



Linking Islands of Data

Nomisma, Numismatics and LOD

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Nomisma, Numismatics and LOD

Handout

<http://tinyurl.com/jo5v3o9>



Nomisma, Numismatics and LOD

1. Why coins? Why bother?
2. Why the web? What sort of Web?
3. What have we done? What more can we do?



Nomisma, Numismatics and LOD

1. Why coins? Why bother?
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Known point of origin (*Places*)





Known issuer (*People; roles*)

VIAF

Virtual International Authority File

Search

Select Field: All Headings Select Index: All VIAF Search Terms: Lysimachus, King of Thrace, ca. 361-281 B.C. Search

Lysimachus, King of Thrace, ca. 361-281 B.C. 

Lysimachos Thrakien, König v361-v281 

VIAF ID: 82975462 (Personal)

Permalink: <http://viaf.org/viaf/82975462>

Preferred Forms

  100 0 [_ta Lysimachus,tc King of Thrace,td ca. 361-281 B.C.](#)
  100 0 [_ta Lysimachos,tc Thrakien, König,td v361-v281](#)
  100 0 0 [_ta Lysimachus,tc King of Thrace,td ca. 361-281 B.C.](#)





Known point of discovery
(*Places; contexts*)



1. Where the first coins were produced



2. Where the first coins are found





Decorated (*Iconography; religion*)

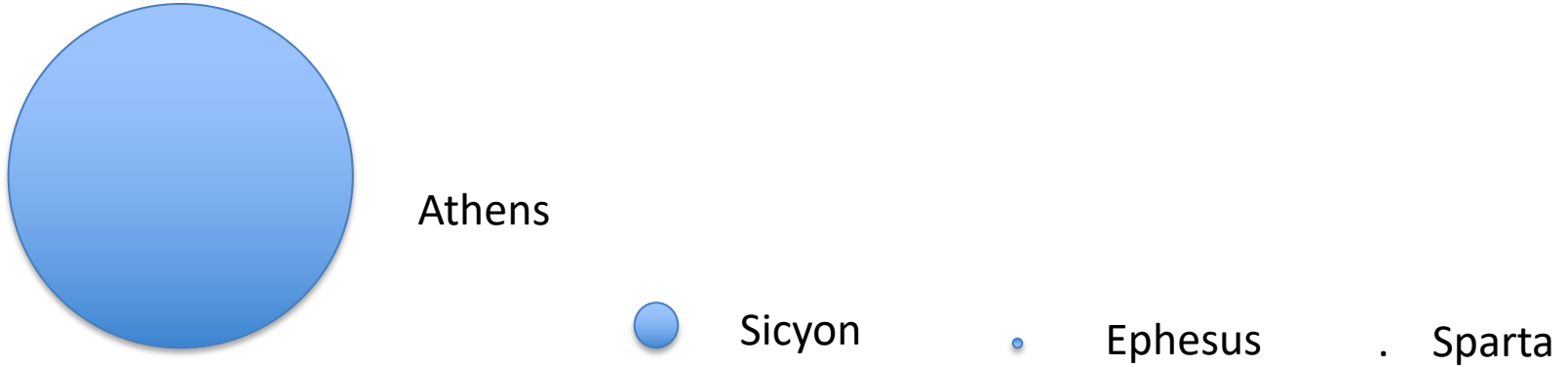


Inscribed (*Titulature; Text*)



SPQR Imperatori Caesari Quod
Viae Munitae Sunt Ex Ea
Pecunia Quae Iussu Senatus Ad
Aerarium Delata Est

Civic coin production, 450-400 BC



Quantifiable (*Statistics*)

Good News: it survives in huge quantities

Collection	Approx No.
New York	200, 000
London	200, 000
Berlin	200, 000
Paris	200, 000
Vienna	100, 000
UK PAS	434, 036
Coinarchives.com	1,606,696
Total	c. 3 Million +

Bad News: it survives in huge quantities

- Over 20 collections of 20,000+ ancient coins
- At least 5 different national reporting schemes
- All catalogue in their own systems, with their own standards, in their own languages
- All are at different stages in their digital journeys

It gets worse...

- Many of the standard catalogues and corpora are more than 50 years old
- None of them exist digitally
- There is no international co-ordinating body for their creation

Reference works (*Roman Imperial Coinage – RIC*)

MINT OF ROME — AER — A.D. 134-138					
No.	Gr.	Æ	Obverse	Reverse	Notes
			HADRIANVS AVG-COS-III. P.P.		
917	S		• (f)	EXERC-DACICVS S.C. B.M. Hadrian standing r. on low base on l., haranguing officer and three soldiers: the soldiers face him and the front two of them carry eagle and standard, respectively: the officer faces r. and holds sword (?). R.	
918	S		• (f)	• As on No. 917, but offi- cer and soldiers all face l.; in background, a vexillum. R.	C. 384
919	S		• (f)	• Hadrian standing l. on platform r., haranguing three soldiers and an officer who faces l. and holds sword and spear (?); the soldiers hold eagle and standard, respecti- vely: in background, vexil- lum. R.	C. 384
919a	S		• (f) (b)	EXERCITVS DACICVS S.C. As on No. 914. R.	C. 371, 2

EXERCITVS GERMANICVS.

920	S		• (f)	EXERCITVS GERMANI- CVS S.C. As on No. 914. R.	C. 371
921	S		• (f)	EXERC-GERMA-S-C. As on No. 914. R.	C. 389

920. C. 374 quotes variety of rev., soldiers carrying standard, vexillum, standard and shield.



(914	S		• (f)	EXER-CAPPADOCICVS S.C. Hadrian on horseback r., haranguing three soldiers: the first holds an eagle, the other two standards. R.	C. 553)
---	-----	---	--	-------	---	--------	---

And what about the humans?

