

Handling of sigillographic data (XML, Machine Learning, Decision Trees)

*Building a digital Corpus of Byzantine seals*

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SunoikisisDC Digital Classics and Byzantine Studies: Session 10  
Monday June 17, 2024. 16:00-17:30 BST = 17:00-18:30 CEST

# A Byzantine seal

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# What a Byzantine seal is ...

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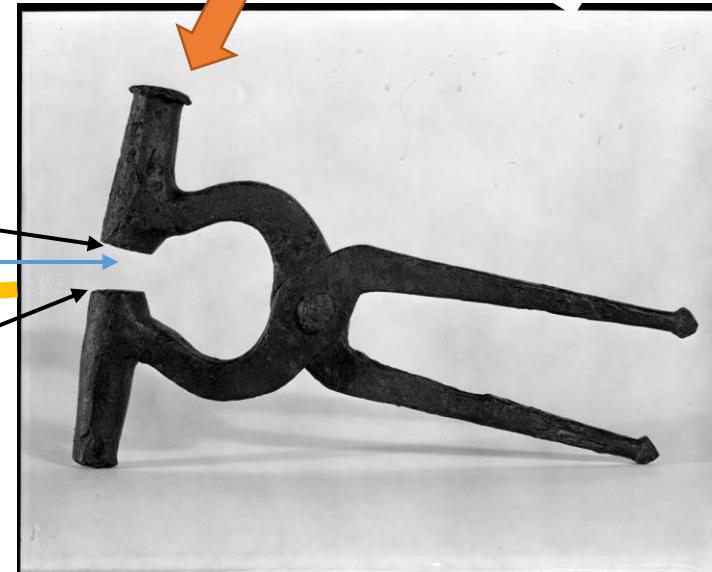
- a small round object
- mostly made of lead
- used to authenticate a document
- often bearing name and functions of the issuer + the chosen iconography
- the documents which the seals were attached to are today lost, hence, the seals are studied *per se*

# ... and how to produce it

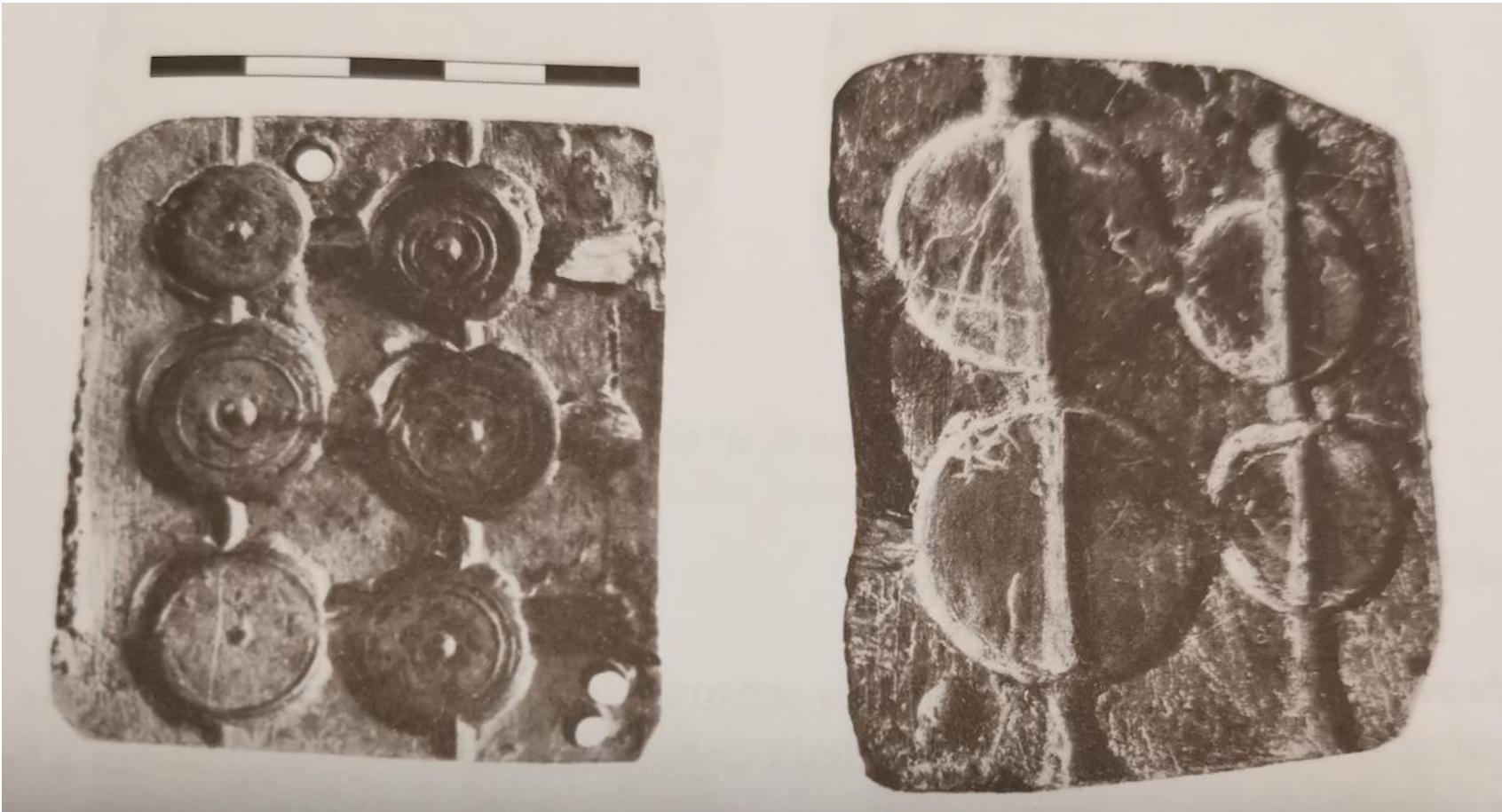
An impression has been left on the blank  
and an image and text bearing object has been produced



Engraved surface (negative)  
One of the 2 faces of the  
future seal



# Blank moulds found in Corinth

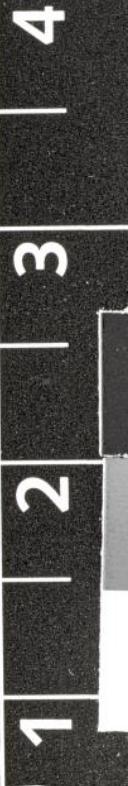


Blank (Dumbarton Oaks, [BZS.1955.1.5114](#))

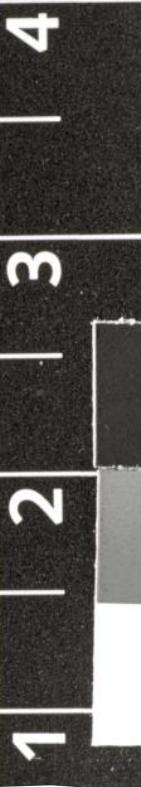


# Matrix/Boullotterion ([Harvard Museum, 1951.31.6](#))





Seal of Nicolas Mesarites (end of 12<sup>th</sup> C. – 13<sup>th</sup> C.) :  
iconography depicting the Virgin Mary and Christ on  
the obverse, and a 4-line metric inscription on the  
reverse (British Library, seal XLIV.59)



