 2007. *Anthropology of Color*. Amsterdam: Benjamins Publishing Company.

MacMullen, R. 2000. *Romanization in the Time of Augustus*. New Haven: Yale University Press.

Malinowski, B. 1922. *Argonauts of the Western Pacific.* New York: E.P. Dutton & Co.

Marion, S., H. Lepaumier, J. Gomez de Soto, G. Seguin, and G. Querré. 2017. "Corail et objets de luxe de La Tène moyenne en Gaule non méditerranéenne. La tombe d'Orval (Manche), les fibules du type de Pleurs, L'enclos de Châteaubernard (Charente)." *Études Celtiques*: 35-59.

Marx, K. 1975. *Karl Marx: Economy, Class, and Social Revolution,* edited and with an Introductory Essay by Z.A. Jordan. New York: Charles Scribner's Sons.

Mauss. M. 1925. "Essai sur le don. Forme et raison de l'échange dans les sociétés archaïques." In *L'Année Sociologique*, *second série, 1923-1924*. Paris: PUF.

Mattingly, D. 2004. "Being Roman: expressing identity in a provincial setting." *Journal of Roman Archaeology* 17: 5-25.

---------- 2006. *An Imperial Possession: Britain in the Roman Empire, 54 BC – AD 409.* London and New York: Penguin Books.

McIntosh, F. 2009. "A study into Romano-British enamelling – with a particular focus on brooches." *The school of historical studies postgraduate forum e-journal* 7.

Megaw, R. and V. Megaw 1989. *Celtic Art from its Beginnings to the Book of Kells.* New York: Thames and Hudson.

Miller, H. M-L. 2009. *Archaeological Approaches to Technology*. Walnut Creek: Left Coast Press.

Millett, M. 1990a. *The Romanization of Britain*. Cambridge and New York: Cambridge University Press.

---------- 1990b. "Romanization: Historical Issues and Archaeological Interpretations." In *The Early Roman Empire* in the West, edited by T. Blagg and M. Millett, 35-41. Oxford: Oxbow Books.

---------- 2021. "'Romanization', social centralization and structures of imperial power." In *Imperium Romanum. Romanization between Colonization and Globalisation*, edited by O. Belvedere and J. Bergemann, 63-75. Palermo: Palermo University Press.

Milovanović, B. 2018. "Jewellery as a symbol of prestige, power and wealth of the citizens of Viminacium." In *Vivere Militare Est: From Populus to Emperors – Living on the Frontier Volume II*, *Monographies 68/2,* edited by M. Korać, S. Golubović, and N. Mrdić, 101-142. Belgrade: Institute of Archaeology.

Mirguet-Archambeau, C., C. Dejoie, C. Roucau, and Ph. De Parseval. 2009. "Nature and microstructure of gallic imitations of sigillata slips from the La Graufesenque workshop." *Archaeometry* 51(5): 748-762.

Mohen, J.-P. 1988. *Les Princes celtes et la Méditerranée.* Rencontres de l'École du Louvre. Paris: Documentation française.

Moore, T. 2007. "Perceiving Communities: Exchange, Landscapes and Social Networks in the Later Iron age of Western Britain." *Oxford Journal of Archaeology* 26(1): 97-102.

---------- 2018. "Wealth, Status, and Occupation Groups." In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P. Wells, 971-998. Oxford: Oxford University Press.

Moore, T. and D. González-Álvarez. 2021. "Societies Against the Chief? Re-Examining the Value of 'Heterarchy' as a Concept for Studying European Iron Age Societies." In *Power from Below in Premodern Societies: The Dynamics of Political Complexity in the Archaeological Record*, edited by T.L. Thurston and M. Fernández-Götz, 125-156. Cambridge: Cambridge University Press.

Moore, T., A. Braun, J. Creighton, L. Cripps, P. Haupt, I. Klenner, P. Nouvel, C. Ponroy, and M. Schönfelder. 2013. "Oppida, Agglomerations, and Suburbia: the Bibracte Environs and New Perspectives on Late Iron Age Urbanism in Central-Eastern France." *European Journal of Archaeology* 16(3): 491-517.

