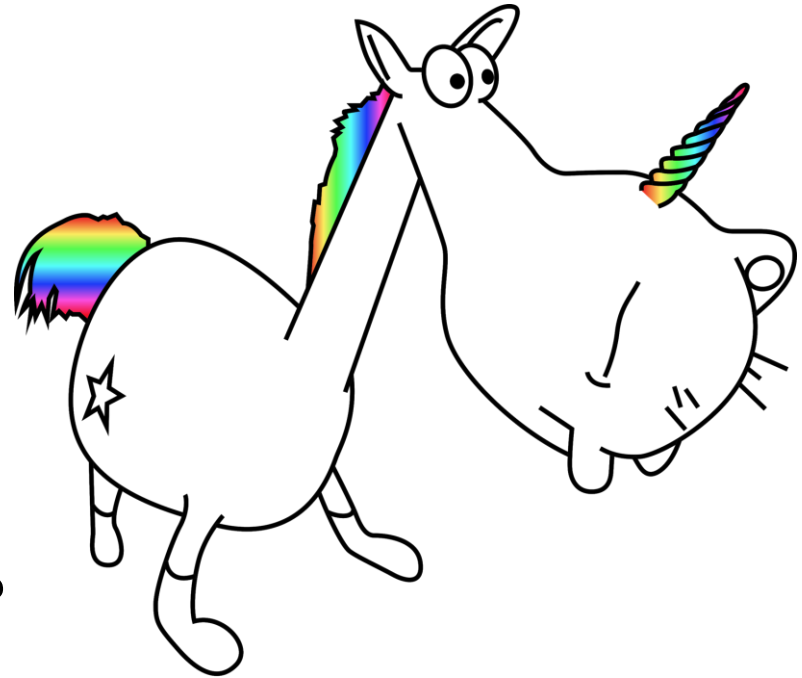
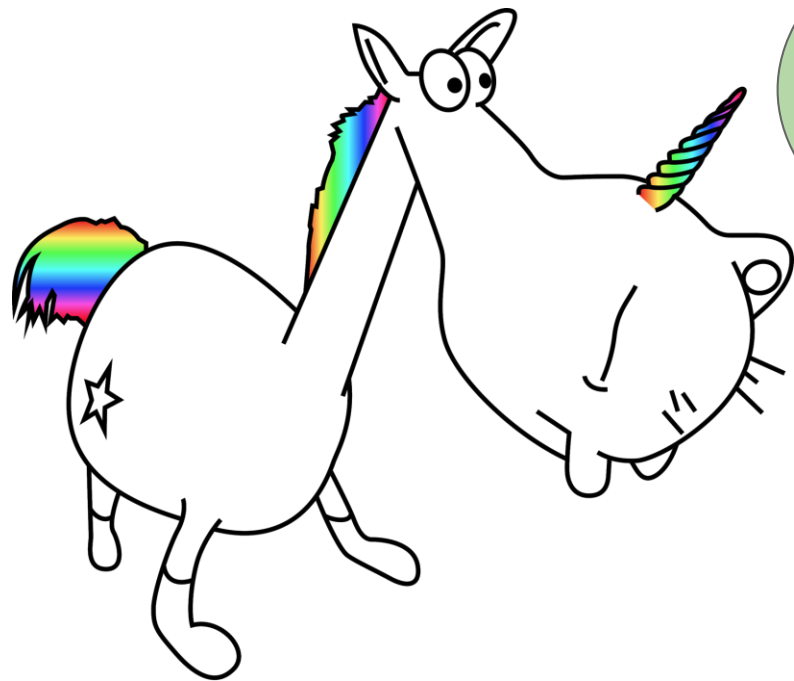


Martina Trognitz & Florian Thiery



Wikidata
A SPARQL(ing) Unicorn?





As a member of the German speaking CAA Chapter, it is an honor to have the possibility to be part of the CAA-UK community a second time. Unfortunately Martina cannot be here :-)



[Wikimedia commons; CC 0](#)

ID	Name	Breite	Länge
001	Korinth	37.91	22.87
002	Pergamon	39.13	27.18
...

Münze

ID	Name	Fundort-ID	Metall
0023	Commodus aus Korinth	001	Bronze
0024	Münze aus Korinth	001	Bronze
...

dokumentiert

Münze-ID	Foto-ID
0023	0049
0023	0050
0024	0051
...	...

Foto

ID	Name
0049	Fundfoto - Avers
0050	Fundfoto - Revers
0051	Fundfoto

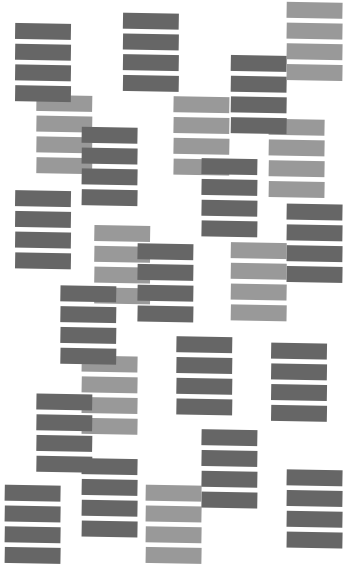


[Martina Trognitz for IANUS, CC-BY SA](#)

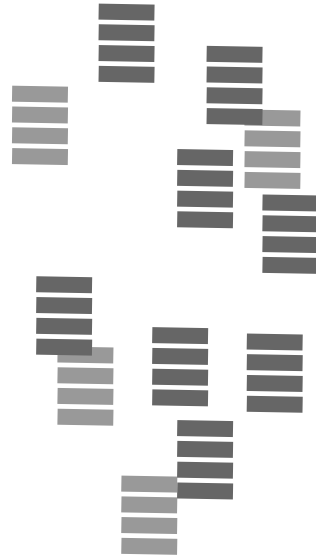
Databases play a central role in archaeological research



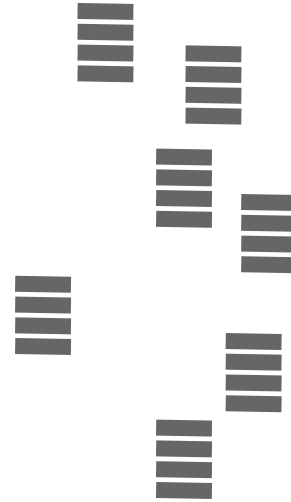
local (offline)



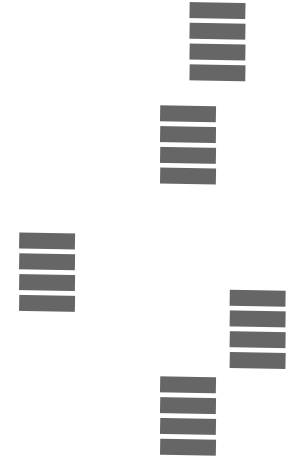
online



online & open



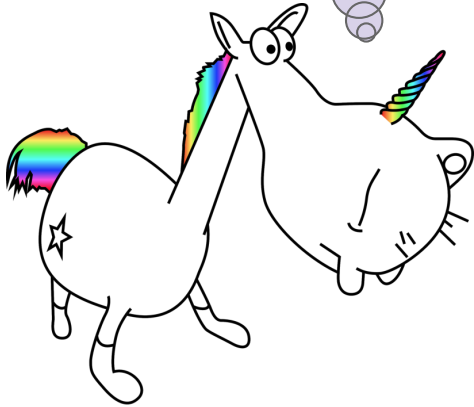
part of LOD



Not many databases are online. Few of them are openly available and accessible. Even less are part of the Linked Open Data Cloud.