Seal of the emperor Alexios I Komnenos (1081-1118) :  
iconography depicting Christ seated on a throne on  
the obverse and Emperor Alexios I Komnenos  
standing on the reverse (British Library, seal XLIV.9)

Seal of Leon governor of Chaldia (1st half of the 9th century): cruciform invocative monogram on the obverse and 4-line inscription on the reverse (British Library, seal XLIV.17)



# Overall Objectives of the ANR-DFG project

## *DigiByzSeal*

### Aims of DigiByzSeal

#### SIGILLOGRAPHIC

**First edition** with scholarly analysis of four **unpublished collections** as well as the digital enhancement of three paper-published corpora, for a total of **ca. 4000 seals**, on which historical studies and research will be performed

#### DIGITAL

Further **development of SigiDoc** and the creation of a **digital ecosystem** for Byzantine sigillography, using the encoded corpora as a critical test mass to build a global sigillographic search engine and, eventually, a **centralised hub for Byzantine sigillography**

#### DISSEMINATION

**Knowledge transfer** and **accessibility** of this material for both researchers and general public to be achieved through cooperation with museums and cultural institutions, training, scholarly publications, and dialogue **within and outside academia**

# Two preliminary remarks

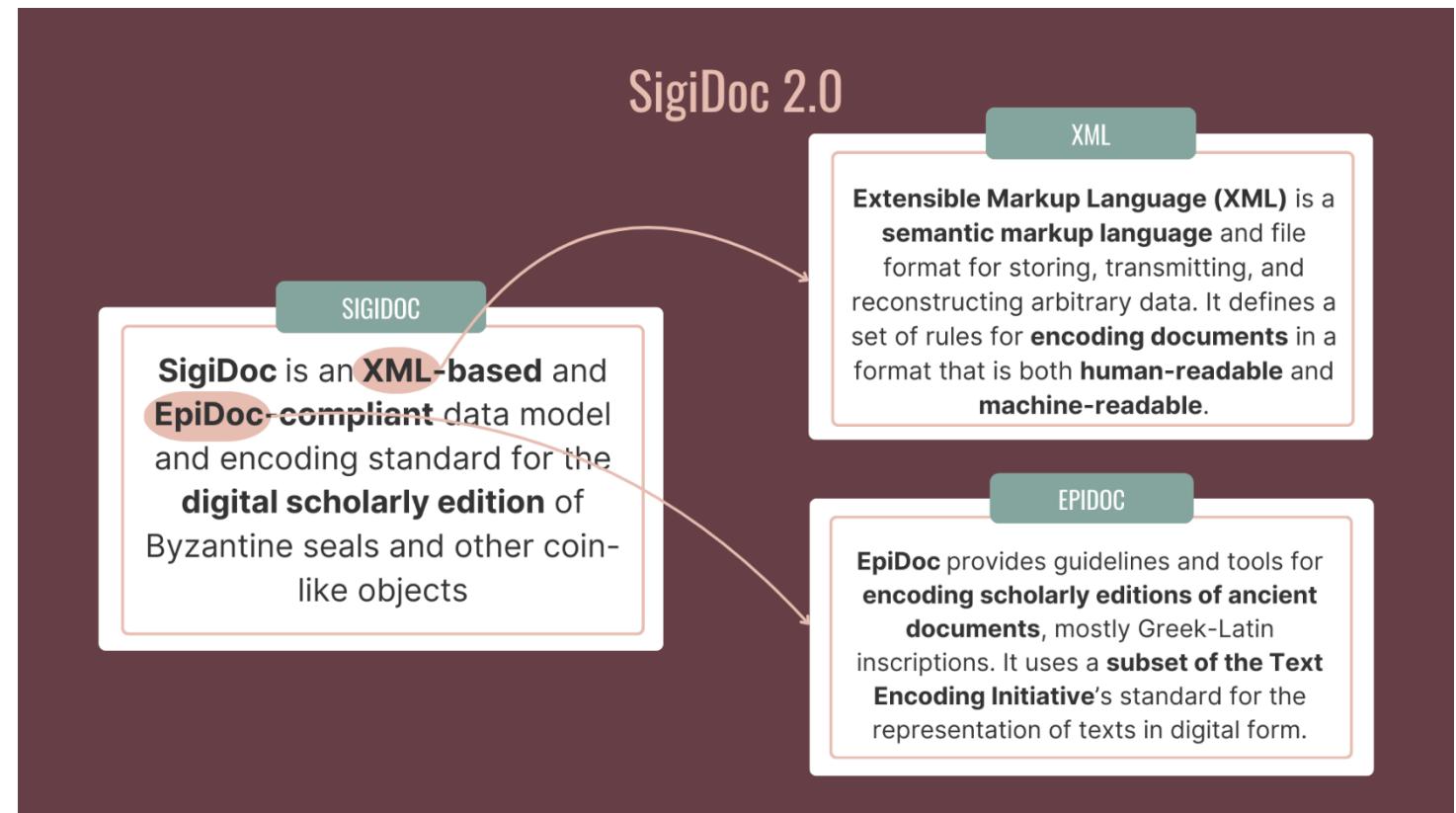
- 
- 1.The absence of rules shared by all for the preparation of a scholarly edition, and thus, more generally, the absence of a handbook

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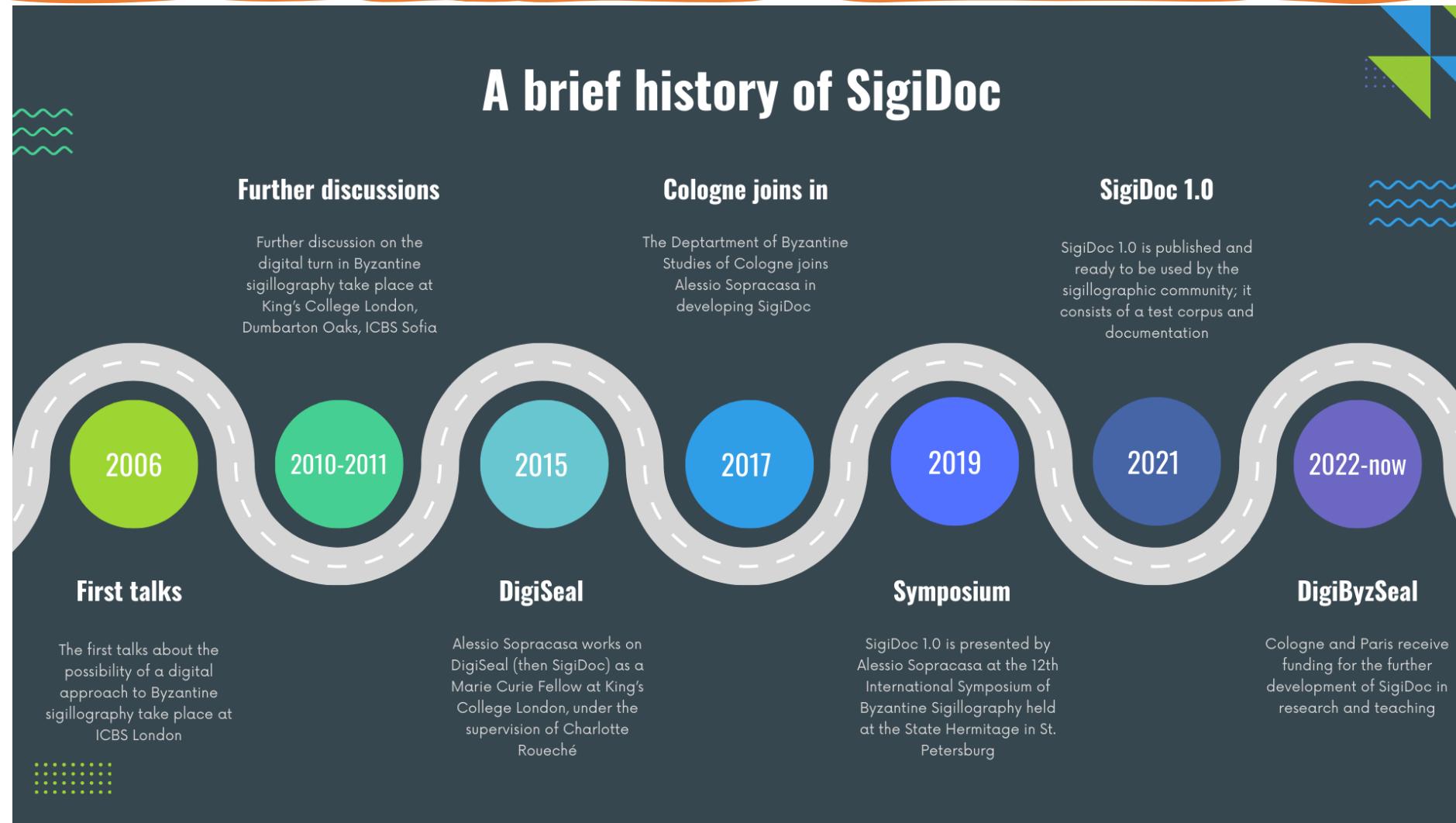
  - 2.The absence of a corpus of Byzantine seals, a sort of *Corpus sigillorum Aevi Byzantini*