Motte, S. and S. Martin. 2003. "L'atelier de verrier antique de la Montée de la Butte á Lyon et ses productions." In *Échanges et commerce du verre dans le monde antique. Actes du colloque de l'Association Française pour l'Archéologie du Verre, Aix-en-Provence et Marseille, 7-9 juin 2001*, edited by D. Foy and M.-D. Nenna, 303-319. Montagnac: Mergoil.

Mullen, A. 2007. "Linguistic Evidence for 'Romanization': Continuity and Change in Romano-British Onomastics: A Study of the Epigraphic Record with Particular Reference to Bath." *Britannia* 38: 35-61.

Müller, F. S.B. Schreyer, J.-J. Charpy, J. Cizmarova, and R. Gebhard. 2009. *Art of the Celts: 700 BC to AD 700.* Ithaca: Cornell University Press.

Nagel, J. 1994. “Constructing Ethnicity: Creating and Recreating Ethnic Identity and Culture.” *Social Problems* 41(1): 152-176.

Nava, M.L. 2011. “Die jahrtausendealte Tradition des Bernsteins.” In *Im Licht des Südens: Begegnungen antiker Kulturen zwischen Mittelmeer und Zentraleuropa*, edited by R. Gebhard, F. Martzatico, and P. Gleirscher, 40-49. Munich: Archäologische Staatssammlung.

Nicolay, J. 2003. “The use and significance of military equipment and horse gear from non-military contexts in the Batavian area: continuity from the Late Iron Age into the Early Roman Period.” In *Kontinuität und Diskiontinuität. Germania inferior am Beginn und am Ende der römischen Herrschaft. Beiträge des Deutsch-niederlandischen Kolloquiums in der Katholieke Universiteit Nijmegen (27. bis 30. 06. 2001),* edited by T. Grunewald and S. Seibel, 345-373. Berlin, New York: Walter de Gruyter.

---------- 2007. “The use and significance of military equipment and horse gear from non-military contexts in the Batavian area: continuity from the Late Iron Age into the Early Roman period.” *Ergänzungsbände zum Reallexikon der Germanischen Altertumskunde* 35: 345-373.

Olson, K. 2008. *Dress and the Roman Woman. Self-presentation and Society*. New York: Routledge.

Ortner, S.B. 1984. “Theory in Anthropology since the Sixties.” *Comparative Studies in Society and History* 26(1): 126-166.

Osborne, R. 2004. “Hoards, votives, offerings: the archaeology of the dedicated object.” *World Archaeology* 36(1): 1-10.

Padilla Peralta, D. “Classics between epistemicides and hauntologies: A Caribbean reading.” In *The Routledge Handbook of Classics, Colonialism, and Postcolonial Theory*, edited by K. Blouin and B. Akrigg, 78-95. Routledge. New York: Routledge.

Pagès, G., P. Dillmann, E. Vega, M. Berranger, S. Bauvais. 2022. “Vice-versa: The iron trade in the western Roman Empire between Gaul and the Mediterranean.” *PLOS ONE* 19(9): 1-38.

Pastoureau, M. 2016. *Red: The History of a Color*, translated by J. Gladding. Princeton and Oxford: Princeton University Press.

Pauli, L. 1975. *Keltischer Volksglaube: Amulette und Sonderbestattungen am Dürrnberg bei Hallein und im eisenzeitlichen Mitteleuropa.* Münchner Beiträge zur Vor- und Frühgeschichte 28. Munich: Beck.

Perrin, F. 2000. “L’origine de la mode du corail méditerranéen (Corallium rubrum L.) chez les peoples celtes: essai d’interprétation.” In *Corallo di ieri – Corallo di oggi*. *Scienze e materiali del patrimonio culturale 5,* edited by J.-P. Morel, C. Rondi Costanzo, and D. Ugolini, 193-203. Puglia: EDPUGLIA.

Petřik, J., K. Adameková, L. Petr, I. Jouffroy-Bapicot, P. Kočár, R. Kočárová, P. Goláňová, and

V. Guichard. 2022. “Landscape evolution around the oppidum of Bibracte (Northern Massif Central, France) from the Late Iron Age to the Post-Mediaeval period.” *Quaternary International* 636(30): 180-195.