I want to compare all greek amphoras dated between 500 and 400 BCE



[MET \(63.11.6\) CC-0](#)



part of LOD

[MET \(SF67441b\) CC-0](#)



online & open

online



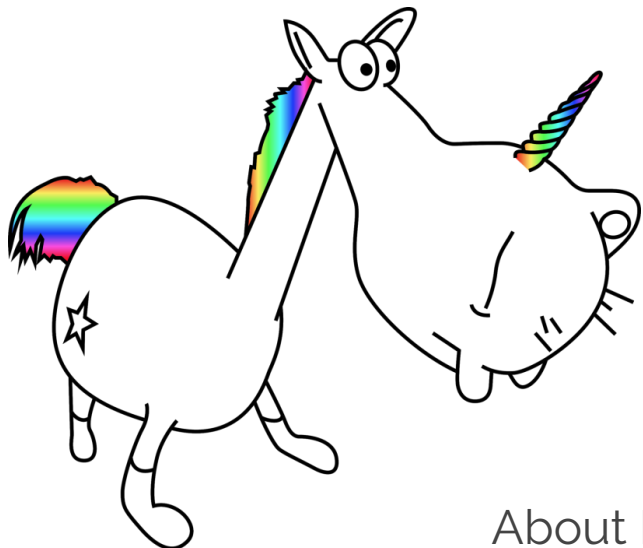
local (offline)

Comparative analysis of records across multiple datasets is difficult

The **SPARQL Unicorn**
was born at...



CHECK OBJECT INTEGRITY
CAA 2019
KRAKÓW 23-27 April



About History...



© Stary Port, Kraków



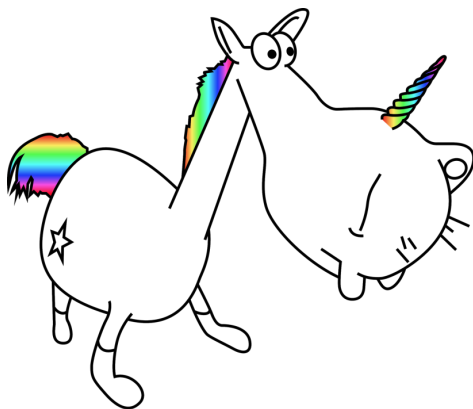
Community



I could
use...



[wikidata.org](https://www.wikidata.org)



Do you know
Wikidata?



- ❖ A free and open knowledge base
→ everybody can add and edit
- ❖ Central storage for structured data of **Wikimedia** projects
(Wikipedia, Wikivoyage, Wiktionary, Wikisource etc.)

Data in Wikidata is:

- ❖ Available under a free license (CC 0)
- ❖ Multilingual
- ❖ [Accessible](#) to humans and machines (GUI & API & SPARQL)
- ❖ [Exported](#) using standard formats (JSON, RDF, XML)
- ❖ Interlinked to other open data sets on the linked data web



What is Wikidata?



- Items
 - Label
 - Description
 - Alias
 - Identifier

- Statements
 - Property
 - Value
 - Qualifier
 - Reference

- In RDF
 - wikidata.org/wiki/Q42.rdf

Wikidata's Data Model

label — **Douglas Adams** (Q42)

description — English writer and humorist
Douglas Noël Adams | Douglas Noel Adams
▶ In more languages

statements

property — **educated at** — value — St John's College

end time	1974
academic major	English literature
academic degree	Bachelor of Arts
start time	1971

qualifiers

rank —

statement group —

opened references

stated in	Encyclopædia Britannica Online
reference URL	http://www.nndb.com/people/731/000023662/
original language of work	English
retrieved	7 December 2013
publisher	NNDB
title	Douglas Adams (English)

+ add reference

collapsed reference

end time	1970
start time	1959

▶ 0 references

+ add (statement)

Charlie Kritschmar (WMDE) [CCO]

Nebra sky disk (Q157094)

artifact found in Nebra, Germany

<https://www.wikidata.org/wiki/Q157094>



Statements

instance of

- archaeological artifact edit
0 references + add reference
- archaeological find edit
0 references + add reference

+ add value

image



1600 Himmelsscheibe von Nebra sky disk anagoria.jpg
2,724 × 2,724; 4.9 MB

0 references + add reference

+ add value

inception

- 1600 BCE edit
sourcing circumstances circa
1 reference + add value

inception

- 1600 BCE edit
sourcing circumstances circa
1 reference + add reference
reference URL http://www.lida-lsa.de/en/nebra_sky_disc/dating/
retrieved 31 October 2016

heritage designation

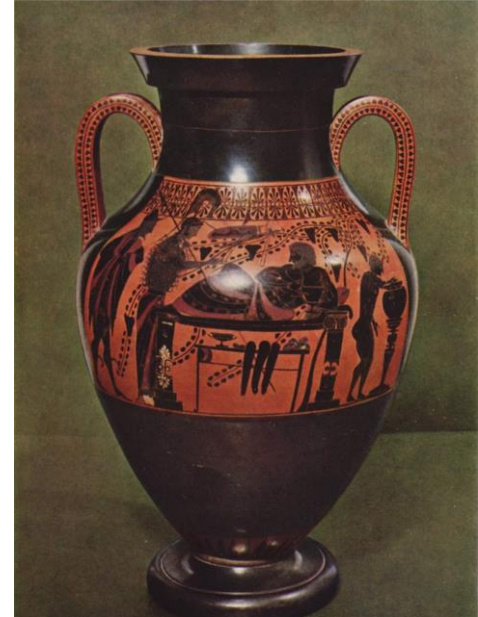
- Memory of the World edit
start time 2013
1 reference + add reference
reference URL <http://www.unesco.org/new/en/communication-and-information/memory-of-the-world/register/full-list-of-registered-heritage/registered-heritage-page-6/nebra-sky-disc/>
retrieved 12 April 2017



- ✧ Amphora ([Q178401](#))
- ✧ Shapes and types
 - ✧ **Panathenaic** ([Q1277842](#))
 - ✧ Belly ([Q11077005](#))
 - ✧ ...
- ✧ Individual Objects
 - ✧ [Q1572162](#)
 - ✧ ...

Amphoras in Wikidata

[Antikensammlung Berlin \(2301\) CC-0](#)



panathenaic amphora (Q1277842)

special shape of attic amphoras

<https://www.wikidata.org/wiki/Q170478>



Statements

instance of Q170478 ancient Greek vase-form edit

↳ 0 references

+ add reference

+ add value

subclass of Q170478 neck amphora edit

↳ 0 references

+ add reference

+ add value

image Q170478  edit

Panathenaic amphora BM B130.jpg
1,900 × 2,880; 2.95 MB

↳ 0 references

+ add reference

+ add value

Identifiers

AAT ID

300200366

Research


Research Home • Tools • Art & Architecture Thesaurus • Full Record Display

Art & Architecture Thesaurus® Online Full Record Display

[Use Search](#)

[Previous Page](#)

[Help](#)


Click the  icon to view the hierarchy.

[Semantic View \(JSON, RDF, N3/Turtle, N-Triples\)](#)

ID: 300200366

Page: [Home](#), [Help](#), [About](#), [Feedback](#), [Privacy](#), [Terms](#), [Contact](#)

Record Type: concept

 **Panathenaic amphorae** (n: k amphora, amphorae (storage vessels), ... Furnishings and Equipment (hierarchy name))

Note: Refers to amphorae that were filled with olive oil from the sacred trees of Athena, given as prizes in the Panathenaic Games. They were neck amphorae with a large, broad body sharply tapering downward and a relatively thin neck. The standard decoration included images of Athena on one side and the contest at which the prize was won on the other, usually in the Black-figure technique.