# 1. The Quest for Common and Shared Rules: SigiDoc 2.0

- its aim is to establish a set of rules and guidelines supposed to become a *de facto* encoding standard
- Versions:
  - 1.0 version released in September 2021
  - 1.1 version released in Spring 2022
  - 2.0 version currently under development



# 1. The Quest for Common and Shared Rules: *SigiDoc 2.0*



# 1. The Quest for Common and Shared Rules: *SigiDoc 2.0*

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- Some of the steps taken so far to improve SigiDoc
  - ✓ *A Critical Mass of Data*
    - *DigiByzSeal* plans to work on about 4,000 seals: of these, about 3,000 are unpublished, the rest comes from two published collections
    - Differences in working on unpublished or published material, the latter raising the question of the nature and the extent of the digital enhancement and of the application of the SigiDoc recommendations
    - This can lead to the inclusion of solutions which Byzantine sigillographers are not familiar with
  - ✓ *Updating the Guidelines and the template*
    - Better explanations (also for controlled vocabularies), more examples
    - Improvement of the stylesheet for a better web interface
    - Deletion of redundancies in the template

The reverse of a seal belonging to the Tatiş collection no. 72 as published by Cheynet, Jean-Claude. 2019. *Les sceaux byzantins de la collection Yavuz Tatış*. İzmir: Metro Matbaacılıl, no. 3.44 and by the DigiByzSeal project.

..| Π.Τ.. | ΡΙΤΕΠ..|ΙΠΔΡΣΠ.|ΦΛΑΓΤ...|-Τ·Ι-  
[...] κ]ριτ(ῆ) ἐπ[ὶ τ(oū)] ἵππ(o)δρ(όμου) (καὶ) Π[α]φλαγ(ονίας) τ[ῷ ...]τι.

- 1 [ - - - - - - - ]
- 2 [...?]Π[...?]Τ[...?...]
- 3 [...?]κ]ριτ(ῆ) ἐπ[ὶ τ(oū)]
- 4 ἵππ(o)δρ(όμου) (καὶ) Π[α-]
- 5 φλαγ(ονίας) τ[ῷ ...]
- 6 τι



# *1. The Quest for Common and Shared Rules: SigiDoc 2.0*

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## Athena Ruby inscription font

« a single, comprehensive font for use in the scholarly publication of Byzantine inscriptions. The font, called Athena Ruby, is an OpenType, Unicode-compliant font, and therefore compatible with all major operating systems. »

For the visual rendering of the seals' inscriptions in the diplomatic edition

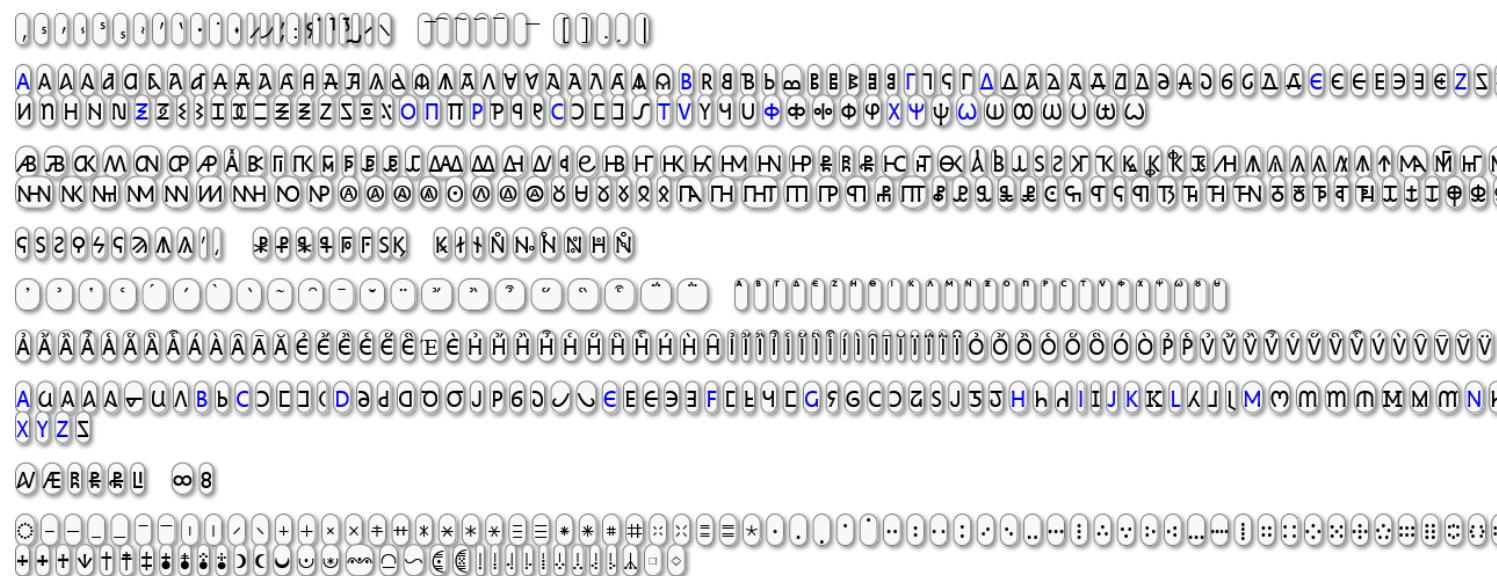
A resource external to the DigiByzSeal project, recommended by SigiDoc and integrated to the EFES instance customised for SigiDoc

# *1. The Quest for Common and Shared Rules: SigiDoc 2.0*

# Athena Ruby Palette

*Written February 2013 by Joel Kalvesmaki for Dumbarton Oaks, Trustees of Harvard University. Updated March 2022*

