

Chapter 2

Diversity and Reuse of Digital Resources for Ancient Mediterranean Material Culture¹

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Introduction

I open with the simple observation that large amounts of information about the material culture of the ancient Mediterranean world are becoming available online. While grounded in specific examples, this chapter is interested in the sources of that information and how diverse entities contribute to, link to, copy or otherwise reuse resources that are discoverable on the public Internet. The main goal is to document that museums, private individuals, publicly funded repositories, commercial enterprises and academic publishers are contributors to this ongoing process. Again, that may seem a well-known fact. Nonetheless, the role of commercial and private initiative in the development of the ‘ancient world web’ is not always acknowledged.

For example, the site *Archnet* sponsored by Arizona State University has long collected links to archaeological websites, including those relevant to the ancient Mediterranean.² Its editorial policy states that ‘In keeping with our mission goals, we have decided not to link commercial sites (with the exception of publishing companies).’ ‘Artefact dealers’ are explicitly included in the definition of commercial sites. Similarly, the Council on Library and Information Resources sponsored a 2003 survey of 33 digital cultural heritage initiatives that included no commercial businesses.³ More recently, a 2006 American Council of Learned Societies (ACLS) report addressed its call to ‘develop public and institutional policies that foster openness and access’ to ‘university presidents, boards of trustees, provosts, and counsels; funding agencies; libraries; scholarly societies;

1 Elements of this chapter were presented in talks given at the Institute for the Study of the Ancient World, New York University; The University of Pennsylvania; and the 2009 Computer Applications and Quantitative Methods in Archaeology (CAA) conference. I am grateful to the reviewers for their comments. The opinions and shortcomings are my own.

2 *Archnet*, Arizona State University, available: <<http://archnet.asu.edu/>>. All URLs in this chapter were accessed in early 2009.

3 Diane Zorich, *A Survey of Digital Cultural Heritage Initiatives and Their Sustainability Concerns* (Washington, DC: Council on Library and Information Resources, 2003), 41.

[and] Congress'.⁴ While the same report does call for cooperation between the public and private sectors in order to 'explore new models for commercial/nonprofit partnerships,' it is not clear that dealer sites are included.⁵ The work of private individuals is ignored. I cite these examples to say that there is a general bias within academic and not-for-profit communities against direct engagement with commercial entities that profit from the sale of antiquities, as well as a tendency by the same communities to overlook the personal efforts of individuals.

For its part, this chapter puts diversity of sources at the centre of its analysis and therefore includes digitized information that comes from commercial entities and individuals. I do so not because of any blanket claims about the relative merits of private work and professional research, nor because I wish to judge the ethics of commerce and scholarship. Instead, I hope to examine digitization and reuse as they are currently occurring in publicly accessible digital arenas. In short, I will show that commercial and private initiative is combining with academic efforts in ways that often achieve the 'openness and access' for which the ACLS has called.

Having indicated that I will discuss digitization resulting from the commercial sale of antiquities that may not have well-established provenances, it is important to reveal a personal bias. I am an archaeologist with an active programme of field research and I believe that the trade in undocumented antiquities encourages looting of ancient sites and the loss of irreplaceable information. This is not an essay about the implications of such trade and I will not press that point here.⁶

What follows should be understood as a commentary on the state of affairs resulting from the cumulative effect of academic, private and commercial efforts to digitize the material culture of the ancient Mediterranean. My approach is resolutely grounded in examination of current resources, meaning specific HTML pages and search-form accessible databases. I am not therefore writing about abstract best practices or future standards and technologies. Rather, I am interested in engaging with digital resources as they exist now. I hope that the explicit reliance on practice as it actually is, rather than how we would like it to be, explains the obvious gaps in the citations that I will make. Taking time to look at individual sites means that only a small proportion of all the relevant digital information can be considered.

My approach is also intentionally anecdotal in that I will rely on my experience using specific features of specific sites. It will also be clear that my conclusions reflect personal opinion. At times I will point out what seem to be obvious areas for improvement in the implementation of the resources I cite, but such criticism should be taken within the context of my opening observation. I take its corollary to be that the net effect of the various efforts pursuing digitization is unprecedented

4 American Council of Learned Societies, *Our Cultural Commonwealth* (New York: American Council of Learned Societies, 2006), p. 2.

5 *Ibid.*, p. 3.

6 For further discussion see Neil Brodie et al., *Stealing History: The Illicit Trade in Cultural Material* (Cambridge, 2000).

and useful access to digital materials for the study of the physical remains of antiquity. This is to the benefit of both scholarly research and the public interest.

Most of my examples come from two fields of study within the broader discipline of ancient studies: numismatics and Roman pottery. For full disclosure, let me say these are my two areas of publication and research, meaning that I am very familiar with the digital resources relevant to each. To the extent that these are well-established disciplines with long histories, the choice does not need justification. But it is the case that neither sits at the very centre of ancient studies, as compared to, for example, Greek and Roman sculpture or architecture.⁷ As will be seen below, however, both the study of ancient coins and of Roman period ceramics are fields for which a rich variety of digital information is currently available. It is particularly the case that each has both hobbyists and commercial dealers as content creators. Linking and reuse between the resources created by these actors and more frequently recognized members of the academic and not-for-profit establishments is a focus of this chapter.