Terms:

- Panathenaic amphorae (preferred, C,U,English-P,D,U,PN)
- Panathenaic amphora (C,U,English,AD,U,SN)
- Panathenaic amphorae (C,U,English,UF,U,N)
- amphorae (Panathenaic amphorae) (C,U,English,UF,U,N)
- amphorae, Panathenaic (C,U,English,UF,U,N)
- amphorae, type c neck (C,U,English,UF,U,N)
- amphorae, type IIc (C,U,English,UF,U,N)
- amphorae type IIc (C,U,English,UF,U,N)
- amphorae type IIc (C,U,English,UF,U,N)
- neck amphorae type c (C,U,English,UF,U,N)
- neck amphorae type c (C,U,English,UF,U,N)
- panathenaic amphorae (C,U,English,UF,U,N)
- Panathenaic amphoras (C,U,English,UF,U,N)
- type c neck amphorae (C,U,English,UF,U,N)
- type IIc amphorae (C,U,English,UF,U,N)
- Panathenische amforen (C,U,Dutch-P,D,U,U)
- Panathenische amfoor (C,U,Dutch-AD,U,U)
- ánforas panatenaica (C,U,Spanish-P,D,U,PN)
- ánforas panatenaica (C,U,Spanish-AD,U,SN)

<http://vocab.getty.edu/aat/300200366>

Query: [w.wiki/gFH](https://www.wikidata.org/wiki/Q170478)



Bournemouth (Q170478)

town in the ceremonial county of Dorset, England

edit

▼ In more languages Configure

Language	Label	Description	Also known as
English	Bournemouth	town in the ceremonial county of Dorset, England	
German	Bournemouth	Seebad in Südeingland	GB-BMH
Polish	Bournemouth	No description defined	
French	Bournemouth	ville du Royaume-Uni	Bournemouth

All entered languages

Statements

instance of town edit

► 1 reference

+ add value

image  edit

Bournemouth. The Square - geograph.org.uk - 509151.jpg
640 × 480; 73 KB

► 1 reference

+ add value

<https://www.wikidata.org/wiki/Q170478>

Identifiers

MusicBrainz area ID e7316723-22d9-4472-8a81-5c89425923ae edit

► 1 reference

+ add value

Freebase ID /m/0161jj edit

► 1 reference

+ add value

OSM relation ID 130884 edit

► 1 reference

GND ID 4140811-1 edit

► 1 reference

VIAF ID 134799521 edit

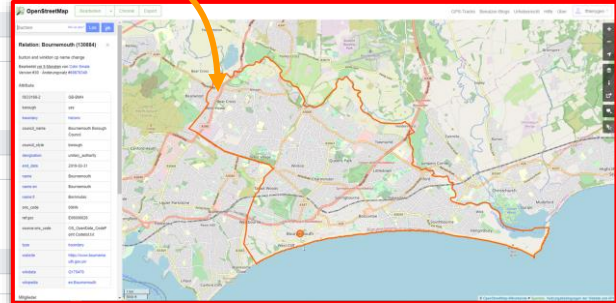
► 1 reference

GeoNames ID 2655095 edit

► 1 reference

+ add reference

+ add value



denarius (Q187776)

ancient coin of the Roman Republic and Empire

<https://www.wikidata.org/wiki/Q187776>



Statements

instance of currency 0 references

subclass of coin 0 references

named after 10 0 references

country ancient Rome 0 references

material used silver 0 references

AAT ID 300037266 0 references

Nomisma ID denarius 0 references

denarius 0 references

denarius (item) (disambiguation)

Latest Data Q187776 Q187776 Q187776 Q187776 Q187776

Associated Types View 10/14

Type	Type Name	Example
Denomination	Denarius	Roman Republic Denarius (246/64 BC)

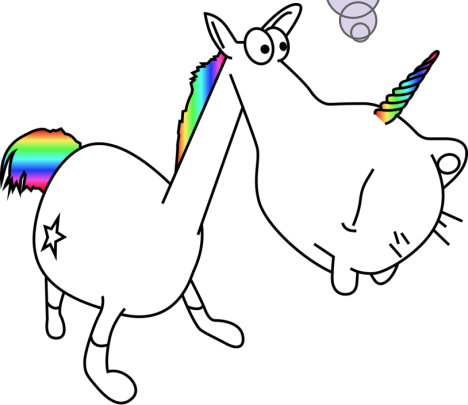
<http://nomisma.org/id/denarius>

Query: w.wiki/gFJ



Use Wikidata SPARQL Query Service

Which amphoras with images are in Wikidata?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

 ?

<w.wiki/8Xh>

WSQS

query.wikidata.org



commons:Hydria des Schuwalow-Malers ...
Q: Hydria des Schuwalow-Malers Heidelber...



commons:Hydria des Schuwalow-...
Q: Hydria des Schuwalow-Malers Heil...



commons:Hydria des Schuwalow-Malers aus Capua, 430 v. Chr. (...
Q: Hydria des Schuwalow-Malers Heidelberg B 133



commons:Antiknmuseum der Universität Heidelberg 57-8.jpg
Q: Kylix des Providence-Malers



commons: Böotisch-geometrischer großer ...
Q: Böötischer Krater



commons:Protokorinthische Oinocho...
Q: Protokorinthische Oinochoe



commons:Fragment einer attisch-schwarzfigurigen Trinkschale aus Phaleron I...
Q: Namensvase des Heidelberger Malers



commons:Fragment einer attisch-schwarzfigurigen Trinkschale aus Phaleron im ...
Q: Namensvase des Heidelberger Malers



commons:Terracotta volute-krater (bowl fo...
Q: Volutenkrater des Malers der wollenen Sat...



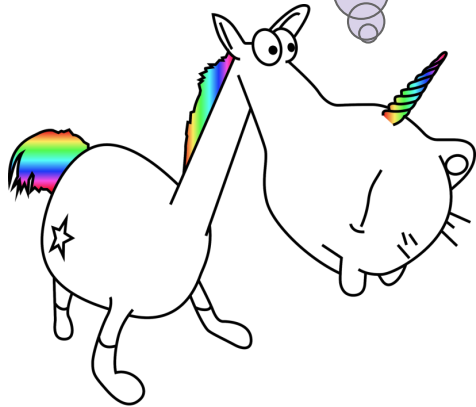
commons:Terracotta aryballos (oil flask...
Q: Keramik-Aryballos, signiert von Nearchos





Bibliographic Information

What literature /
bibliographic information
about 'Aegean Glyptic'
can I find on Wikidata?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

 ?

[long link](#)

query.wikidata.org



tool for viewing bibliographic information

topic

Aegean glyptic (Q58681669)

Recently published works on the topic

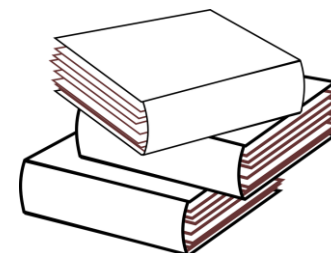
Show entries

Search:

Date	Work	Topics
2018-05-14	CMS Beiheft 5	archaeology // seal // Aegean glyptic // Mycenaean sealstone // Minoan sealstone // sealing
2017-11-12	CMS Beiheft 1	archaeology // seal // Aegean glyptic // Mycenaean sealstone // Minoan sealstone // sealing
2016-08-04	Iraklion, Archäologisches Museum: Die Siegelabdrücke von Kato Zakros. Unter Einbeziehung von Funden aus anderen Museen	archaeology // seal // Aegean glyptic // Mycenaean sealstone // Minoan sealstone // sealing
1998-03-01	The 'Ring of Nestor'	archaeology // ring // forgery // Aegean glyptic // Helladic period
1997-07-01	Another Look at Lerna: An EH IIB Trading Post?	archaeology // Aegean glyptic // sealing // Lerna
1995-01-01	Syrian Seals and the Evidence for Cultural Interaction between the Levant and Crete	archaeology // seal // Crete // Levant // Aegean glyptic // Minoan sealstone
1993-01-01	The Five Roundels from Malia, with a Note on Two New Minoan Genii	archaeology // Malia // Aegean glyptic // Minoan Genius // sealing
1992-03-01	The Multiple Sealing System of Minoan Crete and its Possible Antecedents in Anatolia	archaeology // international relations // Aegean glyptic // sealing
1991-01-01	A Bibliography for Aegean Glyptic in the Bronze Age	archaeology // seal // bibliography // Minoan sealstone // sealing // Aegean glyptic // Mycenaean sealstone
1988-03-01	The Sealing Structures of Minoan Crete: MM II Phaistos to the Destruction of the Palace of Knossos	archaeology // Knossos // Phaistos // Aegean glyptic // sealing