- We work in different institutions
- We work with different institutions
- We work on different projects
- We work on different types of projects
- We work in different ways
- We work in different languages
- But we want to **link** and share data



Hoards

Specimen

Reference



Corpora/
Mint studies

Linking a Discipline



Finds

Specimen

Specimen

Reference

Reference

Reference

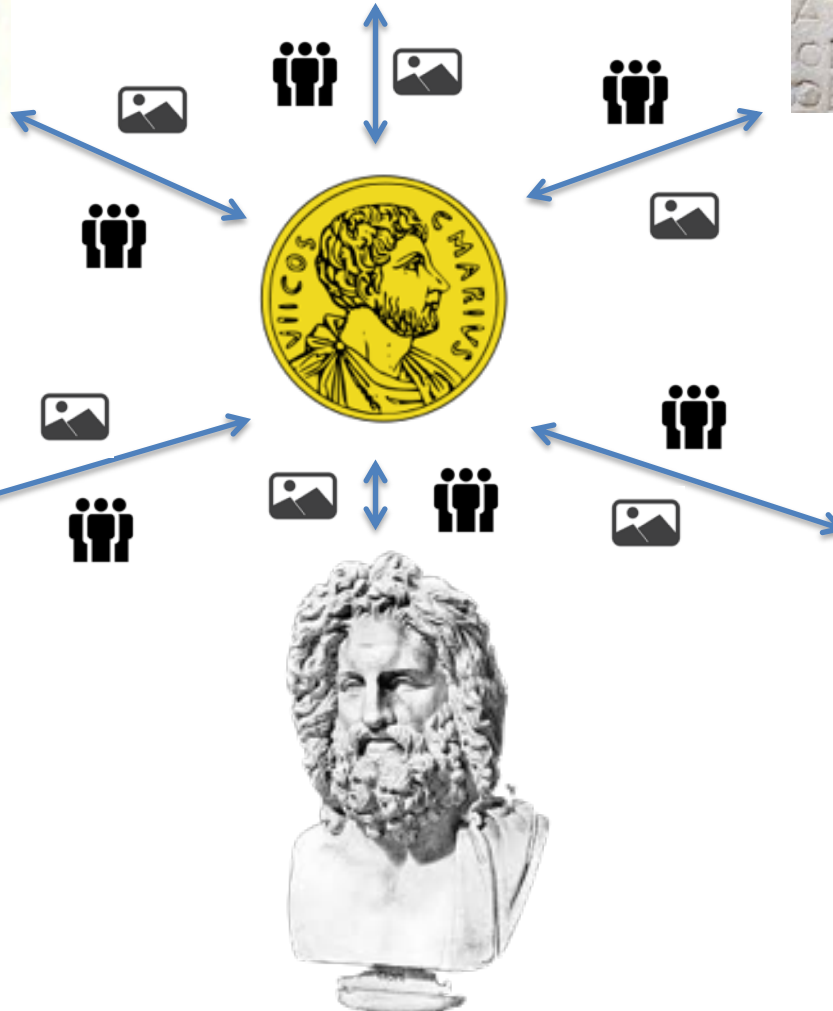
Specimen

Specimen

Reference



Collections



Linking Disciplines



The Answer?

Linked Open Data



Nomisma, Numismatics and LOD

1. Why coins? Why bother?
2. Why the web? What sort of Web?
3. What have we done? What more can we do?

Linked Open Data





Five Stars



Make your stuff available on the Web
(whatever format) under an open license



Make it available as structured data (e.g.,
Excel instead of image scan of a table)



Use non-proprietary formats (e.g., CSV
instead of Excel)



Use URIs to denote things, so that people
can point at your stuff



Link your data to other data to provide
context



Four Rules

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names
3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)
4. Include links to other URIs, so that they can discover more things

Statement

This coin in my collection
was minted at
Rome

A Statement with URIs

<http://numismatics.org/collection/1010.1.51>

<http://nomisma.org/ontology#hasMint>

<http://pleiades.stoa.org/places/423025>

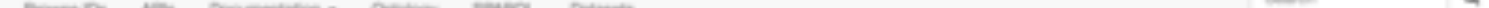


<http://numismatics.org/collection/1010.1.51>

<http://nomisma.org/ontology#hasMint>

<http://nomisma.org/id/rome>

nomisma.org/id/rome



The screenshot shows the top of the nomisma.org website. The browser's address bar displays 'nomisma.org/it/home'. Below the address bar, there is a horizontal navigation bar containing several links: 'Browse IDs', 'APIs', 'Documentation', 'Ontology', 'SPARQL', and 'Datasets'. To the right of these links is a search bar with the placeholder text 'Search' and a magnifying glass icon. Above the navigation bar, there is a row of social media and service icons, including Google Maps, SOLO, OAI-P, JSTOR, Persuade, BookFinder, Phil, WorldCat, Donum, Coincivites, AMS, Mentis, Nomisma, Academia.edu, Fitzeilam, Google Drive, and Doodle. The top of the browser window shows several open tabs, including 'Coinage of the Roman Republic', 'American Numismatic Society', and 'nomisma.org - home'.

rome (nmc:Mint)

[illegible]

sketch definition The mint at the ancient site of Rome in Latium, just

<http://dx.doi.org/10.1017/S0022296712001901>

geolocation <http://homima.org/id/home#this>

edit type	skos:Concept
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<http://dx.doi.org/10.1016/j.sbsbs.2012.05.001>

sketchesMatch <http://collection.britishmuseum.org/id/object/C25708>

<http://dx.doi.org/10.1016/j.sbsbs.2014.07.004>

http://ibtpedia.org/resource/Ancient_Rome

[slow-close-match.com](http://www.slow-close-match.com) <http://geonames.org/3169070>

skow:closeMatch <http://pdx.academy-store.org/placew/423025>

<http://dx.doi.org/10.1016/j.jmbs.2013.07.003>

sketch-clone-Matlab <https://www.getty.edu/figs/70008074>

<https://www.youtube.com/watch?v=77004T40>

<http://www.geonames.org/2168079>

[skos:closeMatch](#) <https://www.wikidata.org/entity/Q11747886>

```
#this (geo:SpatialThing)
```

<http://dx.doi.org/10.1016/j.jurimetrics.2014.05.001>

gender -41.9

gas:long 92.5

Export

[Linked Data](#) [GitHub File](#) [RDF/XML](#) [RDF/TTL](#) [JSON-LD](#)

Geographic Data: KML, geotiff (meta), geotiff (boards), geotiff (find)



10

Acuerdo

Finda

[View fullscreen](#)

RDF Statements

1. Subject (<http://numismatics.org/collection/1010.1.51>)
2. Predicate (<http://nomisma.org/ontology#hasMint>)
3. Object (<http://nomisma.org/id/rome>)

There are three parts: this is a 'Triple'

So where do URIs come from?