As noted, the study of ancient numismatics is well established in the academic world, with roots stretching back to the Renaissance.⁸ There is a vast bibliography that continues to expand, often through the continuing publication of specialized journals. In addition to these trappings of modern scholarship, there is an active community of collectors and dealers that has made substantial contributions to the current state of knowledge about the coinage of the ancient Mediterranean world. This community has adopted the Internet with considerable enthusiasm. For example, the email list Moneta-L, hosted on Yahoo Groups and ‘dedicated to the joys of ancient coin collecting’, saw 3,784 posts in 2008, more than ten per day.⁹ In addition, dealer sites, whose primary purpose is the sale of coins or the facilitation of such sales, are generating large volumes of digitized information, mainly in the form of descriptions of items for sale. Some of these descriptions, though by no means all, are archived and made available to the browsing public.¹⁰ All users of numismatic information, including those in the academic establishment, derive benefit from these activities. Accordingly, any attempt to discuss the current state of numismatic information on the Internet should take account of these commercial sites and of the sites that reuse their content.

7 American Council of Learned Societies, *Report of the Commission on the Humanities* (New York: American Council of Learned Societies, 1964), p. 171, where numismatics is defined as an ancillary discipline. Stephen Willis, *National Research Framework Document* (Study Group for Roman Pottery, 1997), <<http://www.sgrp.org.uk/07/Doc/2.htm>>, had to stress that the same term wasn’t appropriate for the study of Roman pottery, an indication that some might disagree.

8 Guillaume Budé’s *De asse et partibus eius* published in 1514 is recognized as the first printed book in the field of numismatics.

9 *Moneta-L*, <<http://groups.yahoo.com/group/Moneta-L/>>.

10 *Coin Archives*, <<http://coinarchives.com/>>, is currently the most comprehensive site for auction records of ancient coins.

Roman pottery, as a field of study, does not have the advantage of a similar level of online activity. There is no active Internet discussion group devoted solely to its results and methods and, while Roman pottery is bought and sold on the Internet, the dealer sites are not nearly as useful as those for numismatics.¹¹ Accordingly, it is my subjective assessment that the digital resources that originate from within the academic establishment make up a higher percentage of the useful information available for Roman pottery than is the case for ancient numismatics.

Having said that I will include personal and commercial sites, I do want to stress that I am not holding these up as models for future efforts to digitize the ancient world. Many of the resources I cite do not meet best practices of the emerging fields of digital humanities or digital archiving. To take one example of expectations current in these communities, the National Endowment for the Humanities (NEH) asks that the following considerations be taken into account when applying for funds from its 'Preservation and Access: Humanities Collections and Resources' programme:

All applicants employing digital technology should follow standards and best practices that ensure longevity of digital products and facilitate interoperability with other resources and related materials.

And:

Describe the institution's plans for storing, maintaining, and protecting the data, and, where applicable, for the preservation or other disposition of the original source material. Explain how the data will be archived (independent of the processing or delivery software and interface) to migrate them to future media and formats.¹²

The principles implicit in these requirements could be used to criticize, even exclude, many of the websites that I use as illustration here. To put the matter more bluntly, many of the sites discussed below offer no information at all on how they would meet the NEH's requirements. But exclusion is not my goal; understanding the current state of affairs is. I do not, however, mean to suggest that these requirements are inappropriate. In the context of a publicly funded grant, it is self-evidently important that recipients address issues of interoperability and long-term access. Nonetheless, this chapter recognizes that digitization is happening in communities that do not explicitly adhere to principles increasingly acknowledged as central to the success of publicly funded efforts.

11 Cf. *Ancient Touch*, <<http://ancienttouch.com/>>, for an example of a site offering a variety of Roman period ceramics.

12 National Endowment for the Humanities, *Preservation and Access: Humanities Collections and Resources*, <http://www.neh.gov/grants/guidelines/Collections_and_resources.html>.

In this chapter I observe that some commercial enterprises are far more open with their data than are many initiatives originating within the academy or not-for-profit institutions such as museums and digital repositories. This should not be taken as a blanket statement given that initiatives such as the Perseus Project and OpenContext are actively pursuing the distribution of freely licensed digital content.¹³ But where it is true, the fact should be demonstrated and the implications should be explored. Before doing so, I acknowledge that commercial enterprises likely hope to gain from the exposure that reuse of their content brings, that museums fear loss of revenue from the paid reproduction of copyrighted images, and that academic initiatives hope to keep their content from being inappropriately commercialized with no benefit to themselves. This chapter does not intend to explore these motives in depth nor to pass judgment on them. Instead, I intend first to describe how data appears, is found, and also reused via linking and copying. While describing these processes, I also identify aspects of implementation and presentation that may influence the reuse and linking, or the lack thereof, that I see.