[Edit on query.Wikidata.org](#)

[topic/Q58681669](https://tools.wmflabs.org/scholia/topic/Q58681669)



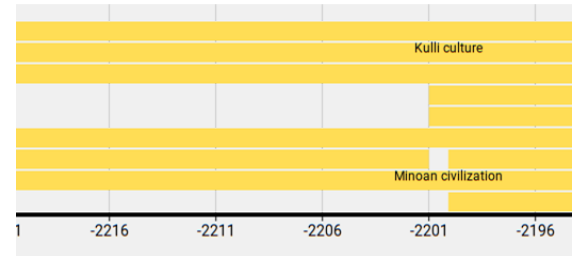
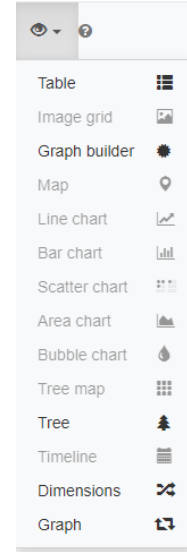
Scholia

tools.wmflabs.org/scholia



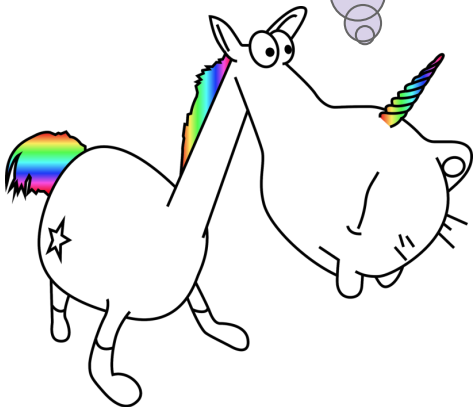
- ❖ Wikidata Query Service
→ visualisation tools in menu
- ❖ [Wikimedia Toolforge](#)
→ [Scholia](#) for bibliographic data
→ Wikidata Timeline
- ❖ [Wikidata:Tools](#)
→ Edit, Query, Enhance,
Visualise, List, Lexicography
- ❖ Programming Libraries
→ Javascript, Python, R
- ❖ [OpenRefine](#)

Existing Tools for Wikidata

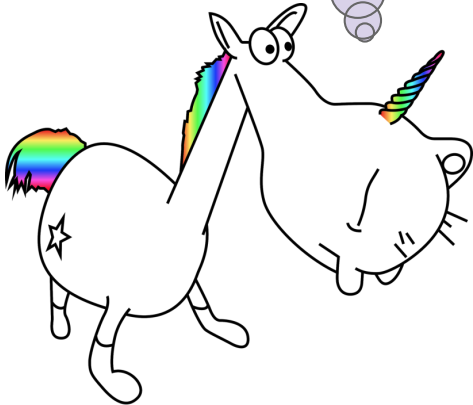




Most of the tools require knowledge of SPARQL. Queries can become very complex.



```
1 SELECT ?date ?work ?workLabel ?topics (GROUP_CONCAT(DISTINCT
separator=" // " ) AS ?places) (GROUP_CONCAT(?authorLabel; sepa
authorstrings) (GROUP_CONCAT(?editorLabel; separator= " - " )
2 WITH {
3 SELECT DISTINCT ?work WHERE {
4 ?work wdt:P921 / (wdt:P361+ | wdt:P1269+ | (wdt:P31* / wd
5 }
6 } AS %works
7 WITH {
8 SELECT (MIN(?dates) as ?datetime) ?work (GROUP_CONCAT(?topi
9 INCLUDE %works
10 ?work wdt:P921 ?topic .
11 FILTER NOT EXISTS {
12 ?topic wdt:P31 wd:Q839954} .
13 FILTER NOT EXISTS {
14 ?topic wdt:P31 wd:Q220659}
15 OPTIONAL { ?work wdt:P577 ?dates . }
16
17 ?topic rdfs:label ?topic_label . FILTER (lang(?topic_labe
18 }
19 GROUP BY ?work
20 } AS %result
21 WHERE {
22 INCLUDE %result
23
24 OPTIONAL { ?work wdt:P50 ?author .
25 ?author rdfs:label ?authorLabel . FILTER (lang(?a
26 }
27 # no extra label assignment here, because we already have a
28 OPTIONAL { ?work wdt:P2093 ?authorstring . }
29 OPTIONAL { ?work wdt:P98 ?editor .
30 ?editor rdfs:label ?editorLabel . FILTER (lang(?e
31 }
32 OPTIONAL { ?work wdt:P123 ?publisher . }
33
34 #collect related places (are in topic list; are instance of
35 OPTIONAL {?work wdt:P921 ?place
```



How can I help
researchers without
knowledge of SPARQL in
using community driven
data from Wikidata?



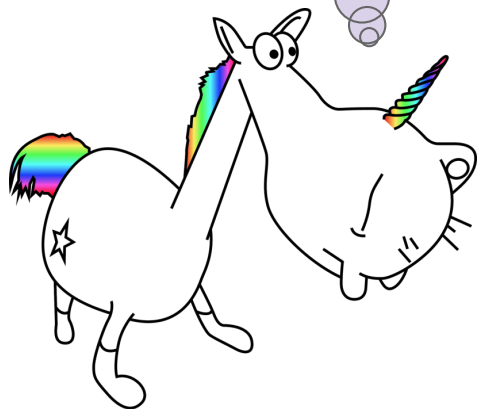
#LittleMinion
#SPARQLUnicorn

develop a 'SPARQL unicorn' as little minion to help researchers





Can I combine Wikidata,
SPARQL and R for
statistical analyses?



[Hadley Wickham and others at RStudio \[CC BY-SA 4.0\]](#)



Cran Packages

- ✧ <https://cran.r-project.org/web/packages/WikidataQueryServiceR/index.html>
- ✧ <https://cran.r-project.org/web/packages/WikidataQueryServiceR/WikidataQueryServiceR.pdf>

Wikidata SPARQL Examples

- ✧ https://www.wikidata.org/wiki/Wikidata:SPARQL_query_service/queries/examples



[Planemad](#) (Public domain)



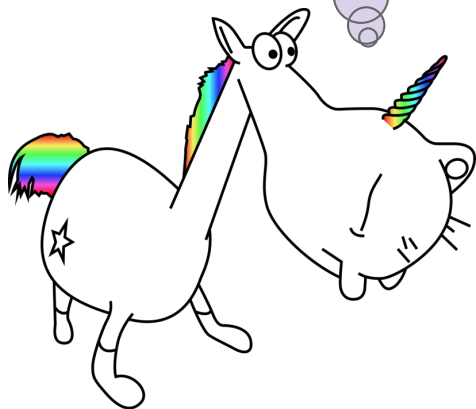
[W3C](#), [Bill Schwappacher](#) (Public domain)



[Hadley Wickham](#) and others at RStudio (CC BY-SA 4.0)



Which motives are on
wikidata greek amphoras,
queried using R?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