Pitts, M. 2008. “Globalizing the local in Roman Britain: An anthropological approach to social change.” *Journal of Anthropological Archaeology* 27(4): 493-506.

---------- 2017. “Gallo-Belgic wares. Objects in motion in the early Roman northwest.” In *Materialising Roman Histories*, edited by A. Van Oyen and M. Pitts, 47-64. Oxford and Philadelphia: Oxbow.

Pitts, M. and M.J. Versluys. 2021. “Objectscapes: a manifesto for investigating the impacts of object flows on past societies.” *Antiquity* 95(380): 367-381.

Price, S.R.F. 1984. *Rituals and Power: The Roman Imperial Cult in Asia Minor*. Cambridge and New York: Cambridge University Press.

Price, J. and S. Cottam. 1998. *Romano-British glass vessels: a handbook,* Practical Handbook in Archaeology 14. York: Council for British Archaeology.

---------- 2001. “Glass Vessels.” In *Excavation of a Romano-British Roadside Settlement in Somerset. Fosse Lane Shepton Mallet 1990, Britannia Monograph Series* 18, edited by P. Leach and C.J. Evans, 170-176. London: Society for the Promotion of Roman Studies.

Pope, R. 2018. “Gender and Society.” In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P.S. Wells, 1049-1078. Oxford: Oxford University Press.

Purcell, N. 1990. "The creation of provincial landscape. The Roman impact on Cisalpine Gaul." In *The Early Roman Empire in the West*, edited by T. Blagg and M. Millett, 7-29. Oxford: Oxbow Books.

Py, M. 1993. *Les Gaulois du midi: de la fin de l'âge de bronze à la conquête romaine*. Paris: Hachette.

Ralston, I. 1988. “Central Gaul at the Roman Conquest: conceptions and misconceptions.” *Antiquity* 62: 786-94.

Rebay-Salisbury, K. 2018. “Horses, Wagons, and Chariots.” In *The Oxford Handbook of the European Iron Age*, edited by C. Haselgrove, K. Rebay-Salisbury, and P.S. Wells, 999-1022. Oxford: Oxford University.

Reddé, M. 2017. “Native Farms and Roman *Villae* in “Long-haired” Gaul: A Confrontation between Classical Sources and Archaeological Data.” *Annales HSS (English Edition)* 72(1): 43-68.

Revell, L. 2016. “Urban Monumentality in Roman Britain.” In *The Oxford Handbook of Roman Britain*, edited by M. Millett, L. Revell, and A. Moore, 767-790. Oxford: Oxford University Press.

Rieckhoff, S. 2012. “Spurensuche. Kelten oder was man darunter versteht …” In *Die Welt der*

Kelten. Zentren der Macht – Kostbarkeiten der Kunst, edited by Archäologischen Landesmuseum Baden-Württemberg, Landesmuseum Württemberg, Landesamt für Denkmalpflege in Regierungspräsidium Stuttgart, and Historischen Museum Bern, 26-36. Baden-Württemberg: Jan Thorbecke Verlag.

Riva, C. and I.G. Mira. 2022. "Global archaeology and microhistorical analysis. Connecting scales in the 1st-millennium B.C. Mediterranean." *Archaeological Dialogues* 29: 1-14.

Robin, L. 2016. *Le verre à Lyon, production et consummation durant le Haut-Empire (Lugdunum). Monographies Instrumentum 53, Série Mobiliers lyonnais*. Autun: Éditions Mergoil.

Rogers, A. 2016. "The Development of Towns." In *The Oxford Handbook of Roman Britain*, edited by M. Millett, L. Revell, and A. Moore, 741-766. Oxford: Oxford University Press.

Romeuf, A.-M. 1986. "Ex-voto en bois de Chamalières (Py-de-Dôme) et des sources de la Seine. Essai de comparaison." *Gallia* 44(1): 65-89.

Romero, A.-M. and A. Maillier (photography). 2006. *Archéologie d'une ville gauloise. Bibracte*. Bibracte: Centre Archéologique Européen.