One last point of methodology: throughout this chapter I use the search engine Google to illustrate the discoverability of information and Wikipedia, and its companion site Wikimedia Commons, to illustrate processes of communal linking and reuse.¹⁴ Neither is perfectly suited to how I use them, but both are, at the time of writing, the leading illustrations of these two concepts. Even when not welcomed, the effect of both sites on practice is widely acknowledged. For example, a recent call for greater training of students opened by declaring it to be common opinion among professors ‘that superficial searches on the Internet and facts gleaned from Wikipedia are the extent – or a significant portion – of far too many of their students’ investigations.’¹⁵ The quantitative dominance of Wikipedia is indicated by recent reports that the site receives 97 per cent of the visits to five popular websites that can generically be called encyclopedias.¹⁶ Google’s reported market share for all search is over 60 per cent, and a 2005 survey of student practice in the United Kingdom indicated that 45 per cent begin their research with a Google search.¹⁷ This high market share has had direct effect on providers of digitized scholarly resources. In 2006 JSTOR, the widely used provider of access

13 Gregory Crane, *The Perseus Project*, <<http://www.perseus.tufts.edu>>; *OpenContext*, <<http://opencontext.org>>.

14 Wikimedia Foundation, Inc. *Wikipedia*, <<http://wikipedia.org>>; this chapter makes use of the English-language version. Wikimedia Foundation, Inc., *Wikimedia Commons*, <<http://commons.wikimedia.org/>>.

15 Andrew Guess, ‘Research Methods “Beyond Google”’, *Inside Higher Ed*, 17 June 2008, <<http://www.insidehighered.com/news/2008/06/17/institute>>.

16 Heather Hopkins, ‘Britannica 2.0: Wikipedia Gets 97% of Encyclopedia Visits’, *Hitwise Intelligence* (1/2009), <http://weblogs.hitwise.com/us-heather-hopkins/2009/01/britannica_20_wikipedia_gets_9.html>.

17 Thomas Claburn, ‘Google Search Share Slips’, in *Information Week*, 14 January 2009, <<http://www.informationweek.com/news/internet/reporting/showArticle.jhtml?article>>.

to archived academic journals, opened itself to indexing by Google. The context for this agreement has been recently explained as follows:

JSTOR began to enable indexing by public search engines at the request of many librarians at participating institutions who were seeing more of their users, particularly students, begin their search with Google. Not surprisingly, this opening of JSTOR to broad public search has enhanced discovery of scholarly materials not only among scholars, but also among a broader audience.¹⁸

I will look more closely at the role of JSTOR as a digitizer of information about the material culture of the ancient Mediterranean, so this quotation, with its explicit reference to Google, appears now only as explanation for using its search engine as a proxy for the discoverability of a resource. More examples of the current relevance of both Google and Wikipedia could be introduced but it seems evident that examination of current practice is well served by reference to these two sites.

Simple keyword search for numismatic resources

Although my discussion will be driven by use of specific resources, I begin this section with a summary table (Table 2.1) that categorizes and counts the sources of information that appear in the first five positions of five Google searches that stand in for mainstream topics in the field of ancient numismatics. In this table, 'Commercial' means sites that list coins for sale at the URL shown in the results; 'Personal/Collector' means sites that are written and hosted by individuals, groups or clubs that have generated or collected numismatic information or

Table 2.1 Google results for numismatic keywords

Search Term	Commercial	Personal/ Collector	Academic/ Museum	Wikipedia
'Augustan coinage'	1	3	1	
'Roman coinage'		4		1
'denarius'	1	3		1
'Athenian tetradrachm'	3		1	1
'Alexander great coinage'	3	2		
Totals	8	12	1	3

eID=212900619>. Jillian Griffiths and Peter Brophy, 'Student Searching Behavior and the Web: Use of Academic Resources and Google', *Library Trends* (Spring 2005).

¹⁸ Michael Spinella, 'JSTOR and the Changing Digital Landscape', *Interlending and Document Supply*, 36:2 (2009): 81. The author of the quoted article is an employee of the organization so I take this description as authoritative.

images; ‘Academic/Museum’ are resources originating within the professional establishment of not-for-profit institutionally affiliated scholarship; and ‘Wikipedia’ indicates the appearance of a Wikipedia article in the results. These categories are broad, but I maintain them throughout this chapter and their relevance will become clear as much by usage as by these brief definitions.

Even accounting for the considerable imprecision of this approach, the numbers seem clear. Comprising 20 out of 25 sites, or 80 per cent, commercial and personal sources dominate the discipline of ancient numismatics as presented by Google.¹⁹

Considering the results of the search for ‘Augustan coinage’ shows the mix of resources summarized in Table 2.1. When initiated at the time of writing, they were:

1. The commercial site *Forum Ancient coins* showing a list of coins for sale;²⁰
2. Page 104 in the chapter ‘The Augustan Coinage, 30 B.C.–A.D. 235’ of K. Harl’s (1996) book *Coinage in the Roman Economy, 300 B.C. to A.D. 700*, as found in Google Books;²¹
3. Coins of Augustus from the site Wildwinds.com, which is mainly an aggregator of auction records;²²
4. Keith Emmett’s ‘An Unpublished Alexandrian Coin of Augustus’, a specialized discussion of an Alexandrian coin hosted on the site *Coins of Roman Egypt*;²³
5. The ‘Coinage of Augustus’ set on Flickr as assembled by the user Joe Geranio.²⁴

Even with Wikipedia missing from this list, it illustrates both the diversity of sources and the over-representation of commercial and personal information.

Moving to the content of these sites, the results of this search ought to be judged a success, as none of the sites is of obviously low quality. It is true that somebody entirely unfamiliar with the topic would almost certainly feel dumped into a sea of information, but it would be ungenerous not to see this list of resources as indicative of collective achievement in the ongoing effort to digitize both the primary evidence and secondary sources of ancient numismatics.