Standard vocabularies for describing relationships:

- SKOS - Simple Knowledge Organization System
- Dublin Core (dcterms) - Defines general metadata attributes
- Friend-of-a-Friend (foaf) - For describing people and their social network

See further:

<http://www.w3.org/wiki/TaskForces/CommunityProjects/LinkingOpenData/CommonVocabularies>

<http://lov.okfn.org/dataset/lov/>

So where do URIs come from?

Specialised resources for common things

- Geonames.org (Modern geography)
- Pleiades (Ancient geography)
- VIAF.org (People)

So where do URIs come from?

Objects: CIDOC-ICOM recommendation on Linked Open Data for museums

- When museum objects are referred to in Internet applications, it is necessary that the objects are uniquely identified by suitable URIs.
- In order to avoid different institutions generating competing URIs for the same object, each object (or set of objects) should have one preferred authority that assigns the URI for the object. The URI authority for the object must be known to all interested parties or be easy to discover.
- The most natural candidate for the URI authority for an object is the museum that curates the object, regardless of whether the museum intends to provide its own services on the Internet or not. This is because it is the only institution that can absolutely determine that two different museum object URIs actually describe the same thing.
- This URI should be derived in a simple way from the inventory numbers published in exhibition catalogues, through on-line museum catalogue access or by asking museum staff. This will avoid the need go through a matching process that could generate errors.
- This URI should have a form that enables any museum to provide a Linked Open Data service that resolves to the associated description of that object.

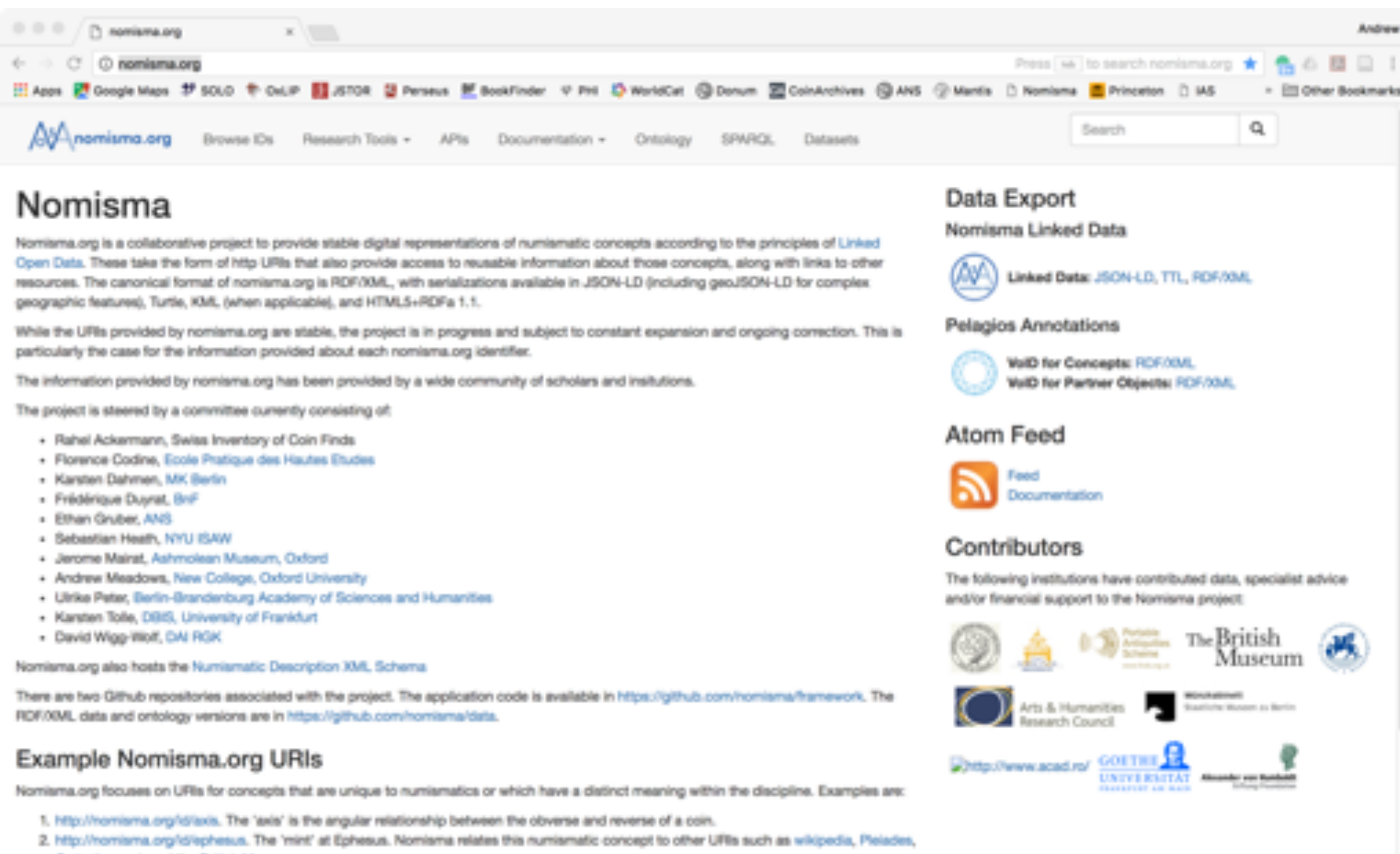
So where do URIs come from?

Controlled Vocabulary for a Discipline

Q. Where do the URIs for specifically numismatic concepts come from?

A. [Nomisma.org](http://nomisma.org)

http://nomisma.org/



The screenshot shows the homepage of nomisma.org. The browser's address bar displays 'nomisma.org'. The website's navigation bar includes links for 'Browse IDs', 'Research Tools', 'APIs', 'Documentation', 'Ontology', 'SPARQL', and 'Datasets'. A search bar is located on the right side of the navigation bar. The main content area is divided into two columns. The left column features the 'Nomisma' logo, a paragraph about the project's collaborative nature and use of Linked Open Data, a note about the project's progress, and a list of steering committee members. The right column contains sections for 'Data Export' (Nomisma Linked Data), 'Pelagios Annotations', 'Atom Feed', and 'Contributors'. The 'Contributors' section lists various institutions and their logos.