 ? <w.wiki/gEr>

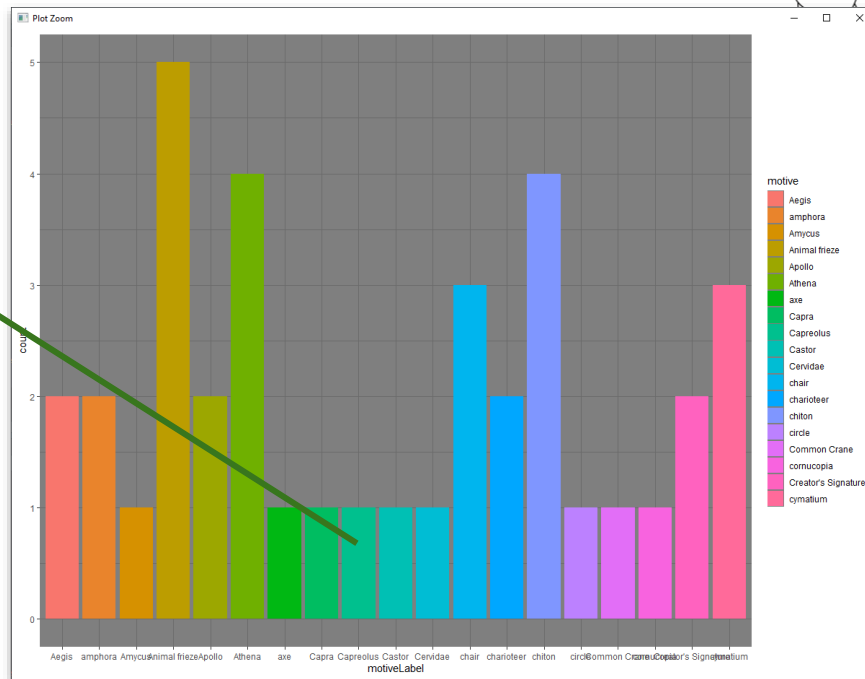
query.wikidata.org



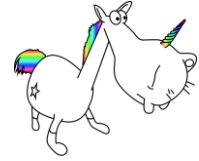
Capreolus (Q1043583)
genus of mammals *Englisch*



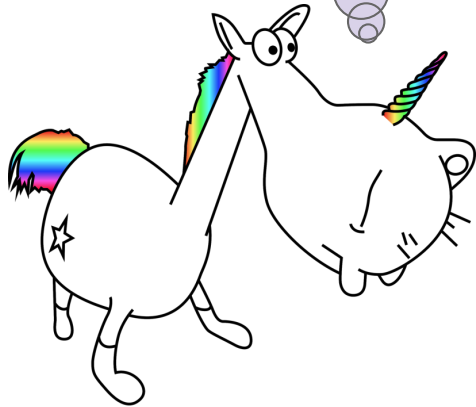
[Museum August Kestner \[CC BY-SA 3.0\]](#)



Query: w.wiki/9Er



Which castles that are archaeological sites are on Wikidata, queried using R?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

? <w.wiki/gEw>

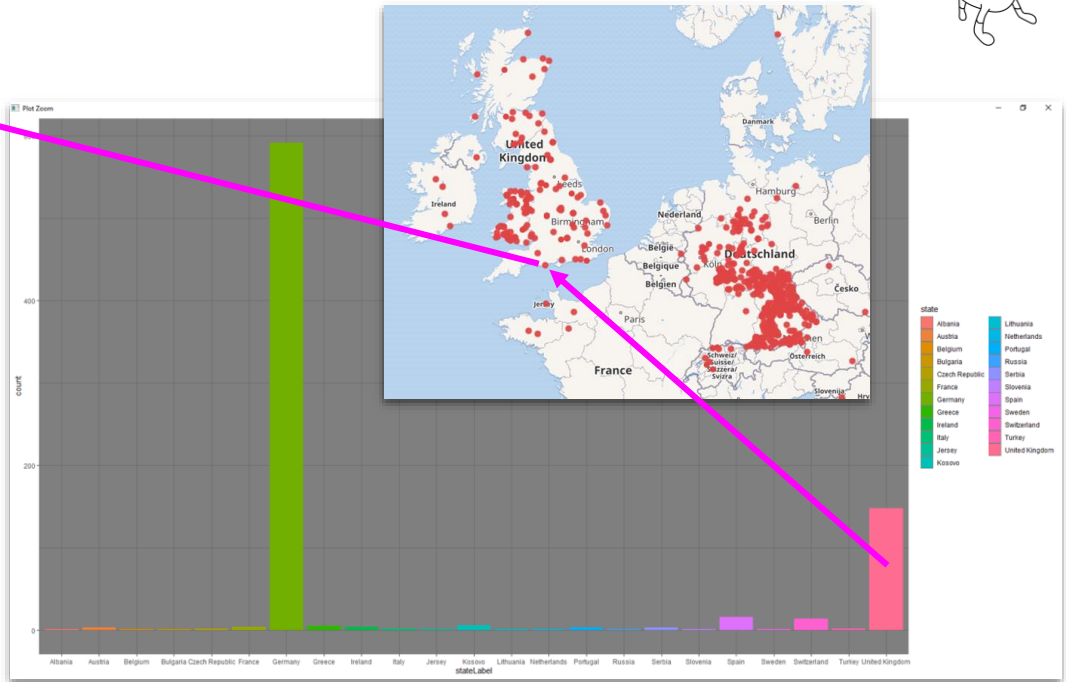
query.wikidata.org



Corfe Castle (Q1236511)
fortification in Dorset, England



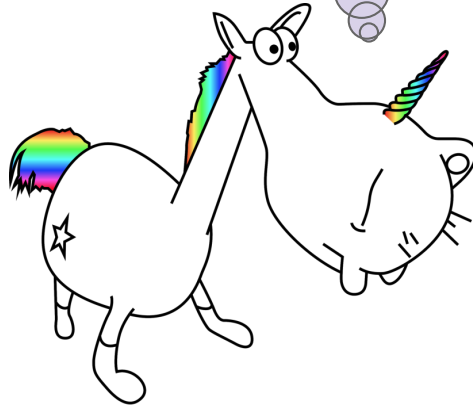
[Chin tin tin \[CC BY 3.0\]](#)



Query: [w.wiki/gEw](https://www.wiki/gEw)

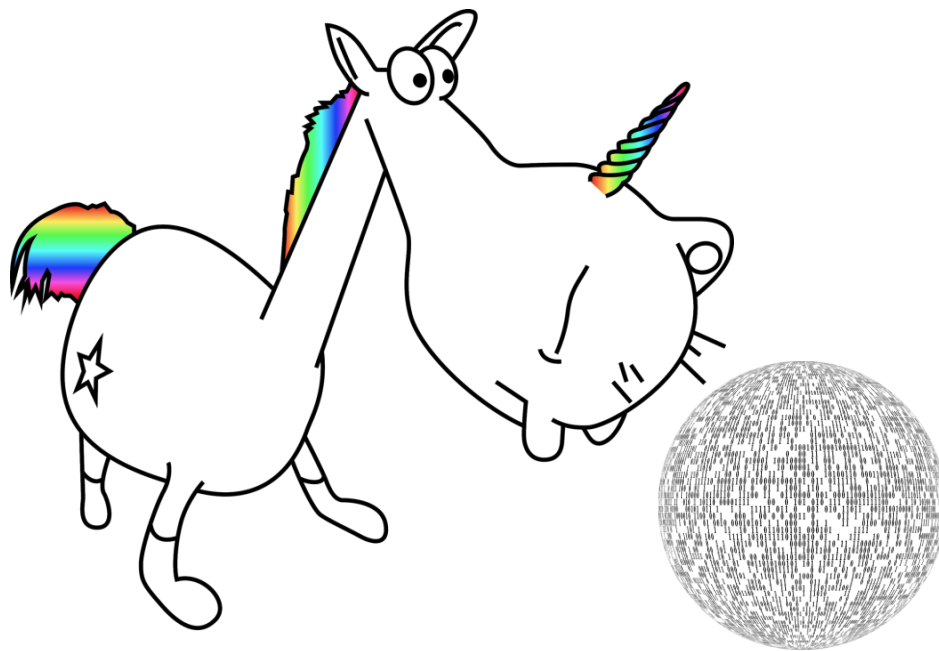


Should I also help in querying Wikidata for statistical analyses in R?