19 I am grateful to Leif Isaksen for drawing my attention to his paper, ‘Pandora’s Box: The Future of Cultural Heritage on the World Wide Web’, <<http://leifuss.files.wordpress.com/2009/04/pandorasboxrev1.pdf>>. This is an unpublished conference paper that makes a similar argument using search results for ‘Mona Lisa’ as its example.

20 Forum Ancient Coins, <<http://www.forumancientcoins.com/catalog/roman-and-greek-coins.asp?vpar=383>>.

21 Google Books, <<http://books.google.com/books?id=5yPDL0EykeAC&pg=PA104>>.

22 WildWinds.com, *Browsing Roman Imperial Coins of Augustus*, <<http://www.wildwinds.com/coins/ric/augustus/i.html>>.

23 Keith Emmett, ‘An Unpublished Alexandrian Coin of Augustus’, *The Celator* 17/8 (2003), <http://www.coinsfromegypt.org/html/library/emmett/emmett_aug.htm>.

24 Flickr, *The Coinage of Augustus*, <<http://www.flickr.com/photos/julio-claudians/sets/72157594346513871/>>.

Because the Harl book is of a very different nature from the other sites, I start there. As a recently published and fully referenced overview and analysis of Roman coinage, it is entirely appropriate that this conventionally published work be shown to a user interested in the broad topic of Augustan coinage. The specific chapter offered ranges in date far past the early imperial period, but that is not a fault. A reader will eventually come up against the limits of Google Books's limited preview, by which publishers set the percentage of a work that can be read by one person, but the same reader has recourse to finding the work in a library or purchasing it from an online bookseller.

The first site listed above, Forum Ancient Coins, is a commercial site. While it does host materials for the study of ancient coinage, half of its front page is given over to links into a sale catalogue, with 4,672 items available at the time of writing.

The first coin offered for sale on the illustrated page is a bronze *diobol* struck at Alexandria and issued under Augustus. Adapting numismatic convention, I will refer to this piece as FAC 33447 on the basis of its item number in the virtual sale catalogue. The coin is correctly identified as an example of *Roman Provincial Coinage (RPC) I* type 5001.²⁵ The colour photograph is a more than adequate representation of the piece, which like many Alexandrian bronzes is quite worn from extended circulation in the closed monetary system of Roman Egypt. Clicking on the 'magnifying glass' icon leads to a slightly enlarged version. All of this is to say that the documentation of FAC 33447 meets any reasonable standard of usefulness and is as good as one would find in many scholarly catalogues. The illustration is in fact superior to the black and white 1:1 scale images found in many paper-based publications.

The immediate fate of the coin itself is clear: it is available for sale on eBay, as indicated by text and icon at the lower right of the page. There is no reason to think that the object itself could be tracked down for subsequent study without some element of good luck. The fate of the information about this piece is slightly more encouraging. Many of the pages on the site have a link to a 'search' page. Here one can type in '33447' and select 'sold' from the 'Status' menu to find the record for the piece in question. This is far from a perfect solution. The most immediate complaint is that there is no semantically clear and potentially stable URL by which to access the information about this coin.²⁶ Therefore, when judged by the criteria of the digital humanities community, concern has to be expressed about the long-term accessibility of this information. Similarly, there is also concern for its current discoverability. Using Google to search for 'site:http://www.forumancientcoins.com/33447' returns no useful results. These observations

²⁵ A. Burnet, M. Amandry and P. Ripollès, *Roman Provincial Coinage, Volume 1. From the Death of Caesar to the Death of Vitellius (44 BC–AD 69)*, 2 vols (London, 1998).

²⁶ Timothy Berners-Lee, *Cool URIs Don't Change* (W3.org, 1998), <<http://www.w3.org/Provider/Style/URI>>.

suggest that this information is accessible only if a user knows its item number, exactly where to look, and how to use the FAC search form.

The site WildWinds, number two in the list of Google results, represents a partial response to the problem of archiving commercially generated records of coins for sale on the Internet. Following the link above and perusing the information shows that the page offers abbreviated descriptions of coins sold on eBay and other commercial sites. There are also coins submitted by individual collectors. That is, the site serves as an aggregator and preserver of information generated by its user community. As with many of the pages on this site, the coins of Augustus issued by imperial mints are listed first and identified by their type numbers in the second edition of *Roman Imperial Coins Volume I (RIC)*; the coins issued by civic mints are listed by their *RPC* numbers, with some variation at the end. These are the standard works in the field, and while neither is replaced by the many similar listings at WildWinds.com, the information that is available on the site is useful. The image quality is variable, but that is a function of the source material not a matter of choice by the organizer of the site.

For the purposes of this discussion, the interest in WildWinds lies in the fact that it leverages an existing scholarly infrastructure, the typologies in *RIC* and *RPC*, to organize and preserve information generated by commercial activity. The results of this effort are exposed on the Internet and access to them is facilitated by search engines such as Google. This is an optimistic view of the effort. Taken on its own terms, however, WildWinds.com successfully presents one segment of numismatic information in a way that has proved useful to the numismatic community. This is shown by its inclusion in lists of well-regarded numismatic sites and its appearance in Wikipedia articles. For example, the page 'Helvetica's Identification Help Page,' an entirely personal effort, says of WildWinds.com:

The best! If you use the website a lot, make a donation, as Wildwinds requires a tremendous amount of work and the traffic and server space probably costs a fortune.²⁷

On Wikipedia, there are links to the site in the articles entitled *Ancient Greek coinage*, *As (Roman coin)*, *Nabataean coinage* and many others.²⁸ While these are informal indications, they illuminate the typical processes by which numismatic information is generated, reused, and linked on the Internet.