Rondi-Costanzo, C. 1997. "Corail de Béziers, du Midi de la Gaule et de méditerranée entre le VIIe et le IIIe s. av. J.-C." In *Languedoc occidental protohistorique: fouilles et recherches récentes (Ve – IVe s. av. J.-C.). Travaux du Centre Camille Jullian, 19*, edited by D. Ugolini, 197-239. Aix-en-Provence: Publications de l'Université de Provence.

Rondi-Costanzo, C. and D. Ugolini. 2000. "Le corail dans le basin nord-occidental de la Méditerranée entre le Ve et le IIe s. av. J.-C." In *Corallo di ieri – Corallo di oggi*. *Scienze e materiali del patrimonio culturale 5,* edited by J.-P. Morel, C. Rondi Costanzo, and D. Ugolini, 177-191. Puglia: EDPUGLIA.

Rowlands, M.J., M.T. Larson, and K. Kristiansen. 1987. *Centre and periphery in the ancient world*. Cambridge and New York: Cambridge University Press.

Roymans, N. 1996. *From the Sword to the Plough: Three Studies on the Earliest Romanisation of Northern Gaul.* Amsterdam: Amsterdam University Press.

Roymans, N. and M. Fernández-Götz. 2019. "Reconsidering the Roman conquest: new archaeological perspectives." *Journal of Roman Archaeology* 32: 415-420.

Sahlins, M. 1976. "Colors and cultures." *Semiotica* 16(1): 1-22.

Said, E. 1978. *Orientalism*. New York: Random House.

Salmon, E.T. 1982. *The Making of Roman Italy*. London: Thames and Hudson.

Santopadre, P., and M. Verità. 2000. "Analyses of the production technologies of Italian vitreous materials of the Bronze Age." *Journal of Glass Studies* 42: 25-40.

Schiffer, M.B. and J.M. Skibo, 1987. "Theory and Experiment in the Study of Technological Change." *Current Anthropology* 28(5): 595-622.

Scott, R.B. and P. Degryse. 2014. “The archaeology and archaeometry of natron glass making.” In *Glass Making in the Greco-Roman World,* edited by P. Degryse, 15-26. Leuven: Leuven University Press.

Shanks, M. and C. Tilley. 1992. *Re-Constructing Archaeology: Theory and Practice*. London, New York: Routledge.

Sharples, J. 2010. *Social Relations in Later Prehistory: Wessex in the First Millennium BC.* Oxford: Oxford University Press.

Sherratt, A. and B. Raftery. “Celtic Art in Britain and Ireland.” In *Celtic Art*, edited by B. Raftery and P.-M. Duval, 101-126. Paris: Unesco: Flammarion.

Simmel, G. 1907. *The Philosophy of Money,* translated by T. Bottomore and D. Frisby. With an Introduction by D. Frisby. London and Boston: Routledge and Keegan Paul.

Skeates, R. 1993. “Mediterranean Coral: Its Use and Exchange in and around the Alpine Region during the Later Neolithic and Copper Age.” *Oxford Journal of Archaeology* 281-292.

Slofstra, J. 2002. “Batavians and Romans on the Lower Rhine. The Romanisation of a frontier area.” *Archaeological Dialogues* 9(1): 16-38.

Sofaer, J., L. Bender Jørgensen, and A. Choyke. “Craft Production: Ceramics, Textiles, and Bone.” In *The Oxford Handbook of the European Bronze Age*, edited by H. Fokkens and A. Harding, 469-491. Oxford: Oxford University Press.

Spivak, G.C. 1988. “Can the Subaltern Speak?” In *Marxism and the Interpretation of Culture,* edited by C. Nelson and L. Grossberg, 271-313. Basingstoke: Macmillan Education.

---------- 1999. *A Critique of Postcolonial Reason: Toward a History of the Vanishing Present.* Cambridge: Harvard University Press.

Stapleton, C.P., I.C. Freestone, and S.G.E. Brown. 1999. “Composition and Origin of Early Mediaeval Opaque Red Enamel from Britain and Ireland.” *Journal of Archaeological Science* 26(8): 913-921.

St. Clair, K. 2016. *The Secret Lives of Colour.* London: John Murray.