*Uses Private Use Area, not Unicode, for variant characters. Suitable for pasting in word processors, but you must have Athena Ruby already installed, and you may need to reformat the pasted text.*



## Abbreviation signs and punctuation

## Greek letters

## Greek ligatures

## Accents, superscript letters; Greek capital letters

## Latin letters and ligatures

## Symbols and decoration elements

# 1. The Quest for Common and Shared Rules: *SigiDoc 2.0*

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## Paper vs. Digital Publication in Byzantine Sigillography

### PAPER

- ✓ Not cost-effective
- ✓ Not readily available
- ✓ Can't be easily updated, resulting in deprecated data even before publication
- ✓ Cumbersome volumes, very often printed in limited editions
- ✓ No possibility of interlinking, which is very useful for a subject dealing with hundreds of thousands of objects

### DIGITAL

- ✓ More sustainable
- ✓ Interoperable
- ✓ Easy perusal thanks to search infrastructure and dynamic indices
- ✓ Can be updated easily
- ✓ Can keep up with the newest research on the topic
- ✓ Makes queries easier, prompting new research questions

# *1. The Quest for Common and Shared Rules: SigiDoc 2.0*

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- Some of the steps taken so far to improve SigiDoc
  - ✓ *A Chained Schema*
    - In its 2.0 version, SigiDoc schema is aligned with the EpiDoc schema 9.6
    - Looking for a more effective and reliable way of managing the SigiDoc schema and keeping it aligned with EpiDoc and TEI: a chained ODD (“One Document Does it all”: <https://tei-c.org/guidelines/customization/getting-started-with-p5-odds/>)
      - The first chained ODD of the EpiDoc schema
      - Currently under testing
      - SigiDoc XML files have been successfully validated against the EpiDoc schema 9.6 and the tei\_all

# *1. The Quest for Common and Shared Rules: SigiDoc 2.0*

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- Some of the steps taken so far to improve SigiDoc
  - ✓ *The Authoring Environment: a Tagless Editor*
    - Currently in its beta version
    - Based on a BaseX database providing APIs in combination with a Vue.js Javascript frontend

# SigiDoc Tagless Editor (beta version)

## Sigidoc Editor

New Seal Edit Seal de ▾

### Statements

**titlestmt**

**Title**

Seal of Ioannes, protoproedros and doux of Antioch

Sceau de Jean, protoprotroèdre et duc d'Antioche

**Siegel**

**Editor**

**EditionStmt**

**Edition:**

Digital conversion

**Record**

**Editor:**

**PublicationStmt**

**Authority:**

## Seal of Ioannes, protoproedros and doux of Antioch

### Artifact

Type Seal

General layout Iconography and legend

Matrix Sigidoc ID -

### Physical description

Type of impression Original impression

Material Lead

Dimension(mm) Diam. 28

Weight (g) -

Axis (clock) -

Overstrike orientation (clock) -

Channel orientation (clock) -

Execution Struck

Countermark -

Shape Round

Condition Etat de conservation correct

### Dating

Date 11th C, ca. 1057-1080

Internal date -

## 2. Towards a virtual corpus of Byzantine seals

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### ✓ *EFES: indexes and search form*

- [EpiDoc Front-End Services](#): a customisation platform for EpiDoc files
- Contribution to the development of this platform
- *DigiByzSeal* work concentrated on indexes and search filters

# Example of a seal's edition

- Paper edition: A. Sopracasa, V. Prigent, « Sceaux byzantins de la collection Sopracasa », dans B. Caseau, V. Prigent et A. Sopracasa (éd.), *Oὐ δῶρὸν είμι τὰς γραφὰς βλέπων νόει.* *Mélanges Jean-Claude Cheynet*, Paris, 2017 (Travaux et Mémoires du Centre d'histoire et de civilisation byzantine du Collège de France, 21/1), p. 703-704.

## 10. Étienne, vestarque et duc d'Antioche

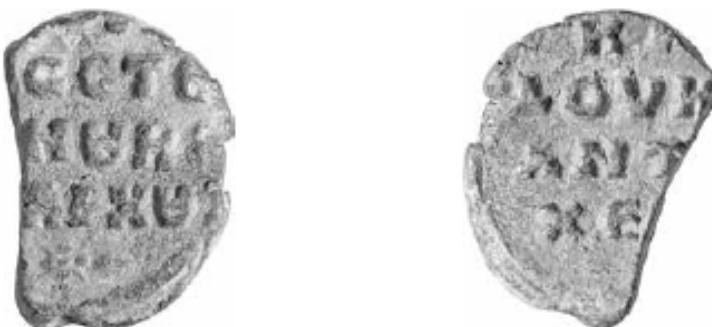
Date : xi<sup>e</sup> siècle (milieu).

Inv. : 50.

Dia. : 22 mm.

Des. : un peu moins d'un tiers du sceau est perdu ; flan rogné sur le pourtour ; frappe non centrée.  
Inédit.

// : V. LAURENT, La chronologie des gouverneurs d'Antioche sous la seconde domination byzantine, *MUSJ* 38-10, 1962, p. 221-254, ici n° 20, p. 241 ; CHEYNET *et al.*, *Seyrig*, n° 157.



Au droit, légende sur quatre lignes (de la première subsiste seulement la partie inférieure du ρ), suivie d'un ornement constitué d'une croix de Saint-André cantonnée de perles et accostée de tirets :

...Ρ.|..CCTΕ|..ΝΘΡΕ|..ΑΡΧΘ|. \* -

[+Σφ]ρ[αγή]ς Στε[φά]νου βε[στ]άρχου

Au revers, suite de la légende sur quatre lignes, vraisemblablement suivie par le même motif qu'au droit :

ΚΑ. | ΔΑΟΥΚ.. | ΑΝΤ.. | ΧΕ... | - ..

κα[ὶ] δουκ[ὸς] Αντ[ιο]χε[ίας]

La liste des ducs d'Antioche a été établie par J.-C. Cheynet<sup>49</sup> : notre personnage fut en poste au milieu du xi<sup>e</sup> siècle, avant 1060<sup>50</sup>. Il s'agirait du mari de la sœur de Michel IV, qui fut envoyée en Sicile entre 1037 et 1040 à la tête de la flotte byzantine, avant d'être nommé duc d'Antioche vraisemblablement à la fin du règne de Michel IV<sup>51</sup>.

# Example of a seal's edition

- Paper edition: A. Sopracasa, V. Prigent, « Sceaux byzantins de la collection Sopracasa », dans B. Caseau, V. Prigent et A. Sopracasa (éd.), *OÙ δῶρὸν είμι τὰς γραφὰς βλέπων νόει.* *Mélanges Jean-Claude Cheynet*, Paris, 2017 (Travaux et Mémoires du Centre d'histoire et de civilisation byzantine du Collège de France, 21/1), p. 710-711.

## 16. Michel Avramopoulos, *asèkrètis et chartulaire du Péloponnèse et de l'Hellade*

Date : xi<sup>e</sup> siècle (tiers central).

Inv. : 78. Ce sceau a été très récemment mis en vente aux enchères<sup>71</sup>.

Dia. : 25 mm.

Des. : bon état de conservation ; frappe décentrée ; rogné sur le pourtour ; légèrement échancré aux orifices du canal ; endommagé sur une petite portion du revers.