The private site *Coins of Roman Egypt* provides access to K. Emmet's discussion of a recently identified issue of Augustus from the mint of Alexandria. The text is a reprint from a 2003 article in the *Celator*, a print-based magazine

27. Helvetica's Identification Help Page, <<http://www.catbikes.ch/coinstuff/coinlinks.htm>>.

28. A review of the editing history of each of these articles suggests that third parties made the links from Wikipedia to WildWinds, which I take to indicate that they are not a result of self-promotion.

whose main readership is collectors of ancient coins.²⁹ In terms of the quality of the material, it is worth noting that the author of the article has also published a catalogue of Alexandrian coin types that is widely used in the field.³⁰ There is no reason to doubt that this article is intended as a serious contribution.

It is also worthwhile taking note of the *Coins of Roman Egypt* site itself. This resource is the personal effort of Michael Covill, an otherwise unaffiliated collector. In addition to a catalogue describing his collection, the site includes overviews of the denominational structure of Alexandrian coinage, an introduction to the dating system found on Alexandrian coins of the Roman period, a bibliography, a set of links, and a library of hosted resources relevant to the topic. Emmett's article that led this discussion to the site appears in this last section. The site's editor also offers an explanation of why he has made this resource available:

One of the things that I enjoy most about the hobby of ancient coin collecting is the willingness of others to share their knowledge along with insight they have received from the coins in their collection. This website is my attempt to aid and encourage the discussion of Alexandrian coinage under the Romans, and to hopefully give something back. If I can be of help to you, or you have found an error on my site, please do not hesitate to email me.

The breadth and generally good quality of the information on the site gives substance to this idealistic statement.

The last site appearing in the first five sites of our example Google search is the appropriately titled Flickr set, 'The Coinage of Augustus'. Consisting of 985 photographs, this set is at first glance useful as an aggregation of attractive photos of iconographically interesting coins.

On closer inspection, however, it appears that almost all of the images in this set are taken from the site of the dealer Classical Numismatics Group (CNG) at <<http://cngcoins.com/>>. For example, the first image in the set, issued in the name of Augustus' adopted grandson Gaius, also appears at <<http://cngcoins.com/Coin.aspx?CoinID=56516>>. The CNG site provides a more complete description of the piece that includes the standard references to RPC and the catalogue of the British Museum. The Flickr set has stripped out this information and presents only the coin with a brief title. Other coins, such as no. 702 in the Flickr set, do retain both the image and the informative text, copied in this instance from item 115218 on the CNG site.

While there is perhaps a lack of courtesy in the failure to directly acknowledge the source of each of these images, such reuse may actually be consistent with the spirit by which CNG has made this material available. The FAQ on the CNG site contains the following question and response:

²⁹ Keith Emmett, 'An Unpublished Alexandrian Coin of Augustus', *The Celator*, 17:8 (2003).

³⁰ Keith Emmett, *Alexandrian Coins* (Lodi, 2001).

Can I use a photograph from CNG's website?

Any of our photographs may be reproduced as long as credit is given to CNG as the source of the photographs. Please include our site's URL, www.cngcoins.com, in any citation.³¹

Although this requirement seems to be clearly stated, I am not a lawyer so I cannot offer an opinion as to whether or not language found in a FAQ is legally binding. It does suggest a willingness to see these images reused in a wide variety of settings.

More explicit is the legal infrastructure by which digital images of CNG coins are duplicated in the Wikimedia Commons, an important source of openly licensed content. Looking at the Wiki source for the page http://commons.wikimedia.org/wiki/File:Solidus_Julian.jpg shows that it includes a `{{{CNG}}}` tag, a reference to the template at <http://commons.wikimedia.org/wiki/Template:CNG>. While an explanation of such templates lies beyond this discussion, the practical result is that inclusion of the characters `{{{CNG}}}` is sufficient to invoke documentation establishing that the duplications and redistribution of CNG's images is legal. The specific rights invoked are those of the Creative Commons Attribution-Share Alike 2.5 licence and of the GNU Free Documentation Licence. This simple approach has made the dealer a prominent source of Wikipedia's numismatic content: at the time of writing over 950 pages link to the CNG template, a minimal indicator of the number of its coins that have been uploaded to the Commons. I was not able to find a similarly convenient arrangement for another source of equivalent imagery.

Returning to the Flickr set, while the failure to acknowledge the source of its images would be unacceptable in an academic context, the end result shows that the publication of reusable data, which CNG's images certainly are, leads to incremental improvement of Internet resources. CNG does not group the records in its database of sold coins under thematic headings, so the existence of an 'Augustan Coinage' Flickr set fills a gap in the functionality of that site. A Flickr set is not a perfect presentation tool, but its appearance in the Google search that initiated this discussion has made this set part of the public resources available for the study of its well-defined subject matter.

The purpose of this section has been to sample actual current practices in the creation and reuse of numismatic content on the Internet. Following the examples suggested by Google searches leads to an emphasis on commercial and personal sources of information. I hope it has been clear that it is not my goal to say whether such sources are good or bad as compared to information originating within academic contexts. They exist; they are being read and their content is being reused, and to the extent that such reuse enriches the materials available for the study of the ancient world as a whole, this benefits all users.