Nomisma

Nomisma.org is a collaborative project to provide stable digital representations of numismatic concepts according to the principles of [Linked Open Data](#). These take the form of http URIs that also provide access to reusable information about those concepts, along with links to other resources. The canonical format of nomisma.org is RDF/XML, with serializations available in JSON-LD (including geoJSON-LD for complex geographic features), Turtle, KML (when applicable), and HTML5+RDFa 1.1.

While the URIs provided by nomisma.org are stable, the project is in progress and subject to constant expansion and ongoing correction. This is particularly the case for the information provided about each nomisma.org identifier.

The information provided by nomisma.org has been provided by a wide community of scholars and institutions.

The project is steered by a committee currently consisting of:

- Rahel Ackermann, Swiss Inventory of Coin Finds
- Florence Codine, *Ecole Pratique des Hautes Etudes*
- Karsten Dahmen, *MK Berlin*
- Frédérique Dyrat, *BnF*
- Ethan Gruber, *ANS*
- Sebastian Heath, *NYU ISAW*
- Jerome Mainat, *Ashmolean Museum, Oxford*
- Andrew Meadows, *New College, Oxford University*
- Ulrike Peter, *Berlin-Brandenburg Academy of Sciences and Humanities*
- Karsten Tolle, *DGSI, University of Frankfurt*
- David Wigg-Wolf, *DAI RGK*

Nomisma.org also hosts the [Numismatic Description XML Schema](#).

There are two Github repositories associated with the project. The application code is available in <https://github.com/nomisma/framework>. The RDF/XML data and ontology versions are in <https://github.com/nomisma/data>.

Example Nomisma.org URIs

Nomisma.org focuses on URIs for concepts that are unique to numismatics or which have a distinct meaning within the discipline. Examples are:

- <http://nomisma.org/id/axis>. The 'axis' is the angular relationship between the obverse and reverse of a coin.
- <http://nomisma.org/id/ephesus>. The 'mint' at Ephesus. Nomisma relates this numismatic concept to other URIs such as [wikipedia](#), [Pelagios](#),

Statement about an Ashmolean object

<http://hcr.ashmus.ox.ac.uk/coin/HCR23285>

(Ashmolean-created URI)

<http://nomisma.org/ontology#hasMint>

(Nomisma.org)

<https://pleiades.stoa.org/places/491687>

(URI for Pella in the online vocabulary for ancient placenames)

Statement about an Ashmolean object

<http://hcr.ashmus.ox.ac.uk/coin/HCR23285>

(Ashmolean-created URI)

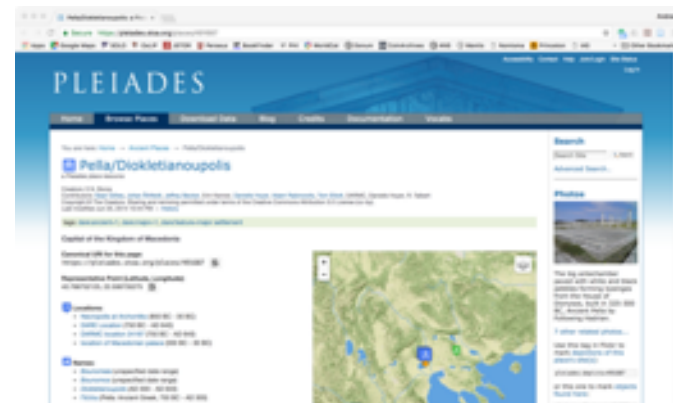
<http://nomisma.org/ontology#hasMint>

(Nomisma.org)

http://nomisma.org/id/pella_macedon

(URI for the mint of at Nomisma.org)

Statement about an Ashmolean object



http://nomisma.org/id/pella_macedon (for humans)

nomisma.org: pella_macedon

nomisma.org/id/pella_macedon

Apps Google Maps SOLO DeLP JSTOR Perseus BookFinder Phil WorldCat Denon CoinArchives ANS Mantis Nomisma Princeton IAS Other Bookmarks

nomisma.org Browse IDs Research Tools APIs Documentation Ontology SPARQL Datasets Search

Quantitative Analysis

pella_macedon (nmo:Mint)

skos:prefLabel $\tau\epsilon$ (gr), Πένα (bg), Pella (ca), Pella (cs), Pella (cy), Pella (de), Αργολή Πέλλα (el), Pella (en), Pella (es), Pella (et), Pella (eu), $\tau\epsilon$ (fa), Pella (fi), Pella (fr), Pella (hu), Pella (it), $\tau\epsilon$ (ja), Pella (ja), Πένα (mk), Pella (nb), Pella (nl), Pella (nn), Pella (pl), Pella (pt), Pella (ro), Πένα (ru), Pella (sk), Pella (sl), Πένα (sr), Πένα (uk), Pella (vi), Пелла (zh)

skos:definition The mint at the ancient site of Pella in Macedonia. (en)

dcterms:isPartOf http://nomisma.org/id/greek_numismatics

geo:location http://nomisma.org/id/pella_macedon#this

rdfs:type **skos:Concept**

skos:broader http://nomisma.org/id/strymonian_and_bottlaean_district

skos:closeMatch <http://collection.britishmuseum.org/id/place/e46346>

skos:closeMatch <http://dbpedia.org/resource/Pella>

skos:closeMatch <http://pleiades.stoa.org/places/481687>

skos:closeMatch <http://vocab.getty.edu/tn/7011026>

skos:closeMatch <http://www.geonames.org/734726>

skos:closeMatch <http://www.freebase.com/m/0d9mk>

skos:closeMatch <http://www.wikidata.org/entity/Q213679>

#this (geo:SpatialThing)

dcterms:isPartOf http://nomisma.org/id/strymonian_and_bottlaean_district#this


geo:lat 40.76033

geo:long 22.525642

Export

Linked Data [GitHub File](#) [RDF/XML](#) [RDF/TTL](#) [JSON-LD](#)

