The Metallurgy of Roman Silver Coinage

The fineness of Roman imperial and provincial coinage has been regarded as an indicator of the broader fiscal health of the Roman empire, with the apparent gradual decline of the silver content being treated as evidence for worsening deficits and the contraction of the supply of natural resources from which the coins were made. This book explores the composition of Roman silver coinage of the first century AD, re-examining traditional interpretations in the light of an entirely new programme of analyses of the coins, which illustrates the inadequacy of many earlier analytical projects. In addition, minor and trace elements, and lead isotopes, provide evidence for the supply of materials and refining and minting technology. Sometimes this allows us to determine the origin of the metal, whether freshly mined or recycled. It can even pinpoint likely episodes of recycling old coins and, when combined with the study of hoards, hint at possible strategies of stockpiling of metal. The creation of reserves has a direct bearing on the question of the adequacy of revenues and fiscal health.

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The Metallurgy of Roman Silver Coinage

From the Reform of Nero to the Reform of Trajan

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Preface

This project has been a long time coming to fruition. It has its origins in a study undertaken by one of the authors (KB) in 1990, part of which was subsequently published as a paper in the *Numismatic Chronicle* (Butcher 1992). This relied on the results of analyses undertaken by David Walker in the *Metrology of the Roman Silver Coinage*. Discussion between the authors about the quality of these analyses in 1992–3 led to a pilot project, which served to highlight the need for an entirely new compositional study of Roman imperial silver coinage (Butcher and Ponting 1995). Several articles have since appeared, some giving overviews, others dealing with specific problems (Butcher and Ponting 1997a; 1997b; 1998; 2005a; 2005b; 2009; 2012).

Initially it was thought that a programme of analyses would lend greater precision to an established picture of debasement and reform, and enable us to compare the silver content of imperial and provincial coinages with more confidence. We expected that trace element and lead isotope analysis would help to demonstrate an increasing reliance on recycled coinage over time, as the Roman empire began to run out of fresh supplies of silver. We did not anticipate that such a radically different picture would gradually emerge from this exercise. Our earlier papers demonstrated that there was a significant discrepancy between the real silver content of the coins and the figures commonly cited for the debasements, and showed that Roman mints had deliberately disguised the extent of debasement by artificially enhancing the silvery surfaces of the coins; but these early discoveries did not challenge the basic narrative of Roman imperial monetary history as one of almost continuous decline in fineness from the reign of Nero onwards. Gradually, however, it became apparent that there was a substantial difference between the standard history of Roman coinage and what our results were telling us. Important reforms had been misdated; or, even more surprisingly, some major points of change cited in the scholarly literature proved to be complete phantoms, generated by a mass of inadequate data. For the first century (the period covered by the present volume) the discrepancies were not too significant, but for the period between the reign of Trajan and the
debasement of Septimius Severus in AD 194 an entirely unfamiliar landscape emerged (overview in Butcher and Ponting 2012). While we can now map that landscape with some confidence, currently we have no clear indication of what was happening to the silver coinage between AD 194 and c. AD 250, the period leading up to what is generally regarded as the third-century ‘collapse’ of the coinage. We know that there were debasements, but when these occurred, how many debasements there were, and how significant each debasement was, we cannot say for certain. At the time of writing, we are in the process of applying for funding to explore this hidden territory, in the hope that the character of the decline in the silver content of Roman coinage can be mapped in its entirety.

Several earlier investigations into the fineness of Roman imperial silver coinage have tried to identify the ‘tipping point’ when the slide towards currency collapse became irreversible. This ‘point of no return’ has been variously identified as the reform of Nero c. AD 64, the reduction in silver content under Domitian in AD 85, the reform of Trajan (misdated to AD 107, but actually occurring in AD 99–100), or the alleged reductions in silver content under Marcus Aurelius (AD 161 and after). We have not attempted to identify any point of change presented in this volume as such, and it is not clear why any debasement must necessarily lead inexorably towards currency collapse (if indeed it truly was a collapse) rather than currency restoration. Why currency restorations were rare, and why (or indeed whether) debasement was tolerated by the general public, are certainly questions worth exploring. It would, however, be premature to present any of the conclusions drawn in this volume as the final word on the subject. At the end of this volume may be found a short chapter that summarises the conclusions, but it should be understood that the interpretations are provisional. Further work on the later coinages may modify the thoughts presented here.