Stead, I.M. 1971. “The Reconstruction of Iron Age Buckets form Aylesford and Baldock.” *The British Museum Quarterly* 35(1/4): 250-282.

---------- 1985. *The Battersea Shield.* London: British Museum Press.

---------- 2006. *British Iron Age Swords and Scabbards with a report on the technology of some of the swords by Janet Lang. And other contributions by C.R. Cartwright, M.R. Cowell, P.T. Craddock, Simon Dove, Marilyn Hockey, D.R. Hook, Valery Rigby, R.J. Stacey and C.P. Stapleton*. London: The British Museum Press.

Stead, I.M., J.L. Flouest, and V. Rigby. 2006. *Iron Age and Roman Burials in Champagne. A project co-directed by A.L. Pacitto. With contributions by Sheelagh Stead, Ian C. Freestone, P.C. Buckland, J.R.A. Greig, C. Frederick, P. Wagner, and C.J. Beal*. Oxford: Oxbow.

Stern, E.M. 1999. “Roman Glassblowing in a Cultural Context.” *American Journal of Archaeology* 103(3): 441-484.

Stig Sørensen, M.L. 2007. “Gender, things, and material culture.” In *Women in Antiquity: Theoretical Approaches to Gender and Archaeology*, edited by S.M. Nelson, 105-135. Lanham: AltaMira Press.

---------- 2013. “Identity, Gender, and Dress in the European Bronze Age.” *The Oxford Handbook of the European Bronze Age*, edited by H. Fokkens and A. Harding, 216-233. Oxford: Oxford University Press.

Szabó, 1990. “The Climax of Celtic Art.” In *Celtic Art*, edited by B. Raftery and P.-M. Duval, 33-72. Paris: Unesco: Flammarion.

Tanner, J. and A. Gardner, eds. 2024. *Materialising the Roman Empire.* London: UCL Press.

Terrenato, N. 2005. “The Deceptive Archetype: Roman Colonialism in Italy and Postcolonial Thought.” In *Ancient Colonizations. Analogy, Similarity, and Difference,* 59-72. London: Duckworth.

---------- 2019. *The Early Roman Expansion into Italy: Elite Negotiation and Family Agendas.* Ann Arbor: University of Michigan.

Thénot, A. 1982. *La civilisation celtique dans l’est de la France. T.I: d’après la collection de Baye au Musée des Antiquités Nationales à Saint-Germain-en-Laye.* Paris: Editions de la Fondation Singer-Polignac.

The R. W. File. *Some Aspects of Glass Inlay and Enamel Decoration in Britain in the Iron Age and Roman Periods*. Rockwell-Wabash Co. Ltd. London.

Thurston, T. 2009. “Unity and Diversity in the European Iron Age: Out of the Mists, Some Clarity?” *Journal of Archaeological Research* 17: 347-423.

Tite, M.S., P. Manti, and A.J. Shortland. 2007. “A technological study of ancient faience from Egypt.” Journal of Archaeological Science 34: 1568-83.

Tokovinine, A. and C.L. McNeil. 2012. “Colored things, chromatic stories: Searching for pigments of the past.” *RES: Anthropology and Aesthetics* 61/62: 279-282.

Towle, A. and J. Henderson. 2007. “The Glass Bead Game: Archaeometric evidence for the existence of an Etruscan glass industry.” *Etruscan Studies* 10(5): 47-66.

Towle, A., J. Henderson, P. Bellintani, and G. Gambacurta. 2001. “Frattesina and Adria: report of the scientific analysis and early glass from Veneto.” *Padusa* 37: 7-68.

Tringham, R. 1990. “Men and Women in Prehistoric Architecture.” *Traditional Dwellings and Settlements Review* 2(1): 35-36.

Urton, G. and J. Papadopoulos. 2012. *The Construction of Value in the Ancient World*. Los Angeles: Cotsen Institute of Archaeology Press.

Lydon, J. and U. Rizvi, eds. 2019. *Handbook of Postcolonial Archaeology.* New York:

Routledge.

van Beek, R. 2002. *Glazen Glorie in de Oudheid: glazen uit de klassieke oudheid in het Gemeentemuseum Den Haag. Vereniging van Vrieden van Ceramiek en Glas* 178(2). Almere: Klondyke.