Geographic Data [KML](#) [geoJSON \(mints\)](#) [geoJSON \(hoards\)](#) [geoJSON \(finds\)](#)



Leaflet | Powered by Leaflet and Mapbox. Map data by OpenStreetMap contributors, Imagery © Mapbox

Mints Hoards Finds View fullscreen

Associated Types (max 10)

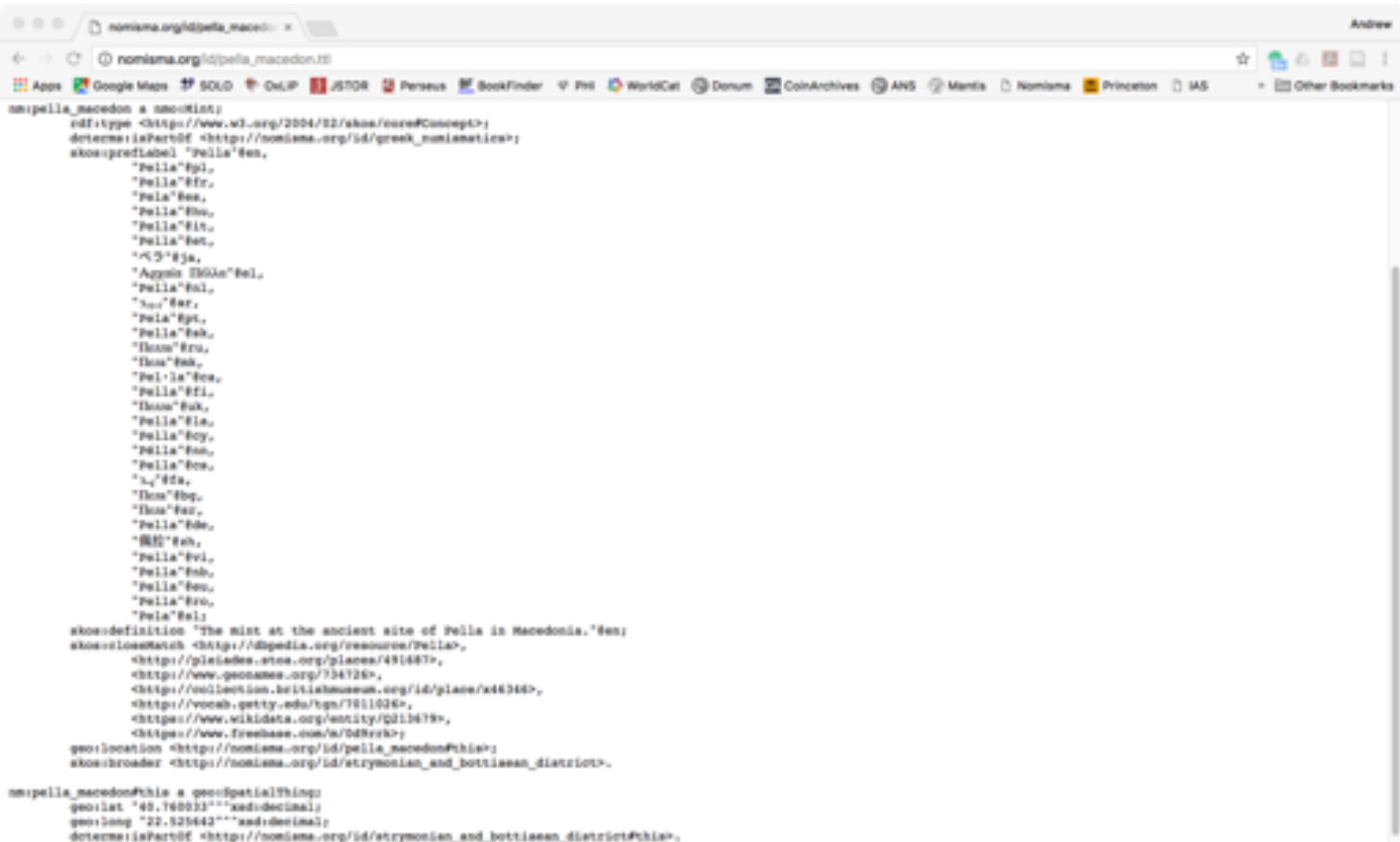
[+ View SPARQL for full query](#) [Download CSV](#)

Timeline

Time Series

Examine

http://nomisma.org/id/pella_macedon
(for machines)



So where do URIs come from?

Specialised resources for numismatic things



Nomisma.org

(Ontology and basic vocabulary)

RRC, RIC, OCRE, CHRR, CHREP, RPC, IGCH, OGC
(numbering systems)