Inédit.



À l'avers, dans un cercle de grènetis partiellement conservé, saint Michel, de face, debout sur un *suppédion*, les ailes partiellement déployées ; le nimbe semble double ; l'archange tient de la main gauche un globe crucigère et de la droite un long *labarum* ; il porte *divitision* et *loros*, le repli de ce vêtement posé dans l'angle du bras. Pas de sigle visible ; inscription invocative circulaire, dont subsiste : ΩΨΩΔΘΛ., [... βοήθει τ]ῷ σῷ δούλῳ) ; le destinataire de l'invocation ne peut être identifié avec certitude : Μιχαὴλ, Αρχιστράτηγε, voire simplement un Κύριε stéréotypé.

Au revers, inscription sur sept lignes :

ΜΙΧΑΗ.ΙΑΣΤΕΛΠΕΙΛΟΠΟΝΝΣ|ΕΛΛΑ...|ΑΡΡΑΜΩ|ΠΑΛ

Μιχαὴ[λ] ἀσηκρίτ(η) (καὶ) χ(α)ρτελ(αρίφ) Πελοπονν(ήσου) (καὶ) Ἐλλά[δ(ος)] [τῷ] Αβραμοπούλ(ῳ)

La lecture de la fonction presuppose une correction à la quatrième lettre de la troisième ligne, où il faudra donc plutôt lire Θ. Le χ initial est en ligature avec le ρ, à la façon d'un chrisme mais sans que la hampe du ρ traverse le χ.

## 2. Towards a virtual corpus of Byzantine seals

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### ✓ *Authority Lists*

- i.e. how DigiByzSeal handle historical data coming from seals
- all the data that a specific edition considers to be of importance
- to be shared among all the SigiDoc projects in order to ensure consistency and interoperability among them

Μιχαὴ[λ] ἀσηκρίτ(η) (καὶ) <rs type="offices" ref="#0035">χ(α)ρτελ(αρίω)</rs>  
<rs type="places" ref="#geo0078">Πελοπονν(ήσου)</rs> (καὶ) <rs type="places"  
ref="#geo0084">Ελλά[δ(ος)]</rs> [τῷ] Ἀβραμοπούλ(ω)

## 2. Towards a virtual corpus of Byzantine seals

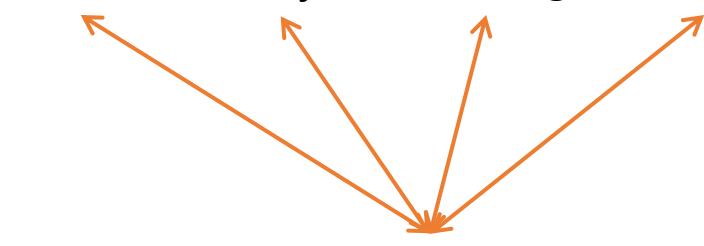
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### ✓ IDs

- Byzantine seals and matrices need unique identifiers = a proper digital existence
- Automatic and randomly generated alphanumerical strings of six elements (s-o5zje4, m-12rbX7)
- To find and gather together any parallels, that is, any seals struck with the same matrix
- And to fulfill one of the ultimate aspirations of Byzantine sigillography: the virtual reconstitution of the matrices