Van der Veen, V. 2021. "Women in Roman Military Bases: Gendered Brooches from the Augustan Military Base and Flavio-Trajanic Fortress at Nijmegen, the Netherlands." *Britannia* 52: 343-363.

Van Dommelen, P. 2012. "Colonialism and Migration in the Ancient Mediterranean." *Annual Review of Anthropology* 41: 393-409.

van Nijf, O.M., and A. Heller, eds. 2017. *The Politics of Honour in the Greek Cities of the Roman Empire.* Leiden: Brill.

Van Ossel, P. and A. Defgnée 2001. "Champion, Hamois. Une villa romaine chez les Condruses. Archéologie, environnement et économie d'une exploitation Agricole antique de la Moyenne Belgique." Namur: Ministère de la Région wallonne.

Van Oyen, A. 2012. "Knowledge Systems in the Production of *Terra Sigillata*. Moving Beyond the Local/Global Paradox." In *TRAC 2011: Proceedings of the Twenty First Annual Theoretical Roman Archaeology Conference which took place at The University of Newcastle 14-17 April 2011*, edited by M. Duggan, F. McIntosh, and D.J. Rohl, 48-59. Oxford: Oxbow Books.

---------- 2013. "Towards a post-colonial artefact analysis." *Archaeological Dialogues* 20(1): 81-107.

---------- 2015a. "Deconstructing and reassembling the Romanization debate through the lens of postcolonial theory: from global to local and back?" *Terra Incognita* 6: 205-226.

---------- 2015b. "The Roman City as Articulated through Terra Sigillata." *Oxford Journal of Archaeology* 34(3): 279-299.

---------- 2024. "The Roman Empire and transformations in craft production." In *Materialising the Roman Empire*, edited by J. Tanner and A. Gardner, 181-204. London: UCL Press.

Van Wijngaarden, G.-J. 2009. "An archaeological approach to the concept of value: Mycenaean pottery at Ugarit (Syria)." *Archaeological Dialogues* 6(1): 2-23.

Verger, S. 2015. "Le début du monde celtique historique et du second âge du Fer (vers 450-Vers 390)." In *L'Europe Celtique à l'âge du Fer, VIIIe-Ier siècles*, edited by O. Buchsenschutz, 152-176. Paris: puf.

Versluys, M.J. 2014. "Understanding objects in motion. An *archaeological* dialogue on Romanization." *Archaeological Dialogues* 21(1): 1-20.

---------- 2021. "Romanisation as a theory of friction." In *Imperium Romanum. Romanization between Colonization and Globalisation*, edited by O. Belvedere and J. Bergemann, 33-48. Palermo: Palermo University Press.

Voss, B. 2008. *The Archaeology of Ethnogenesis: Race and Sexuality in Colonial San Francisco*. Berkeley: University of California Press.

Wallace, L. 2016. "The Early Roman Horizon." In *The Oxford Handbook of Roman Britain*, edited by M. Millett, L. Revell, and A. Moore, 117-133. Oxford: Oxford University Press.

Wallerstein, I. 1974. "The Rise and Future Demise of the World Capitalist System: Concepts for Comparative Analysis." *Comparative Studies in Society and History* 16(4): 387-415.

---------- 2004. *World-Systems Analysis: An Introduction.* Durham and London: Duke University Press.

Ward, C. 2023. "Rethinking the 'Spectrum of Luxury': Roman jewellery from the Bay of Naples." In *Acta ad Archaeologiam et Artium Historiam Pertinentia* XXXIII(19), edited by S.J. Baker, C.A. Ward, and C. Prescott, 305-320. Rome: Scienze e Lettere S.r.l.

Ward-Perkins, J.B. 1970. "From Republic to Empire: Reflections on the Early Provincial Architecture of the Roman West." *The Journal of Roman Studies* 60: 1-19.

Wattenmaker, P. 1998. "Craft Production and Social Identity in Northwest Mesopotamia." *Archaeological Papers of the American Anthropological Association* 8(1): 47-55.