Nomisma, Numismatics and LOD

1. Why coins? Why bother?
2. Why the web? What sort of Web?
3. What have we done? What more can we do?

The four pillars

1. Collections



2. Reference works



3. Hoards



4. Single finds



1. Collections

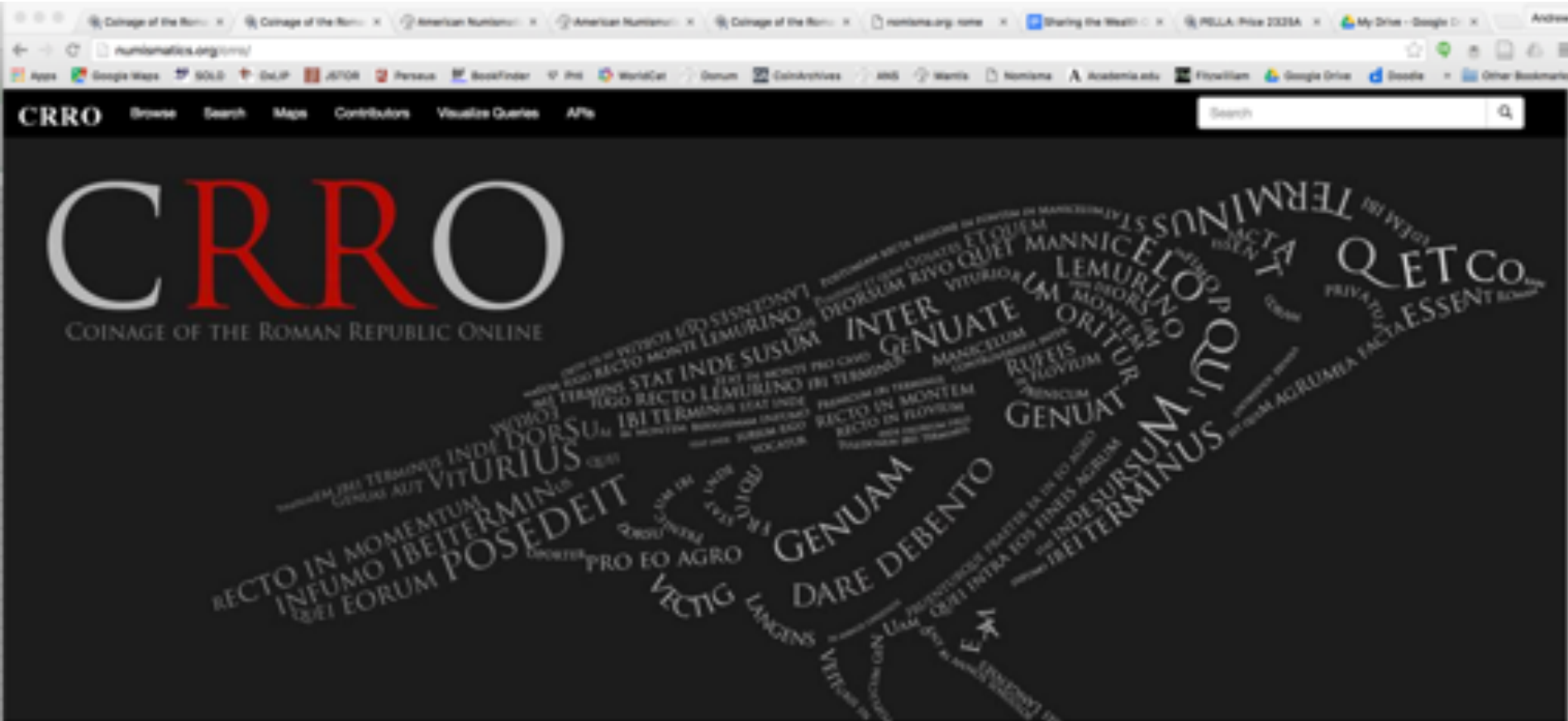


<http://numismatics.org/collection/1010.1.51>

<http://nomisma.org/ontology#hasMint>

<http://nomisma.org/id/rome>

2. Reference Works



Coinage of the Roman Republic Online

Coinage of the Roman Republic Online (CRRO) aims to provide in effect an online version of Michael Crawford's 1974 publication *Roman Republican Coinage* (RRC), which is still the primary typology used for the identification of Roman Republican coin types. Since its publication in 1974 there have been significant revisions to the dating of the series following the discovery of new hoards, but no attempt has been made to reflect these or make any other amendments to the published typology at this stage. The descriptions for these coins are based on the typology set out in RRC, but have been modified to meet the standards of the British Museum's collection-management system. Additional types not in the British Museum's collection were added to this database by Richard Witschonke of the ANS.

2. Reference Works



Hellenistic Royal Coins (HRC) is a [National Endowment for the Humanities](#) funded project based at the American Numismatic Society in New York City. HRC is a web-based resource for users to learn about, research, and conduct different types of analyses on the coinages produced by the different dynasties and rulers of the ancient Mediterranean and Near East during the Hellenistic period (ca. 323–31 BC). These include the coins struck by (and in the name of) Alexander the Great and those struck by his successors, such as the Seleucids in the Near East and the Ptolemies in Egypt.

This site, the HRC Union Catalogue, allows users to search across all existing HRC type corpora simultaneously. These include: [PELLA](#), a resource that currently focuses on the coinage in the name of Alexander the Great; [Seleucid Coins Online](#), a resource devoted to the coinage of the Seleucid dynasty; and [Ptolemaic Coins Online](#), a resource for the coinage of the Ptolemaic dynasty. In the future we hope to add additional resources for the coinages of other Hellenistic dynasties and rulers including the Antigonid, Attalid, and Bactrian dynasties.

Support



NATIONAL ENDOWMENT FOR THE
Humanities

In March 2017, the National Endowment for the Humanities awarded Hellenistic Royal Coins \$262,000 as part of the the broader [Hellenistic Royal Coins \(HRC\)](#) initiative. This grant is issued through the NEH [Humanities Collections](#) and

3. Hoards

CHRR Online

Coin Hoards of the Roman Republic Online

25

0

Apollo Ceres Cupid Cybele Diana Dioscuri Genius Hercules

AMERICAN NUMISMATIC SOCIETY

PARVA NE PEREANT

UCL

Coin hoards of the Roman Republic Online (CHRR Online) is a database of Roman Republican coin hoards mainly from the period 150 BC to AD 2. This database began life as a personal research database constructed by Kris Lockyear using a combination of published data and Michael Crawford's personal archive now housed in the British Museum. The online database, which utilises the Numishare application developed by Ethan Gruber, is a joint project between Kris Lockyear (Institute of Archaeology, University College London) and the American Numismatic Society.

The database is not intended to be a comprehensive listing of hoards of that date. For a detailed discussion of the construction of the database and the data contained within it, please see the FAQ, Lockyear 2007, Lockyear 2013 or Lockyear and Gruber forthcoming.

The database is currently Version 1 (beta).

The data is freely available to scholars for use in their research. We only ask that you:

(a) identify each hoard in your publications using the unique three-character hoard identifier;

(b) cite the database in the following manner:

Lockyear, Kris (2013). *Coin hoards of the Roman Republic Online*, version X. New York: American Numismatic Society. Data retrieved from <enter web address> on <enter date>.

CHRR Online is a [Numishare](#) tool based on the stable numismatic identities established by the [Numisma](#) project. The Roman Republican coin data served by Numisma has been supplied by the British Museum's [Roman Republican Coinage project](#).