31 Classical Numismatics Group, *Frequently Asked Questions*, <http://www.cngcoins.com/Frequently+Asked+Questions.aspx>.

Search form accessible data

The previous discussion took the dominant search engine metaphor for accessing information on the Internet on its own terms and focused on the results of simple keyword searches. I now shift my focus to information accessible through search forms, a body of knowledge sometimes referred to as the ‘deep web’.³² It is well understood that these forms, while enabling users to find specific items within large datasets, can present a problem for search engines that ‘crawl’ the Internet. Progress has certainly been made, with search engines now showing results from sites such as JSTOR as well as from museum catalogues such as that of the Museum of Fine Arts in Boston. These two resources are well established and I use them as my first two examples of the academic and professional contributions to the digitization of the ancient Mediterranean material culture.

A centralized repository: JSTOR

The site JSTOR describes itself as:

a not-for-profit organization dedicated to helping the scholarly community discover, use, and build upon a wide range of intellectual content in a trusted digital archive.³³

The concept of a ‘trusted digital archive’ distinguishes JSTOR from the majority of possibly ephemeral information accessible through Google, as does its focus on the ‘scholarly community’. In practice, and I write the following as a user, JSTOR provides access to peer-reviewed scholarship, much of it previously published in academic journals or otherwise sourced from the academic community. As with Google, the primary means of accessing the archive is full-text search via user selected keywords. One sees this on the front page, which presents visitors with a simple box for entering terms, along with a link to ‘Advanced Search’.

Initiating the search ‘athenian tetradrachm’ shows that JSTOR is a repository of information on this particular coinage, which in the Classical and Hellenistic periods was one of the most widely circulated issues in the Mediterranean world. This is not a surprise and it is not necessary to give a detailed review of the 442 articles that were listed at the time of writing. Instead, I wish to look at how the information in JSTOR appears when accessed from the public web. I do this because there are instructive comparisons to be made with the sites discussed in the previous section, and then with the museum and academic resources introduced below.

³² Michael Bergman, *The Deep Web: Surfacing Hidden Value* (2001), <<http://dx.doi.org/10.3998/3336451.0007.104>>.

³³ JSTOR, *Mission and History*, <<http://www.jstor.org/page/info/about/organization/missionHistory.jsp>>.

I have already noted that JSTOR allows Google and other search engines directly to index its content. This effectively enables the discovery of relevant articles. Searching for 'site:jstor.org athenian tetradrachm' at Google again offers a list of highly relevant articles. I cite this search not to compare the relative quality of the results, but instead to look for indications that JSTOR is reaching the 'broader audience' it hopes to reach by opening itself to Google. As with WildWinds and CNG, I take as an indication of success the fact that links to articles in JSTOR appear in Wikipedia entries. At the time of writing, a search for 'link:jstor.org site:en.wikipedia.org roman greek archaeology' showed that titles in JSTOR are linked from the Wikipedia articles such as *Greek mythology*, *Roman art*, *Kourion*, *Archaeology of Israel*, and *History of Roman Egypt* – to name only the first five.

Such linking occurs because JSTOR has long promoted the use of stable URLs to refer to articles in its collection. While early efforts relied on the SICI system and resulted in very long strings of characters, since April 2008, JSTOR has established URLs similar in form to <<http://jstor.org/stable/297385>>. ³⁴ In addition, JSTOR also publishes Digital Object Identifiers for articles so that the URL <<http://dx.doi.org/10.2307/297385>> will also work. As it stands now, there are four forms of stable JSTOR URLs and all appear in Wikipedia articles.

But there is a limit to JSTOR reusability. While not a for-profit commercial enterprise, JSTOR does charge for access to its content. Consequently, most users reading the Wikipedia article *Symmachi–Nicomachi diptych* will not be able to follow the links to K. Dale's 1994 *American Journal of Archaeology* article 'A Late Antique Ivory Plaque and Modern Response' or to E. Simon's 1992 'The Diptych of the Symmachi and Nicomachi: An Interpretation' from *Greece and Rome*, without payment of \$10.00 or \$19.00 respectively. It is good that any gaps in Wikipedia's text are mitigated by reference to peer-reviewed scholarship. The efficacy of such a link is lessened by JSTOR's need to fund its current and long-term operations. I understand that these revenues help ensure the long-term stability of the URLs linked, but the contrast with CNG's approach to sharing its content is clear.

Museums

A distinguishing feature of museums is their direct ownership of ancient objects and the intention to maintain that ownership over the long term. It is also the case that museums usually acknowledge that the fact and right of ownership comes with a responsibility to share information about their collections. This responsibility is acknowledged in individual mission statements. For example, the Museum of Fine Arts (MFA) in Boston states that:

³⁴ In practice these addresses often redirect to URLs of the form <<http://jstor.org/pss/297385>>, though for practical purposes either form serves the same purpose.