Webley, L. 2015. "8. Rethinking Iron Age connections across the Channel and North Sea." In *Continental Connections: Exploring Cross-Channel Relationships from the Mesolithic to the Iron Age*, edited by H. Anderson-Whymark, D. Garrow, and F. Sturt, 122-144. Oxford and Philadelphia: Oxbow.

Wells, P. 1980. *Culture Contact and Culture Change: Early Iron Age Central Europe and the Mediterranean World.* Cambridge: Cambridge University Press.

---------- 1984. *Farms, Villages, and Cities: Commerce and Urban Origins in Late Prehistoric Europe.* Ithaca: Cornell University Press.

---------- 1990. "Iron Age Temperate Europe: Some Current Research Issues." *Journal of World Prehistory* 4: 437-476.

---------- 1995. "Identities, Material Culture, and Change: 'Celts' and 'Germans' in Late-Iron-Age Europe." *Journal of European Archaeology* 3(2): 169-185.

---------- 2001. *Beyond Celts, Germans and Scythians: Archaeology and Identity in Iron Age Europe.* London: Duckworth.

---------- 2011. "Chapter 11: The Iron Age." In *European Prehistory*, Interdisciplinary Contributions to Archaeology, edited by S. Milisauskas, 405-460. Springer Science.

Webster, J. 2001. "Creolizing the Roman Provinces." *American Journal of Archaeology* 105(2): 209-225.

Weiner, A.B. 1988. *The Trobrianders of Papua New Guinea*. New York: Holt, Tinehart, and Winston.

Willmott, H. 2005. *A History of English Glassmaking, AD 43-1800*. Gloucestershire: Tempus

Publishing Limited Stroud.

Woolf, G. 1993. “Rethinking the Oppida.” *Oxford Journal of Archaeology* 12(2): 223-234.

---------- 1995. “The Formation of Roman Provincial Cultures.” In *Integration in the early Roman west: the role of culture and ideology: Papers arising from the international conference at the Titelberg (Luxembourg) 12-13 November 1993,* edited by J. Metzler, M. Millett, N. Roymans, and J. Slofstra (Dossiers d'archéologie du Musée national d'histoire et d'art; Vol. 4), 9-18. Luxembourg: Musée Nationale.

---------- 1997. “Beyond Romans and Natives.” *World Archaeology* 28(3): 339-350.

---------- 1998. *Becoming Roman: The Origins of Provincial Civilization in Gaul*. Cambridge, New York: Cambridge University Press.

---------- 2002. “Generations of aristocracy. Continuities and discontinuities in the societies of Interior Gaul.” *Archaeological Dialogues 91:* 2-15.

---------- 2012. *Rome: An Empire’s Story*. Oxford and New York: Oxford University Press.

---------- 2014. “Romanization 2.0 and its alternatives.” *Archaeological Dialogues* 21(1): 45-50.

---------- 2021. “Taking the long view. Romanization and Globalization in Perspective.” In *Imperium Romanum. Romanization between Colonization and Globalisation*, edited by O. Belvedere and J. Bergemann, 19-31. Palermo: Palermo University Press.

Yatsuk, O., L. Koch, A. Gorghinian, G. Fiocco, P. Davit, L.C. Giannossa, A. Mangone, S. Francone, A. Serges, A. Re, A. Lo Giudice, M. Ferratti, M. Malagodi, C. Iaia, and M. Gulmini. 2023. “An archaeometric contribution to the interpretation of blue-green glass beads from Iron age Central Italy.” *Heritage Science* 11(13): 1-26.

Zlámalová Cílová, Z., V. Čisťakova, V. Brychová, L. Lapčák, G. Březinová, T. Kmječ, Š. Matoušková, and H. Čižmářová. 2024. “Non-metallic decorative inlays in La Tène jewellry – contribution of archaeometry to the understanding of production technologies.” *Archaeological and Anthropological Sciences* 16(4): 60.

Zuiderhoek, A. 2009. *The Politics of Munificence in the Roman Empire: Citizens, Elites and Benefactors in Asia Minor. Cambridge: Cambridge University Press.*