Linked Data

Powered by Numishare.

numisma.org

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4. Findspots

Multiple finds projects now exist:

UK: the Portable Antiquities Scheme (PAS)

<https://finds.org.uk/>

Europe: Antike Fundmünzen in Europa (AFE)

<http://afe.fundmuenzen.eu/>

Pulling it together

numismatics.org/chrr/

CHRR Online Browse Search **Maps** Analyse Hoards APIs FAQ

CHRR Online
Coin Hoards of the Roman Republic Online

AMERICAN NUMISMATIC SOCIETY
PARVA NE PEREANT

UCL

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Powered by Numishare.

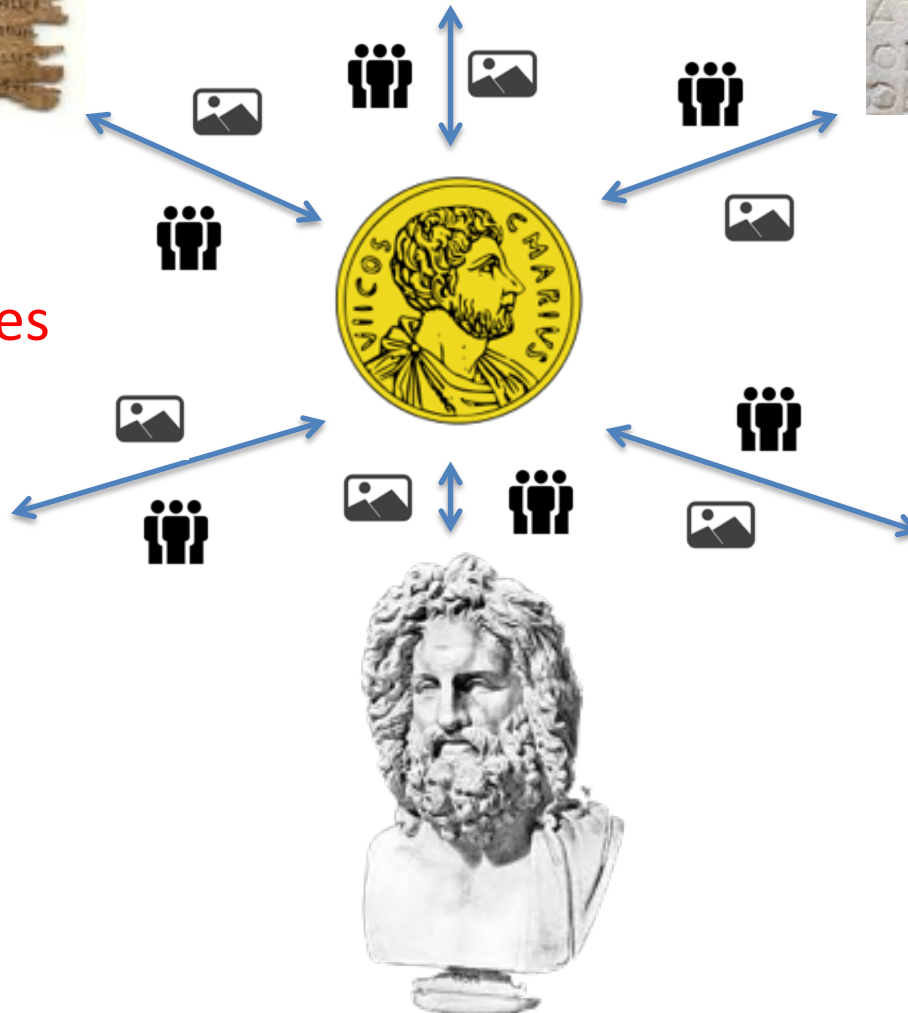
numisma.org

This work is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License.

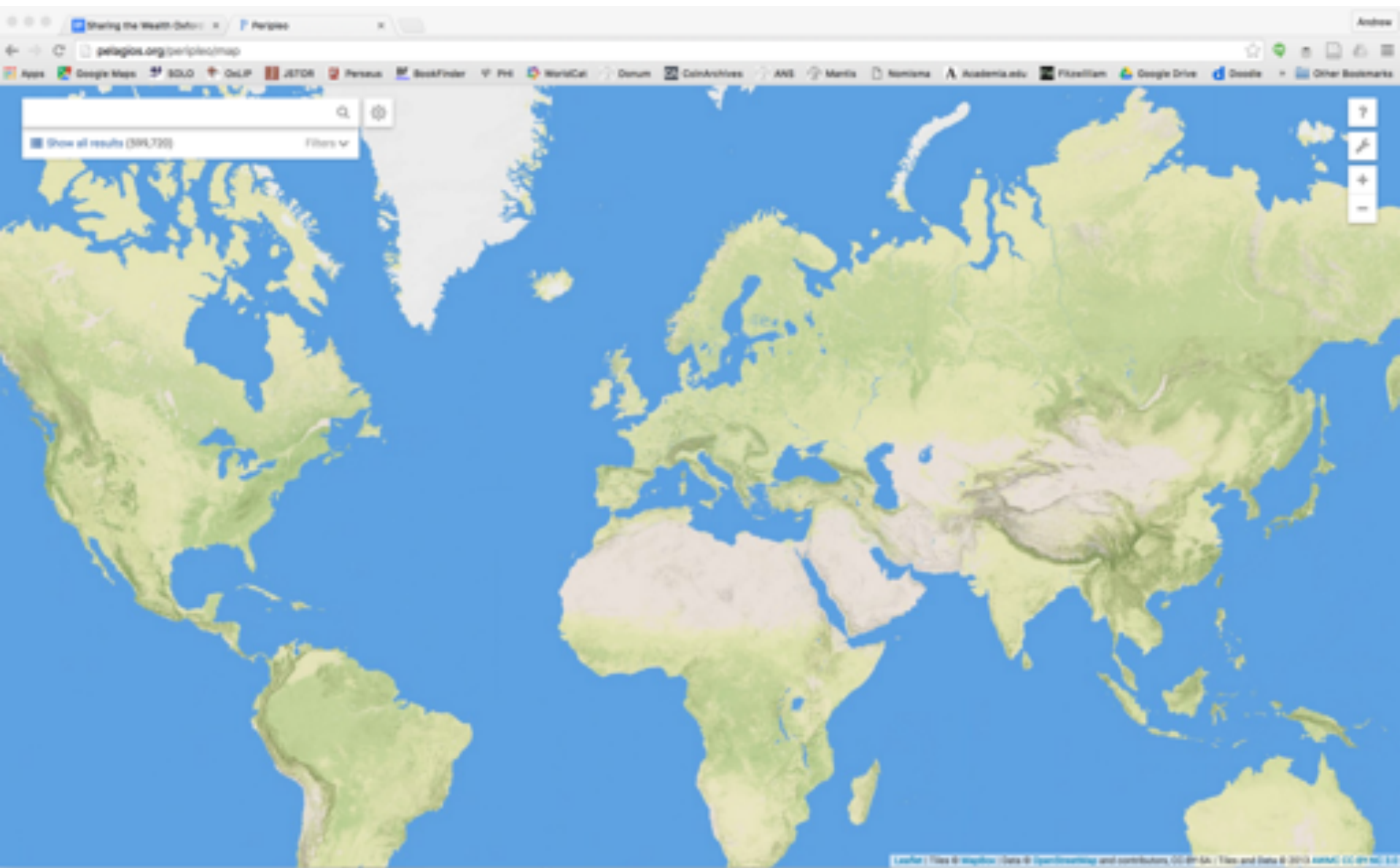
Speaking to the wider world...