Through exhibitions, programs, research and publications, the Museum documents and interprets its own collections.³⁵

Digital technologies are an increasingly important component of achieving the mission of the modern museum and the MFA has been a leader in providing access to its curatorial database via a search form accessible from the main page.³⁶ According to the Internet Archive, a link to this functionality first appeared on the opening page of the museum's website in early 2004.³⁷ As of this writing, 346,000 artworks are documented, including thousands drawn from the more than 70,000 objects in the museum's Greek, Roman and Near Eastern collections. The form defaults to requiring that all search terms be found in a record, so that entering 'african red slip' should be adequate to return objects said to be of this common Roman period fine tableware. Of the fourteen objects listed in response to this search, twelve are in fact African red slip vessels, most from the fourth century. The quality of the documentation is very good. While there are no references to Hayes's standard typology for the ware and no profile drawings as would be found in an expert catalogue, details such as the diameter of the vessels are given and the photographic documentation is excellent.³⁸

Despite the high quality of this resource, I was not able to find any reuse of this material on the public Internet. That there is no direct copying of these images is not surprising given the language controlling the reuse of materials on the MFA website. All search results on the site include the following text:

We are pleased to share images of objects on this Web site with the public as an educational resource. While these images are not permitted to be used for reproduction, we encourage you to do so by visiting our image rights page to submit a request.³⁹

The text 'image rights page' links to a page on 'Web Use and Gallery Photography,' which reads in part:

The reproduction, redistribution, and/or exploitation of any materials and/or content (data, text, images, marks, or logos) for personal or commercial gain is not permitted. Provided the source is cited, personal, educational, and noncommercial use (as defined by fair use in US copyright law) is permitted.⁴⁰

35 Museum of Fine Arts, *Mission Statement*, <www.mfa.org/about/index.asp?key=53>.

36 Museum of Fine Arts, *Collection Search Results*, <http://mfa.org/collections/search_art.asp>.

37 Cf. <<http://web.archive.org/web/20040410214702/>>, <<http://www.mfa.org/>>.

38 John Hayes, *Late Roman Pottery* (London, 1972).

39 Museum of Fine Arts, *Collections Search Results*, <<http://www.mfa.org/collections/>>.

40 Museum of Fine Arts, *Web Use and Gallery Photography*, <<http://www.mfa.org/about/sub.asp?key=50&subkey=1082&topkey=50>>.

Additionally, images on the individual object pages appear above a link with the text 'license this image'. This leads to a page asking the user to describe the specific use being requested and with fields for providing credit card information, though actual prices are not given. Taking the combined language of the relevant MFA pages, one does not need to be a lawyer to recognize that there are legal obstacles to integrating this material into third-party resources such as Wikipedia and Wikimedia Commons.

But what about citation of and linking to records in the MFA database along the lines of what JSTOR has promoted with its stable URLs? Unfortunately, the idea of a permanent digital reference for objects in the MFA database is not currently implemented. For example, the late Roman ceramic bowl with the accession number 1981.658 appears in the list of ARS vessels generated above. Clicking from that list to the individual record brings one to a page with the URL:

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http://mfa.org/collections/search_art.asp?recview=true&id=459660&coll_keywords=&coll_accession=2005%2E102&coll_name=&coll_artist=&coll_place=&coll_medium=&coll_culture=&coll_classification=&coll_credit=&coll_provenance=&coll_location=&coll_has_images=&coll_on_view=&coll_sort=2&coll_sort_order=0&coll_view=0&coll_package=0&coll_start=1
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While a technically sophisticated user can shorten this string to <http://www.mfa.org/collections/search_art.asp?recview=true&id=459660>, no indication of this is offered. The MFA website, despite the high quality of its content, is not then amenable to reuse by legal duplication or by linking on the basis of well-formed addresses. Accordingly, references to the MFA ancient collection are rare on Wikipedia, nor could I find links to this material through Google.

I do note that the prohibition against copying is not always followed. The same Flickr user, Joe Geranio, who constructed the Augustan Coinage photo set, has included MFA material in his 'Julio-Claudian Women' set. For example, the image and some of the documentation for MFA 88.642, a Julio-Claudian portrait of a young woman, appears in this set.⁴¹ There is an implication, though not a direct assertion, that the intent of this reuse is personal and educational, but there is no explicit reference to permission from the MFA to include its images in Flickr. In the absence of such permission, it may be that this reuse is in violation of the terms of the MFA's image right page as quoted above. A definitive statement on that issue lies beyond the scope of this discussion.

41 Flickr, *Julio Claudian Girl MFA*, available <<http://www.flickr.com/photos/julio-claudians/2303095903/>>.

Scholarly content

The site *Roman Amphorae: A Digital Resource*, hosted by the UK's Archaeological Data Service (ADS) describes itself as an 'online and introductory resource for the study of Roman amphorae, rather than a definitive study of all amphorae for specialists'.⁴² This is correct to the extent that it acknowledges the potential enormity of trying to describe all variants of all known Roman amphora forms. The content that is on the site is, nonetheless, certainly expert, up to date, and useful to anyone working in the field. Indeed, by publishing a catalogue of amphora forms online and by deploying high-resolution colour images of amphora fabrics, the site surpasses the utility of many printed reference works. As with the MFA site, it is interesting to look for aspects of the interaction between this resource and the public Internet.

As noted, *Roman Amphorae* is part of the UK's ADS. Because of this relationship, all users coming to the site are presented with a page that asks them to confirm that they accept the terms and conditions of two documents: a Copyright and Liability Statement, and a Common Access Agreement.⁴³ The terms are not onerous. The Copyright and Liability Statement states that:

A non-exclusive, non-transferable licence is hereby granted to those using or reproducing, in whole or in part, the material for valid not-for-profit teaching and research purposes.