s-t56b2l s-o5zje4 s-89u4fg s-v5n230

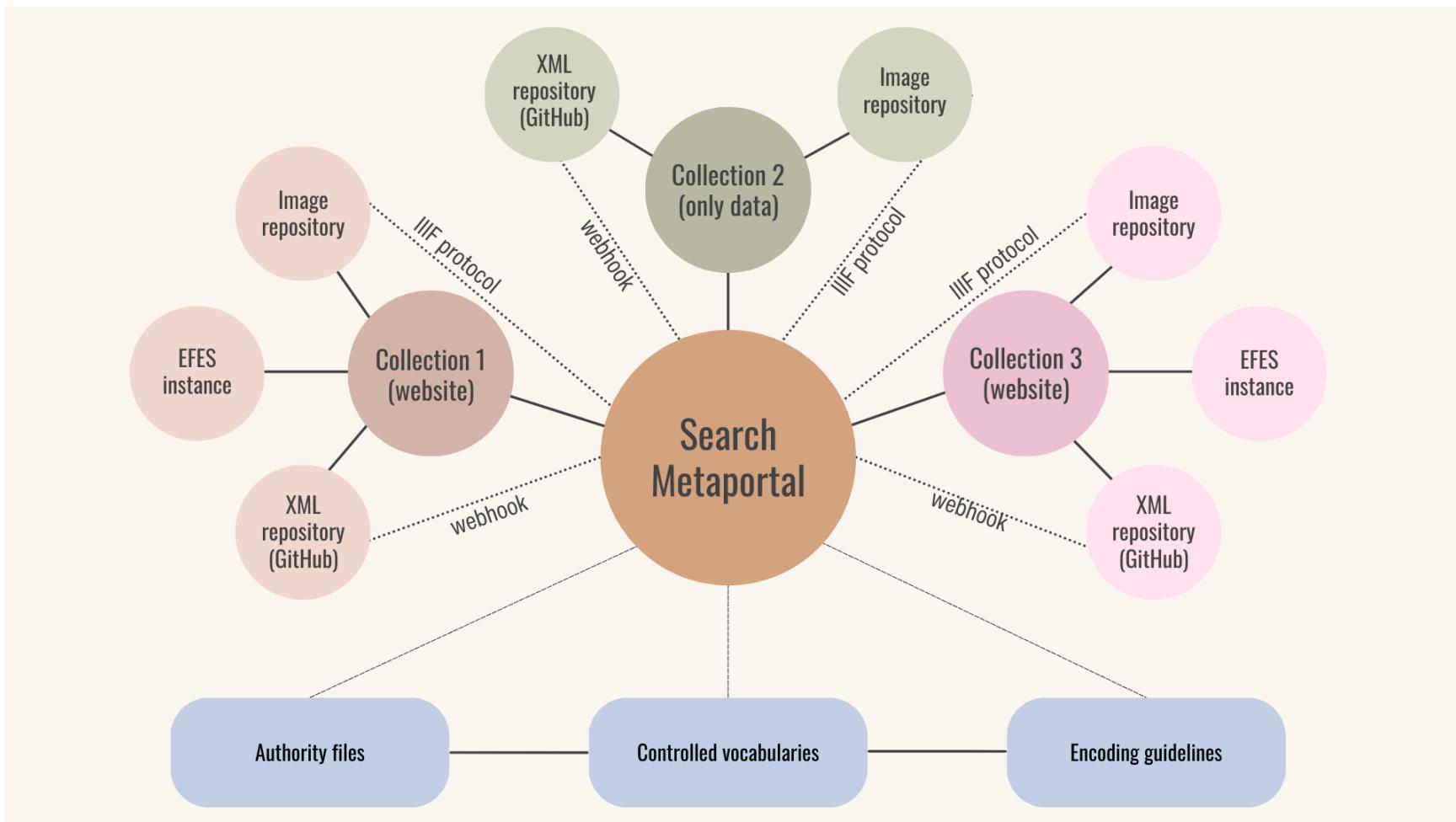


## 2. Towards a virtual corpus of Byzantine seals

### ✓ *Federated search portal*

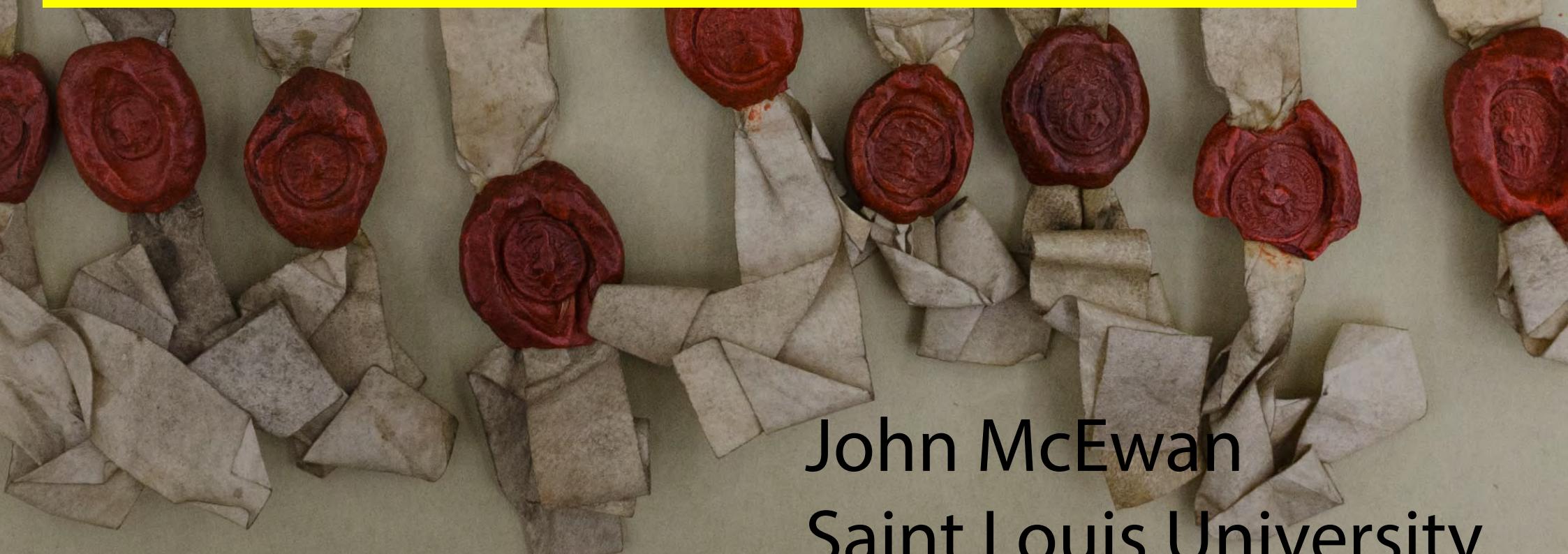
- all the editions made with SigiDoc will be virtually unified by the use of this tool and their content will be available for consultation through the common search interface
- A major commitment this year has been to lay the foundations of a common ground of materials as a [GitHub repository](#), in order to make them available for all the projects interested in editing Byzantine seals with SigiDoc
  - 1 central EFES-SigiDoc instance, to be forked
  - 1 repo for schema and templates
  - 1 repo for authority lists
- Collections can use EFES or another software to present their material, or they can just have raw XML files; this has no impact on the effectiveness of the search performed by the portal, because this federated search has a list of [online Git repositories](#) (GitHub, GitLab, or else...) and harvests them
- Foundations of a virtual *Corpus sigillorum Aevi Byzantini* (?)

## 2. Towards a virtual corpus of Byzantine seals



...gimis... duxit... vallis... tacent... folie... tacent... & alii... Dat... sextodecimo die... mensis Octobris anno regni...  
Sexti post conquestum Anglie tricesimo nono.

# Introduction to the Digisig Project

A collection of medieval-style wax seals and parchment scrolls. The seals are red and embossed with various heraldic symbols and text. The scrolls are made of aged, yellowish-brown paper, some tied with string and others crumpled. They are arranged in a loose, overlapping cluster.

John McEwan  
Saint Louis University



British Museum (2006,1004.1)  
Portable Antiquities (KENT-683033)