Much is said about weight and fineness, and about composition, in the pages that follow. Those readers used to calculating fineness in terms of weight of silver may find the occasional lack of absolute certainty in this matter frustrating, but complete precision on such a point is impossible. That would require us having the coins in the state in which they were originally issued, which we do not. Corrosion during centuries of burial and further leaching of copper salts during cleaning ensure that those coins that have come down to us are no longer mint state, however fresh their appearance (besides, the method of manufacture of coins made of silver-copper alloys introduced slight but random changes to their weights before
they were even struck). The use of these silver-copper alloys for disguising the underlying quality of the metal worked well for ancient issuing authorities, and it is a tribute to the success of this simple technique for enhancing the surfaces of the coins that the real fineness of Roman silver coinage has eluded us for so long.

The book catalogues the results for 1,136 coins, comprising both imperial denarii and provincial silver denominations. We have not felt it necessary to include photographs of the coins, except in those cases where the classification seems uncertain (in this case, for coins of the Civil Wars of AD 68–69 attributed to mints in Spain and Gaul). The photographs are those that we have taken ourselves, or that have been provided courtesy of the British Museum’s free image service. Many of the coins analysed can be seen via the project pages on the Archaeology Data Service (http://archaeologydataservice.ac.uk/archives/view/coins_lt_2005/).

The focus of this volume is on the period from Nero to Trajan, but readers will note that there are also sections devoted to earlier coins, particularly the issues of Julio-Claudian emperors before Nero, and ranging back in time to Julius Caesar, who here is credited with creating the system of precious metal denominations (an act usually attributed to Augustus). A reader might therefore wonder why we have not cast our net wider, beginning our programme of analyses with Caesar instead of Nero. One reason is entirely practical. Originally we had planned to begin with later Republican denarii, the last coinages of the Seleucids and Ptolemies and the eastern provincial issues of the first century BC, but gaining access to much of the material of that period proved impossible. In future we may be able to address the coinage of that period, which probably hides as many surprises as the post-Neronian coinage, but that will require access to the relevant material, which currently lies beyond our reach.

Given the difficulties of accessing pre-Neronian coins for sampling, the reform of Nero is a logical place to begin the story of Roman imperial silver. It marks the introduction of the silver-copper alloy for the denarius, after a long period when the denomination had been made of pure silver, and the introduction of a new weight standard that was to persist until at least Severan times. It also marks a kind of watershed in hoarding patterns, as will be seen in the pages that follow. And finally, it seems to mark the beginning of a prolonged phase of recycling of older coins, which ended only when almost all pre-Neronian denarii had been eliminated from the circulation pool. The Neronian denarius set the standard for the silver coinage of the High Roman Empire.
We have not set out to provide a comprehensive, final explanation for all the features observed here, and we regard our current interpretations of the evidence as interim. It is to be hoped that our data will provide material for further thought and debate about the nature of Roman silver coinage, and ancient coinage in general.
This project has relied on the expertise and assistance of a large number of people. Its smooth running has required their help and all the necessary elements (coins, personnel, funding, analytical equipment and research time) being in place at the right moment. Ensuring that all of these are in place simultaneously is an almost impossible feat (and indeed proved impossible on more than one occasion), and we would like to acknowledge the good will and patience extended to us by so many people, without whom the project would never have stood any chance of success. For access to coins we are thankful for the support of staff from five important numismatic collections: Christopher Howgego and Volker Heuchert (Ashmolean Museum, Oxford); Andrew Burnett, Roger Bland, Richard Abdy and Jonathan Williams (British Museum); Keith Sugden (Manchester Museum); Benedikt Zäch, Inge Ghelfi and Ulrich Werz (Münzkabinett Winterthur); and William E. Metcalf (Yale University). Many of these individuals have also provided other forms of essential support apart from granting consent for us to sample the coins, including acting as referees on various proposals for funding and publication, and, more generally, moral encouragement over the years. For this help, and for much more, we are profoundly thankful. Access to some of these important collections also requires the consent of formal bodies such as the Visitors of the Ashmolean Museum, Oxford and the Trustees of the British Museum, and to them we extend our deep gratitude.