The Common Access Agreement also invokes 'research use or educational purposes' and 'asks that users be fair and reasonable in their use of the data supplied through the ADS'. In general, many of the terms are unexceptional within the genre of end-user licences that govern use of many sites on the Internet. There does seem to be encouragement of reuse and this is welcome.

It is unusual, however, that users are required to indicate their agreement with these documents each time they come to use *Roman Amphorae*. This requirement is implemented by showing an intermediate page that appears whenever one accesses ADS data as part of a new session.⁴⁴ A further distinctive feature of *Roman Amphorae* is the suggestion that references point only to the front page of this publication. The text '*Cite only*: <http://ads.ahds.ac.uk/catalogue/resources.html?amphora2005> for this page' appears at the bottom of each page (with my

⁴² Simon Key and David Williams, *Roman Amphorae: A Digital Resource* (ADS, 2005), <<http://ads.ahds.ac.uk/catalogue/resources.html?amphora2005>>.

⁴³ Archaeology Data Service, *Copyright and Liability Statements*, <<http://ads.ahds.ac.uk/copy.html>>; Archaeology Data Service, *Common Access Agreement*, <<http://ads.ahds.ac.uk/cap.html>>.

⁴⁴ The authentication page is at <<http://ads.ahds.ac.uk/catalogue/terms.cfm>>. The site tests for http cookies that only require new agreement with terms after an unspecified period of no usage.

emphasis indicating use of red text in the online version). The intent of this notice is to promote the use of a stable URL that will continue to work for the foreseeable future.⁴⁵ It may have the outcome of reducing the reuse and discoverability of the separate components of the publication.

I note these two features of *Roman Amphorae* because they provide context for the observation that its pages are invisible to search engines. Looking at the entry for the common late Roman amphora form Keay 62, manufactured in what is now Tunisia, one sees the sentence ‘Keay (1984) subdivides this type into five variants (A–E)’.⁴⁶ Searching for this quoted string at Google does not lead to this page. The same is true when searching at AskJeeves.com, Microsoft’s Live.com and Yahoo.com. Searching without the quotes returns a long list of URLs but no links to *Roman Amphorae*. A search just on ‘Keay 62’ also does not include *Roman Amphorae* in its results. This page, then, does not seem to exist from the perspective of search engines, and it falls beyond the scope of this chapter to explain this fact beyond making the observations already offered.

Conclusion

In my introduction I made clear that personal opinion played a role in my selection and presentation of particular sites. When not guided by the results of Google searches, I have selected sites whose evident utility and high profile make them suitable for consideration. My presentation has certainly been influenced by my strong opinion that information ought to be deployed in such a way that it can be easily found and be part of public reuse and reinterpretation. As I said, I took Google to be one indicator of discoverability and Wikipedia of reuse. I am interested in the cumulative effect of small decisions by authors and distributors of digital resources; and I believe that one consequence of the choices made by academic sources is the ceding of important territory in some of the most dynamic and visible parts of the Internet. Commercial entities and private individuals are engaging in practices that are open and that do promote access, and they are reaping the benefit of their decisions. I of course do not mean to suggest that academics are not exploring new forms of scholarship that are likewise open. I have already mentioned the Perseus Project, which itself does have a coin catalogue, and OpenContext, which includes Roman pottery. Recently, the Suda Online, long a model of open scholarship, established permanent and short URLs for all its entries.⁴⁷ In my research, I have ensured that the American Numismatic Society’s collection publishes a stable URL for every piece catalogued in its collection, and the overview of pottery at Troy

45 I thank Julian Richards for this information.

46 I respect the text quoted above and do not offer the direct URL for this entry.

47 E-mail from Raphael Finkel republished at <<http://www.stoa.org/?p=853>>.

that I co-edit is available under a Creative Commons licence.⁴⁸ Other projects that I work on are in different stages of implementing sustainable links and allowing meaningful reuse, so I understand that digital publication is an ongoing process that can respond to developing best practices.

It is important to repeat that visibility in Google and Wikipedia is not a sufficient basis for judging the success or viability of digital information. Nonetheless, I do believe that if museums are going to restrict the copying of their information, they should make it easy to link to individual records; that offering some version that can be reused in Wikipedia, or other contexts, is a service that will increase the impact of digital assets; and that discoverability via search engines for high-quality scholarly information means that students and others starting their research with these tools are more likely to find materials that increase their understanding of the ancient Mediterranean world.

Finally, let me say that I understand that citation of specific websites means that my primary sources will probably not be available for any great length of time after the publication of the preceding observations and critiques. The underlying data may be preserved, but appearances and policies change over time. As an extreme example, the results of the Google searches I use will certainly be different even before publication. It is also the case that standards and best practices are evolving. Many researchers look to the development of the 'Semantic Web', which allows linking between concepts and not just spans of text within documents, to enable new forms of interaction between digital resources.⁴⁹ To the extent that these tools for publication will be available to the same diversity of sources that I have invoked throughout this chapter, it may be the case that my comments remain relevant.

48 Items in the American Numismatic Society database are accessible using URLs of the form <<http://numismatics.org/collection/1858.1.1>>. Sebastian Heath and Billur Tekkök, *Greek, Roman and Byzantine Pottery at Ilion (Troia)* (2006–2009), <<http://classics.uc.edu/troy/grbpottery/>>.

49 Leo Sauerma and Richard Cyaniak, *Cool URIs for the Semantic Web* (2008), <<http://www.w3.org/TR/cooluris/>>.