# Seal Matrices



<http://www.digisig.org/entity/10567642>

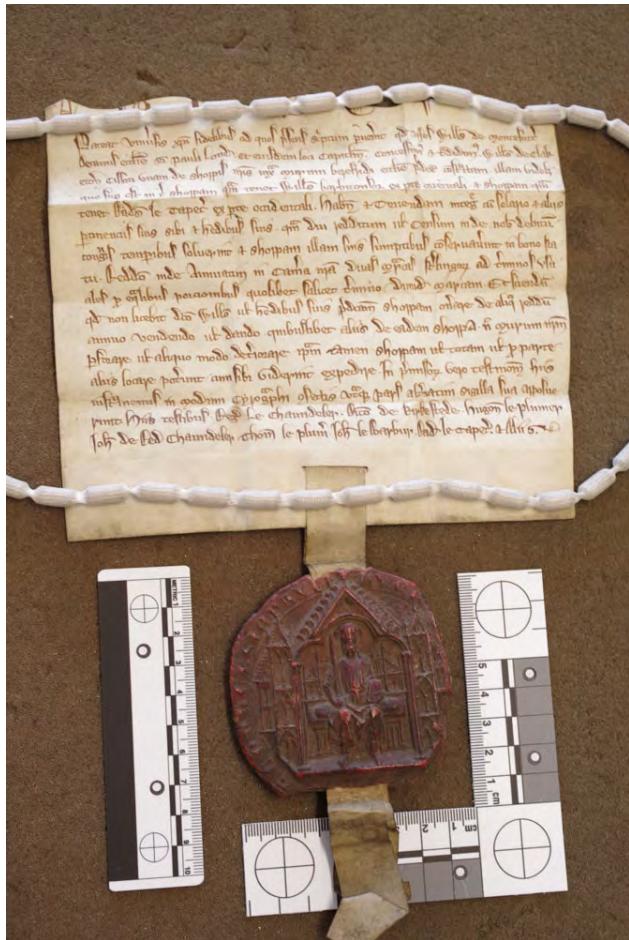


Portable Antiquities  
Scheme, YORYM-13A179



# Tray of seal matrices

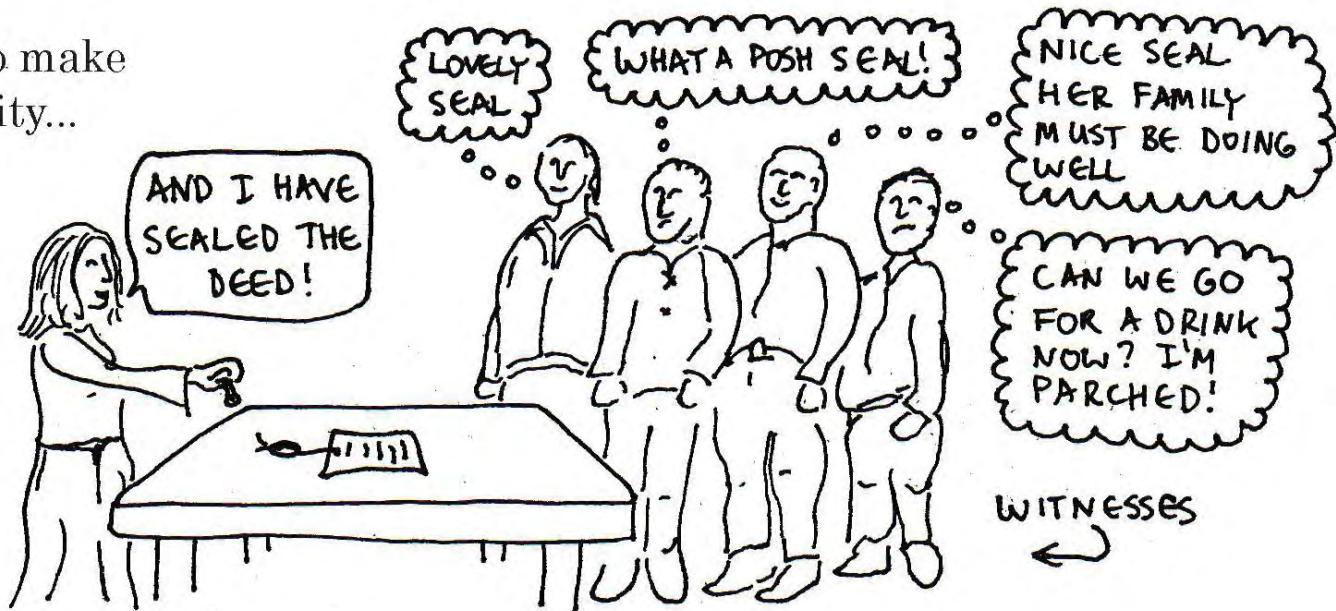
# Seal Impressions



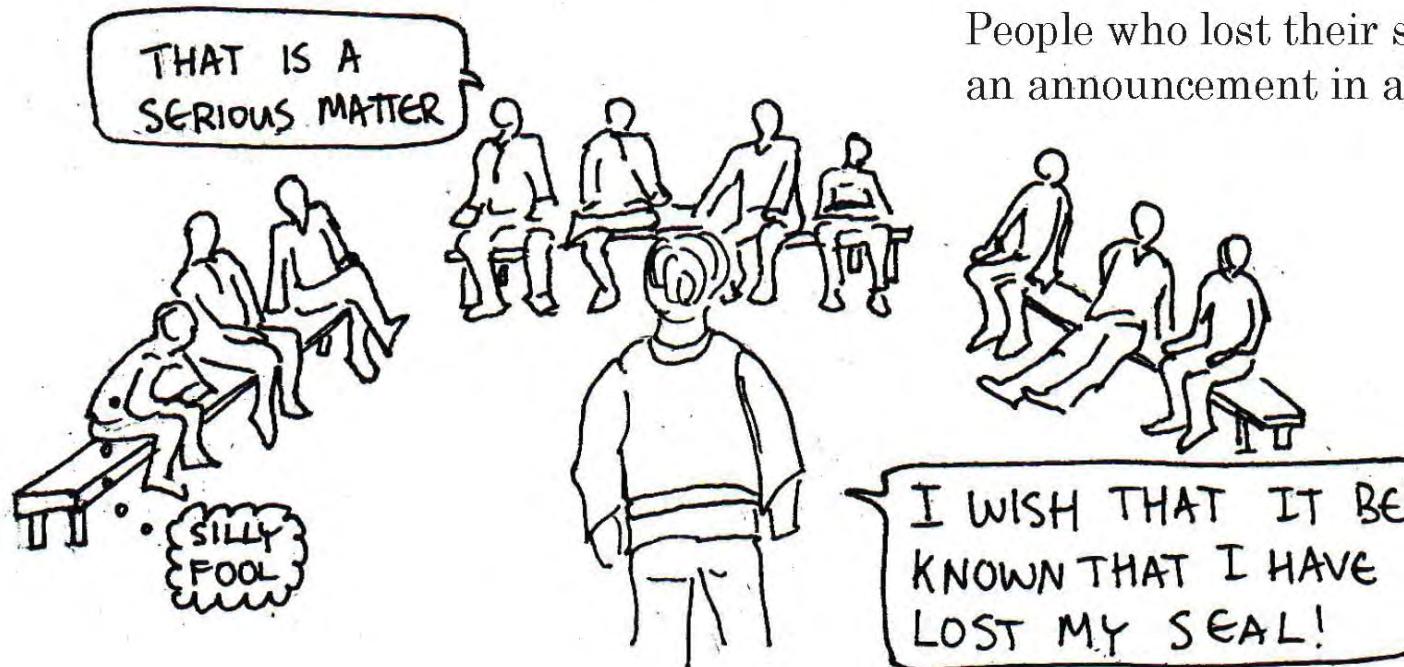
# Sealed property records stored in boxes



People used seals to make statements of identity...



... but they also had a judicial significance.



People who lost their seals might make an announcement in a public assembly...

...otherwise they could be held accountable for any fraudulent use of the seal.



SBH HC1/1019 (<http://127.0.0.1:8000/page/item/10017660>)