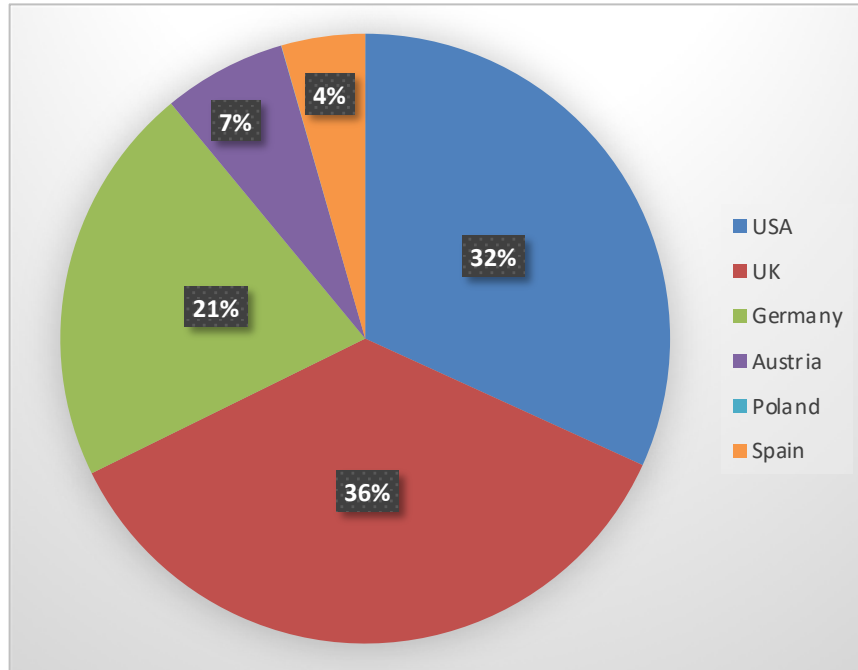
Linking Disciplines



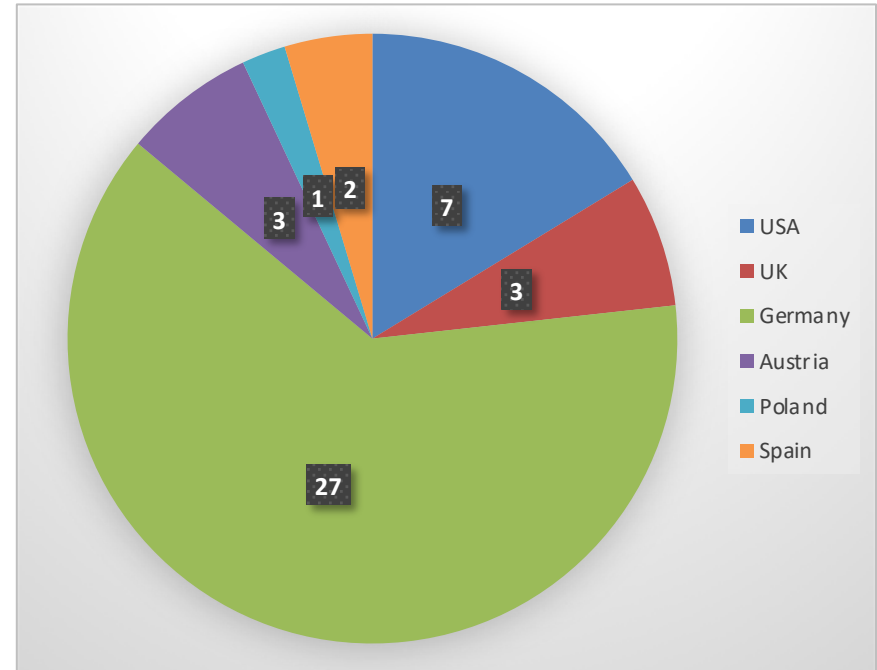
Speaking to the wider world...



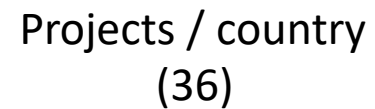
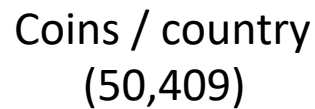
Contributors to OCRE



Coins / country
(132,074)



Projects / country
(43)

[illegible]



viaf.org/viaf/220831018



viaf.org/viaf/67609414

Heavy Lifting:

Sebastian Heath

Ethan Gruber

Dan Pett

Karsten Tolle



Numismatic Thinking:

Ulrike Peter

Frédérique Duyrat

David Wigg-Wolf

Jerome Mairat

Karsten Dahmen

Nomisma Steering Group



viaf.org/viaf/57237069



viaf.org/viaf/49459411



viaf.org/viaf/311090083



viaf.org/viaf/314901820



viaf.org/viaf/5240736



Money, Data, Tea and Sympathy:



{BnF



Münzkabinett
Staatliche Museen zu Berlin



Portable
Antiquities
Scheme
www.finds.org.uk



NATIONAL ENDOWMENT FOR THE
Humanities



The British
Museum



JISC



Arts & Humanities
Research Council



The End