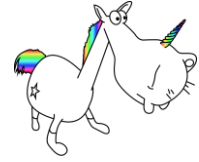


#LittleMinion
#SPARQLUnicorn

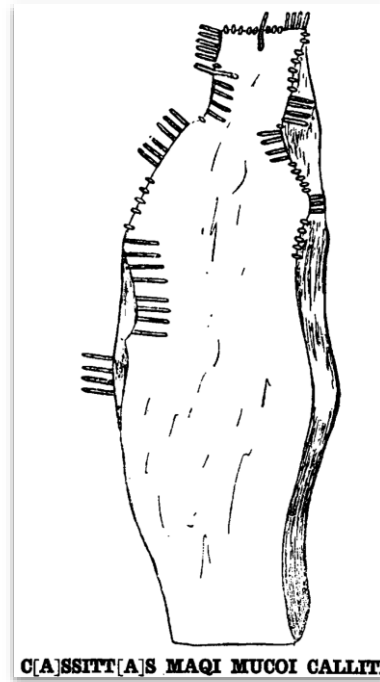
Use 'SPARQL unicorn' to connect Wikidata and R



Be part of the Wikidata community!
An example on how to do this...



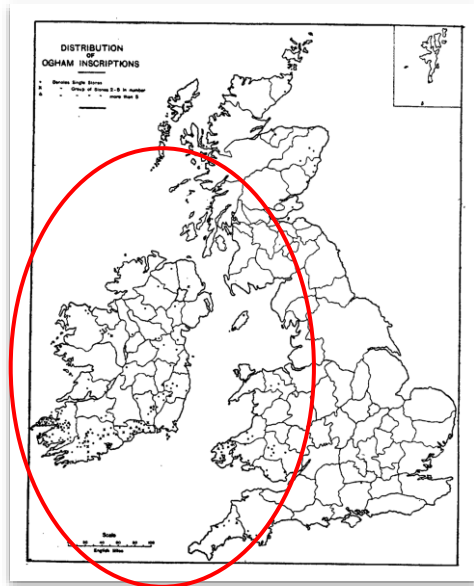
[UCC Stone Corridor, Stone 4, CIIC 81 \(Florian Thiery\) CC BY 4.0](#)



[R.A.S. Macalister, Corpus Inscriptionum Insularum Celticarum, Vol. I \(1945\)](#)

#TimoHomburg
#FlorianThiery
#mainzed
#i3mainz

... is the Linked Ogham Stones 'side' Project



[R.A.S. Macalister, Corpus inscriptionum insularum Celticarum, vol. I \(1945\) / p.502](#)

+++ Ireland
+ *Wales*
+ *England*
+ *Isle of Man*

Distribution of Ogham Inscriptions



Provide the **Ogham Stones**, their **contents**, **person relationships** marked on the stones, **tribal affiliations**, and other metadata as **Linked Data**.

By using **vocabularies** such as **Wikidata** (Vrandečić et al., 2014), **FOAF** (Brickley, 2007), and **Lemon** (McCrae, 2012), we ensure the creation of a semantic dictionary for Ogham that we dynamically extract from text sources.

- **Classification** of Ogham Stones (family hierarchy, name description, etc.)
- **Visualisation** of relations (families , tribes) using maps generated via Linked Data
- **Publishing the data in Wikidata to contribute to the Wikidata community**

The **↔//↔** Idea



OGI Ogham Analyses

CC BY 4.0 Timo Homburg, Florian Thiery, data based on <http://ogham.celt.dias.ie> CC BY-NC-SA 3.0 Ireland, ©2013 by the School of Celtic Studies <http://www.celt.dias.ie>



<https://ogi-ogham.github.io/oghamextractor/>



CIIC 81 (Q69385424)

Ogham Stone CIIC 81

 edit

[In more languages](#) Configure

Language	Label	Description	Also known as
English	CIIC 81	Ogham Stone CIIC 81	
German	CIIC 81	Ogham Stein CIIC 81	
Polish	No label defined	No description defined	
French	No label defined	No description defined	

Statements

instance of ORCID **ogham stone** edit
0 references
[+ add reference](#)
[+ add value](#)

part of ORCID **Ogham Stones** edit
0 references
[+ add reference](#)
[+ add value](#)

CIIC 81 @ Stone Corridor University College Cork, No. 4

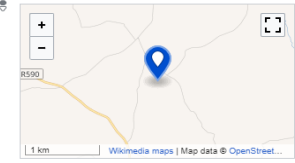
<https://www.wikidata.org/wiki/Q69385424>





country Ireland

coordinate location



material used stone

collection Stone Corridor University College Cork

CIIC 81 @ Stone Corridor University College Cork, No. 4

<https://www.wikidata.org/wiki/Q69385424>



location of discovery

County Cork
0 references

Garranes
0 references

edit
+ add reference
+ add reference
+ add value

inscription

C[A]SSITT[A]S MAQI MUCOI CALLITI (Irish)
0 references

inscription mentions

ogham formula word
0 references

MAQI
0 references

MUCOI
0 references



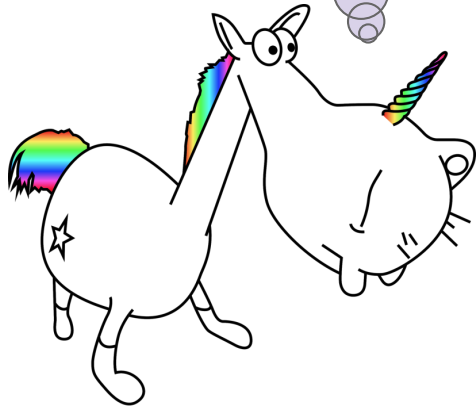
C[A]SSITT[A]S MAQI MUCOI CALLITI

R.A.S. Macalister, Corpus Inscriptionum Insularum Celticarum, vol. I (1945)

CIIC 81 @ Stone Corridor University College Cork, No. 4
<https://www.wikidata.org/wiki/Q69385424>



Which ogham stones are available in Wikidata?