Most of the coins sampled came from British hoards now preserved in regional museums, and we would therefore like to express our gratitude to the curators for allowing access to these: Jenny Hall (Museum of London); Gail Boyle and Kate Iles (Bristol City Museum); John Davies (Norwich Castle Museum); Philip Wise (Colchester Castle Museum); Peter Robinson (Doncaster Museum); Brett Thorn (Buckinghamshire Museums); and especially Stephen Minnitt (Somerset Museums) for supporting extensive access to the Shapwick hoard. Access to other material was generously permitted by Danny Syon and Donald Ariel (Israel Antiquities Authority) and Renata Windler (Canton of Zurich). Thomas Curtis, then of A. H. Baldwin and Sons, Ltd, also helped find additional material for sampling, which proved invaluable for our preliminary studies of Egyptian coinage. We would also
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The main stage of the project was funded by the Arts and Humanities Research Council, UK (Grant ID: 119434). Initial stages of the project were funded by the Leverhulme Trust (RF&G/6/RFG/2002/0336), the Faculty of Arts and Sciences Research Committee and the University Research Board, American University of Beirut and the Research Committee of the School of Archaeology, Classics and Egyptology, The University of Liverpool. We are extremely grateful to all these bodies for their support.

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In addition, we would like to express our gratitude to Justine Bayley and David Dungworth of English Heritage for much valued support during the early phases of the analyses; to Robert Lindsay of Thessco, Sheffield, for invaluable insights into the modern process of depletion silvering; to Sophie Rowe and Pablo Fernandez-Reyes for careful preparation of the coin sections and their photography; to Philip Cox, who checked the footnotes against the bibliography; to Michael Sharp and the staff at Cambridge University Press, including our copy-editor Frances Brown for her expertise and patience in seeing the script through to publication; to Marguerite Spoerri-Butcher, who checked the bibliography and more generally endured the interference in family life engendered by writing this book; to Irit Narkiss for photographing some of the coins and her unqualified support and encouragement over the many years of sampling trips and analysis sessions, through to the completion of this manuscript.

It has been a pleasure to be able to share the information with a community of scholars across the world. Some have supplied information, materials or various forms of support and assistance over the years, for which we
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Finally, we would like to dedicate this volume to the memory of David Walker, and in doing so acknowledge our debt to him. While the analyses that we present here may be viewed as overturning most of those that he presented in *The Metrology of the Roman Silver Coinage*, Walker’s three volumes still have relevance and deserve detailed study, and have been our guide as we prepared our own programme of analyses. His books remain a mine of information, particularly with regard to provincial coinages, and their clear layout and logical organisation are difficult to improve on. In short, they are too important to be ignored. The subject may move forward, but that does not invalidate the fundamental contribution of this pioneering scholar.
Abbreviations

AJN American Journal of Numismatics
AM Martin, P.-H. 1978 Die anonymen Münzen des Jahres 68 nach Christus, Mainz
ANRW Temporini, H. and Hase, W. (eds.), Aufstieg und Niedergang der römischen Welt
ANSMN American Numismatic Society Museum Notes
ANSNNM American Numismatic Society, Numismatic Notes and Monographs
ASR Robertson, A. S. 2000 An Inventory of Romano-British Coin Hoards, London
BSFN Bulletin de la Société Française de Numismatique
CAH The Cambridge Ancient History
CH Coin Hoards
CHRBR Coin Hoards from Roman Britain
CIL Corpus Inscriptionum Latinarum
CTMAF Corpus des trésors monétaires antiques de la France
GIC Howegego, C. J. 1985 Greek Imperial Countermarks, London
IGCH Thompson, M., Merkholm, O. and Kraay, C. M. 1973 An Inventory of Greek Coin Hoards, New York
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<tr>
<td>JIAN</td>
<td>Journal International d’Archéologie et de Numismatique</td>
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<td>JRS</td>
<td>Journal of Roman Studies</td>
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<tr>
<td>Milne</td>
<td>Milne, J. G. 1933 Catalogue of Alexandrian Coins, Oxford</td>
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<td>MIN</td>
<td>Metallurgy in Numismatics</td>
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<td>MIR</td>
<td>Moneta Imperii Romani</td>
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<td>NC</td>
<td>Numismatic Chronicle</td>
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<td>NdS</td>
<td>Notizie degli scavi di antichità</td>
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<td>NZ</td>
<td>Numismatiche Zeitschrift</td>
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<td>PACT</td>
<td>Journal of the European Study Group on Physical, Chemical and Mathematical Techniques Applied to Archaeology</td>
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<td>Prieur</td>
<td>Prieur, M. and Prieur, K. 2000 The Syro-Phoenician Tetradrachms and their Fractions from 57 BC to AD 253, Lancaster, PA</td>
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## List of abbreviations

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<td><em>Sylloge Nummorum Graecorum, Switzerland, vol. I: Levante – Cilicia</em>, Berne, 1986</td>
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<td>ZfN</td>
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