Wikidata Query Service

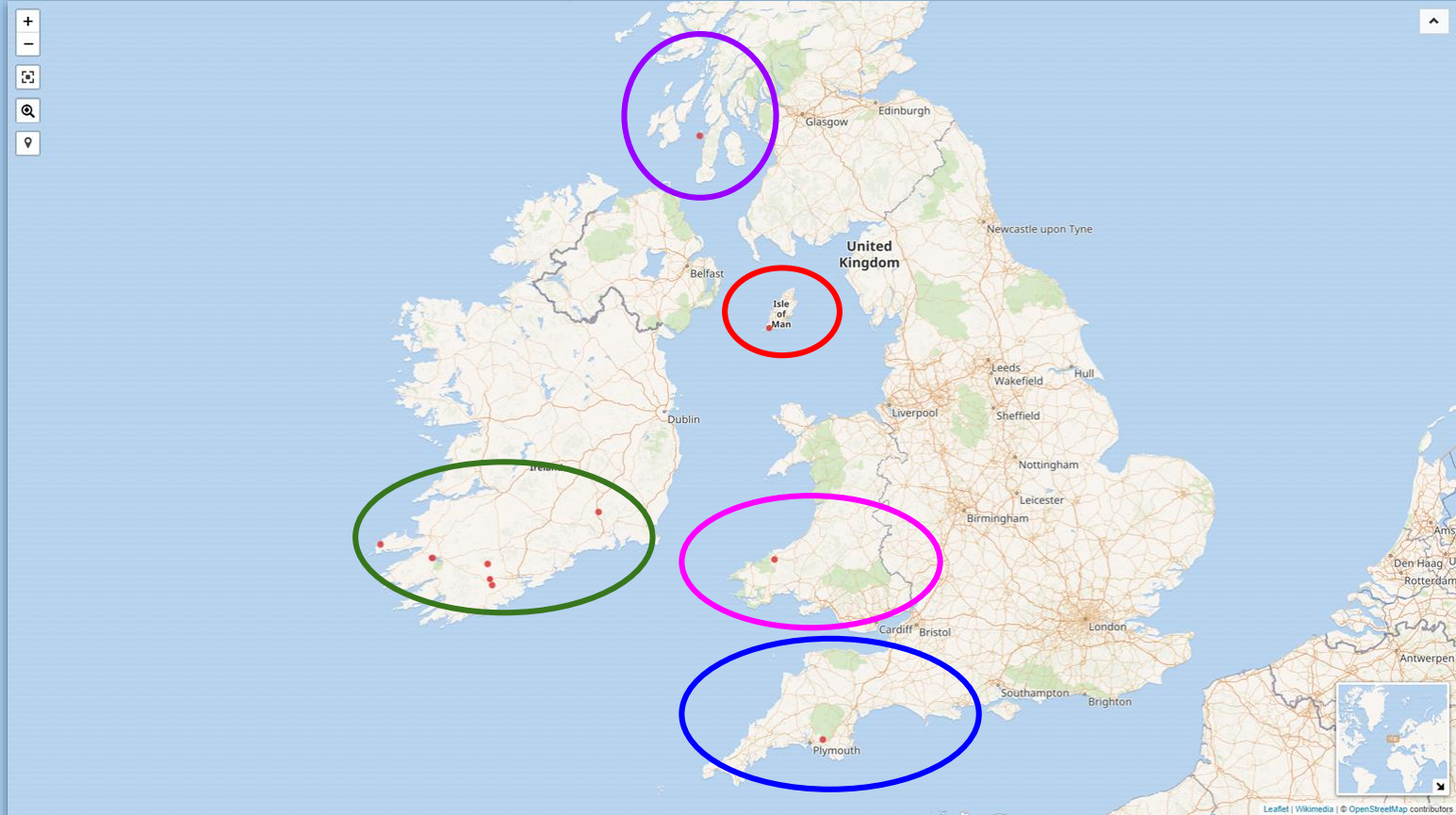
Examples Help More tools

1 (Input a SPARQL query or choose a query example)



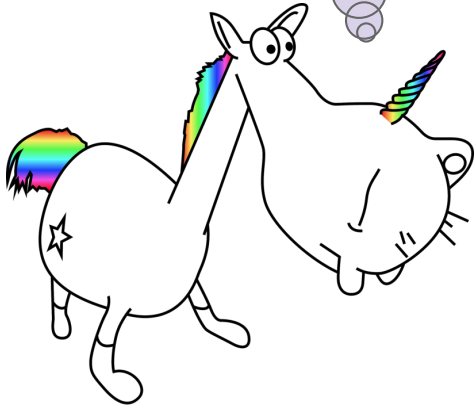
[w.wiki/G9Bg](https://www.wikidata.org/wiki/G9Bg)

query.wikidata.org






Which ogham stones can
be seen at UCC?



Wikidata Query Service

Examples Help More tools

1 (Input a SPARQL query or choose a query example)

 **UCC** ?

University College Cork, Ireland
Coláiste na hOllscoile Corcaigh
ucc.ie

w.wiki/gB8

query.wikidata.org

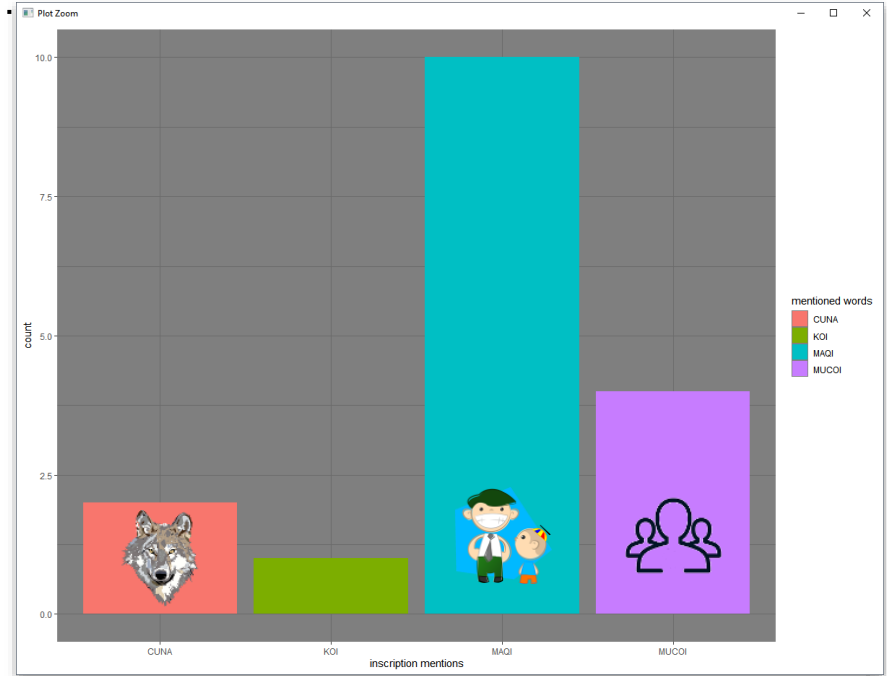
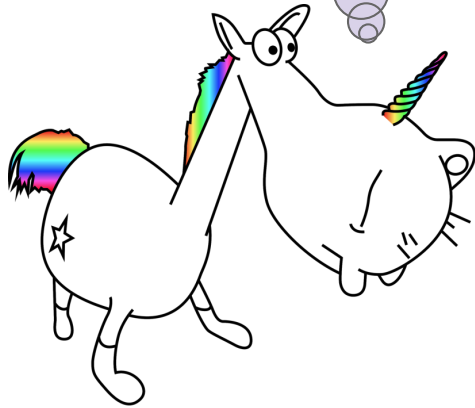


[UCC Stone Corridor, Stone 4, CIIC 81](#)
(Florian Thiery) CC BY 4.0



(Florian Thiery) CC BY 4.0

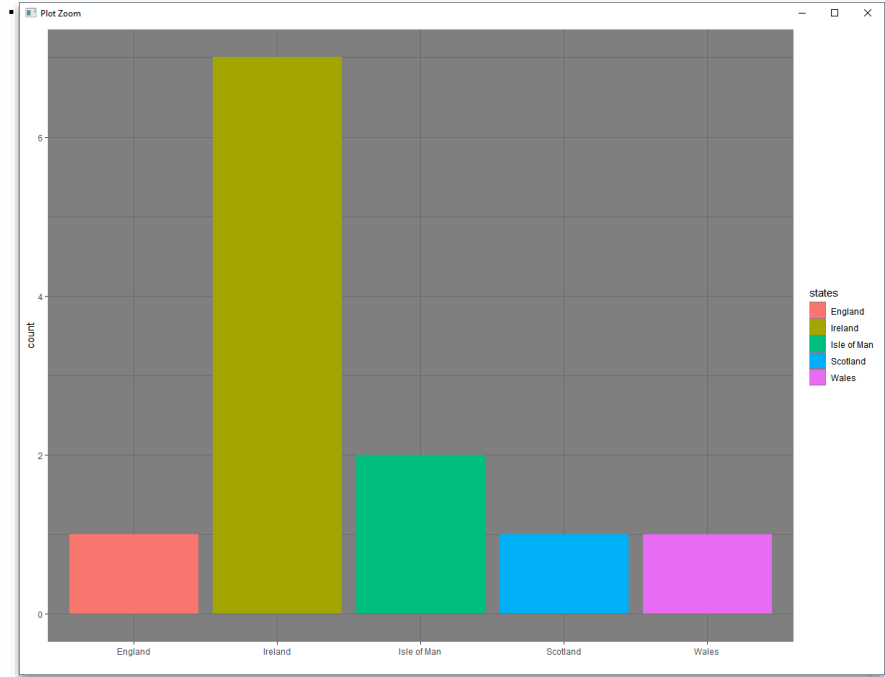
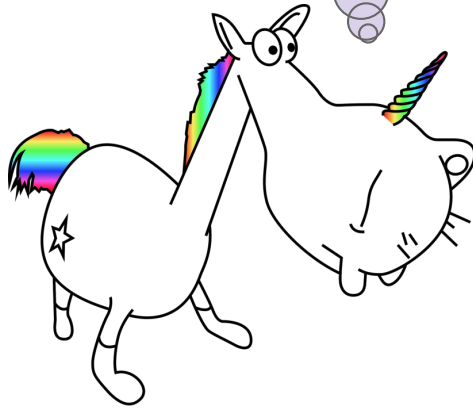
Which words are mentioned on wikidata ogham stones, queried using R?



<https://github.com/sparqlunicorn/sparqlunicornGoesR>

Query: [w.wiki/Q9E8](https://www.wikidata.org/wiki/Q9E8)

Where are the wikidata ogham stones located, queried using R?



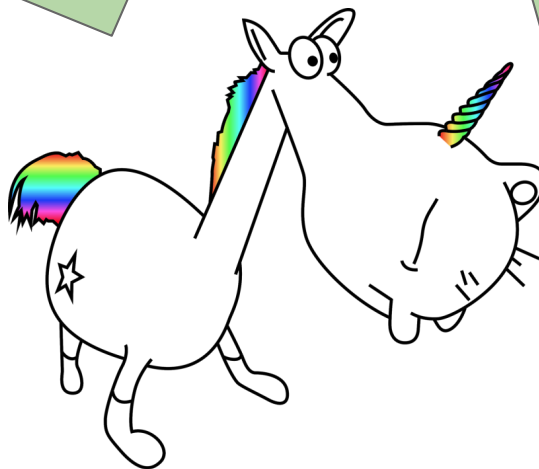
<https://github.com/sparqlunicorn/sparqlunicornGoesR>

Query: [w.wiki/G9EA](https://www.wikidata.org/wiki/G9EA)

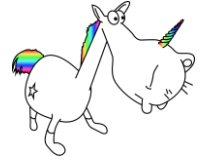


I will build a tool that will help researchers to query Wikidata without knowledge of SPARQL and the underlying data model.

Moreover, this tool will be able to combine the SPARQL results with third party tools, such as R, for further analysis like statistics.



*"We would like to further establish **Linked Data** in **archeology**, enable **beginners** to use and produce Linked Data, invite other **scientists** for discussion, and embed LOD as an **important topic** through an **SIG** at the **CAA** conference and **community**."*



Data Dragon

Special Interest Group

*CAA SIG on "Semantics and LOUD in
Archaeology"*



Aims and Perspectives

- Create a friendly and open **platform** to discuss the role of LOD and FAIR Data in archaeology.
- Enable the CAA community to get the **LOD basics** throughout workshops, teaching material, etc.
- Take on the challenge to develop **LOD publishing workflows** in archaeology.
- Integrate the **semantic modeling & ontology community** (e.g. CIDOC CRM, SKOS, ...) and **infrastructure community** (Pelagios, Nomisma, Wikidata, ...) into LOD in archaeology.
- Forge closer **collaborations between researchers** already active in this field and allow for the education of researchers and other interested parties.
- ...



Data Dragon

Special Interest Group

CAA SIG on "Semantics and LOD in Archaeology"





Data Dragon

Join our SIG at #CAAOxford or contact us!



CAA2020 OXFORD
iN SIDE
FORMATION
14 - 17 APRIL 2020



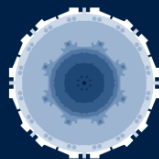
Data Dragon

#S21
#LinkedData
#DataDragons

Florian Thiery
Martina Trognitz
Ethan Gruber



DOI 10.5281/zenodo.3466014

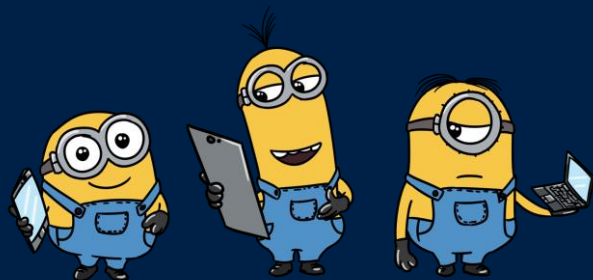


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SIDE
FORMATION
14 - 17 APRIL 2020



#S18
#LittleMinions
#Minions

Ronald Visser
Moritz Menenga
Florian Thier



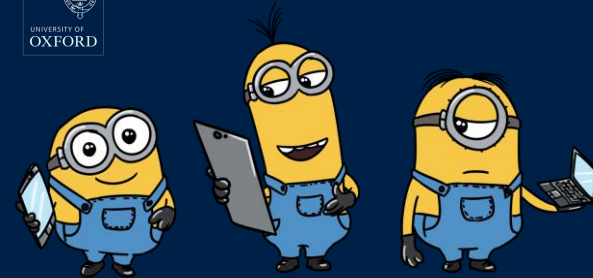
DOI 10.5281/zenodo.3466010



cya in Oxford 2020 at #CAAOford ;-)



Data Dragon



Thx!

Any questions?

Mail

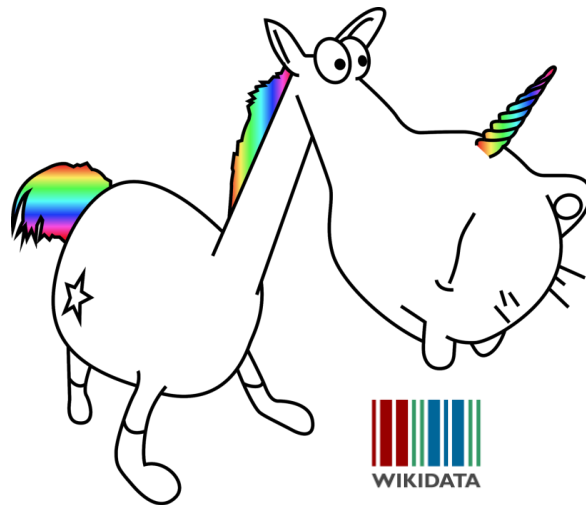
rse@fthiery.de

martina.trognitz@oeaw.ac.at

Wikidata

<https://www.wikidata.org/wiki/Q56702089>

<https://www.wikidata.org/wiki/Q66606154>





Related Literature

- Macalister, Robert Alexander Stewart. 1996. *Corpus Inscriptionum Insularum Celticarum*. Celtic Studies. Kill Lane, Blackrock, Co. Dublin, Ireland ; Portland, OR: Four Courts Press.
- Adrian Bielefeldt, Julius Gonsior, Markus Krötzsch. 2018. *Practical Linked Data Access via SPARQL: The Case of Wikidata*. In Tim Berners-Lee, Sarven Capadisli, Stefan Dietze, Aidan Hogan, Krzysztof Janowicz, Jens Lehmann, eds., Proceedings of the WWW2018 Workshop on Linked Data on the Web (LDOW-18), volume 2073 of CEUR Workshop Proceedings, 2018. CEUR-WS.org.
 - <https://iccl.inf.tu-dresden.de/w/images/8/85/Wikidata-SPARQL-queries-Bielefeldt-Gonsior-Kroetzsch-LDOW-2018.pdf>



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