<http://127.0.0.1:8000/page/item/10322920>

An example of a seal from London incorporating an ancient gem



SBH HC1/881



12127214\_SBH\_445\_P1060203



12126764\_SBH\_307



Anneis de Muntpincun,  
c.1166

LMA 25121/1348



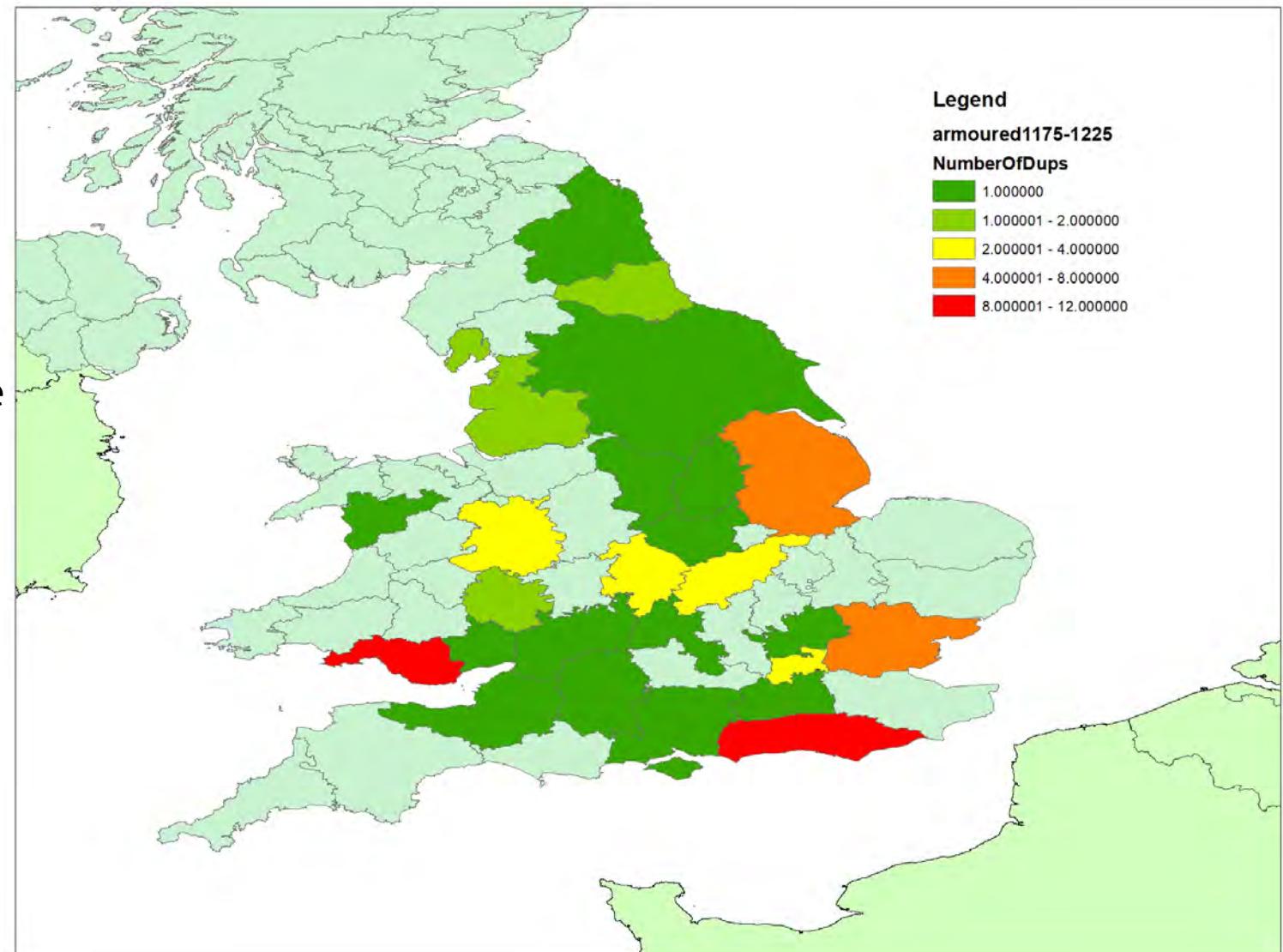
Agnes , widow of  
Everard Carpenter

c.1220

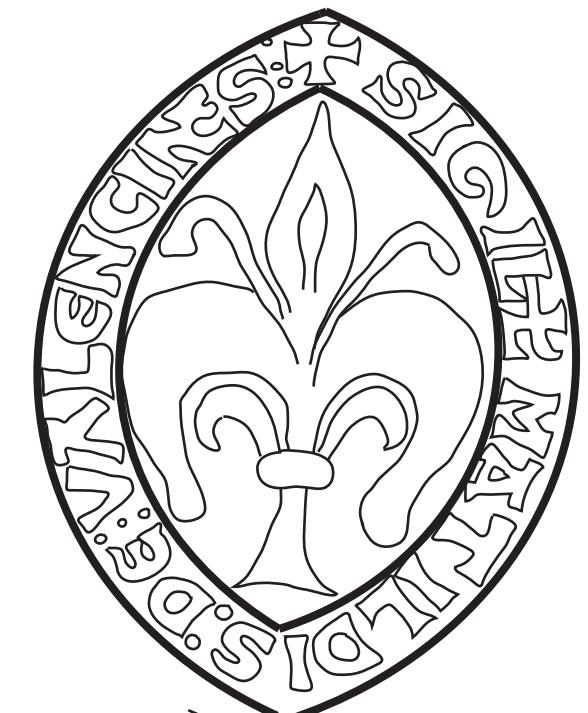
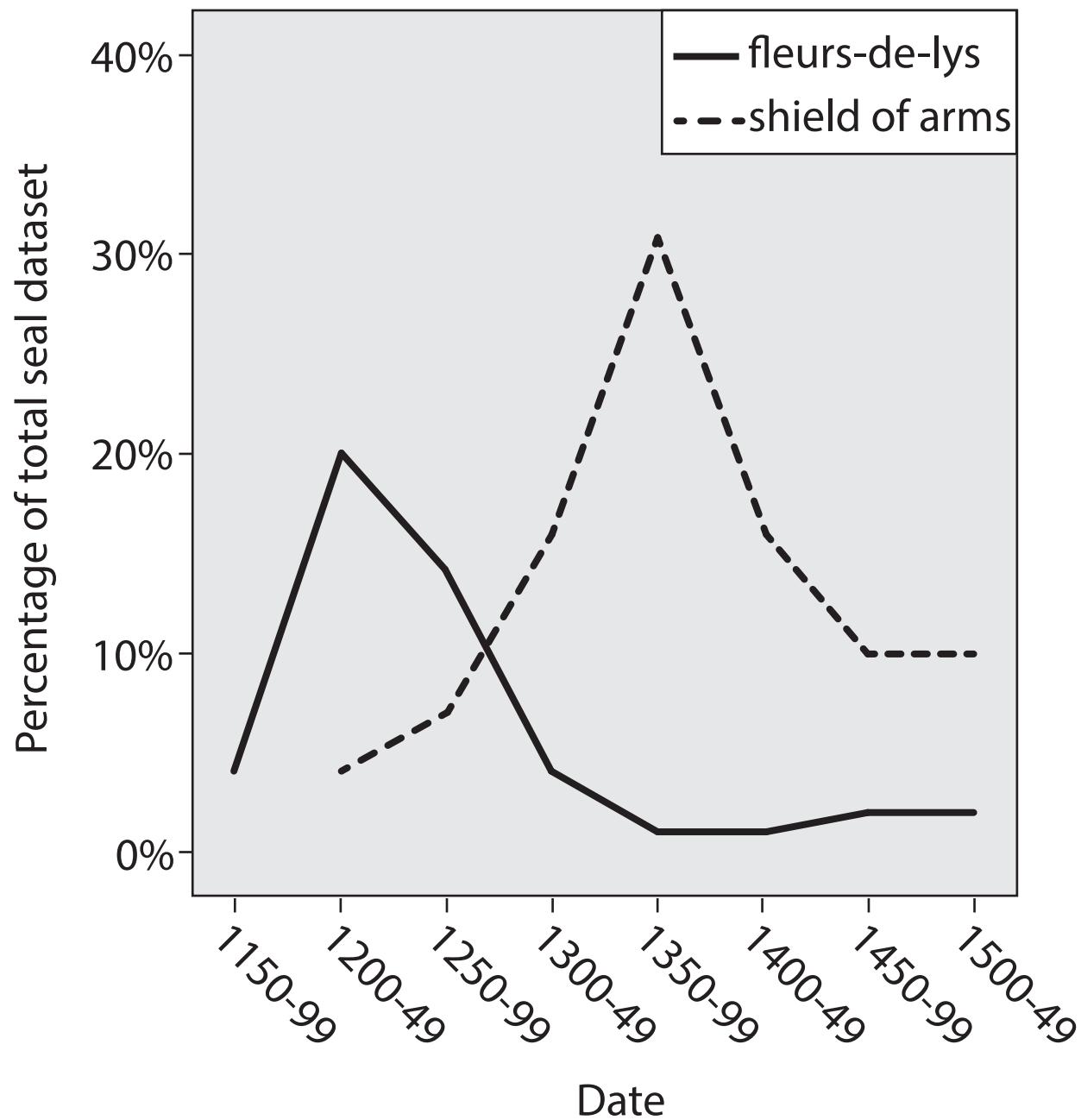
SBHB/HC/1/105

# Seals with an armoured equestrian man, 1174-1225

#	location
14	London
10	Glamorgan
10	Lincolnshire
10	Sussex
6	Essex
4	Middlesex
3	Northamptonshire
3	Shropshire
3	Warwickshire
2	Durham
2	Herefordshire
2	Lancashire



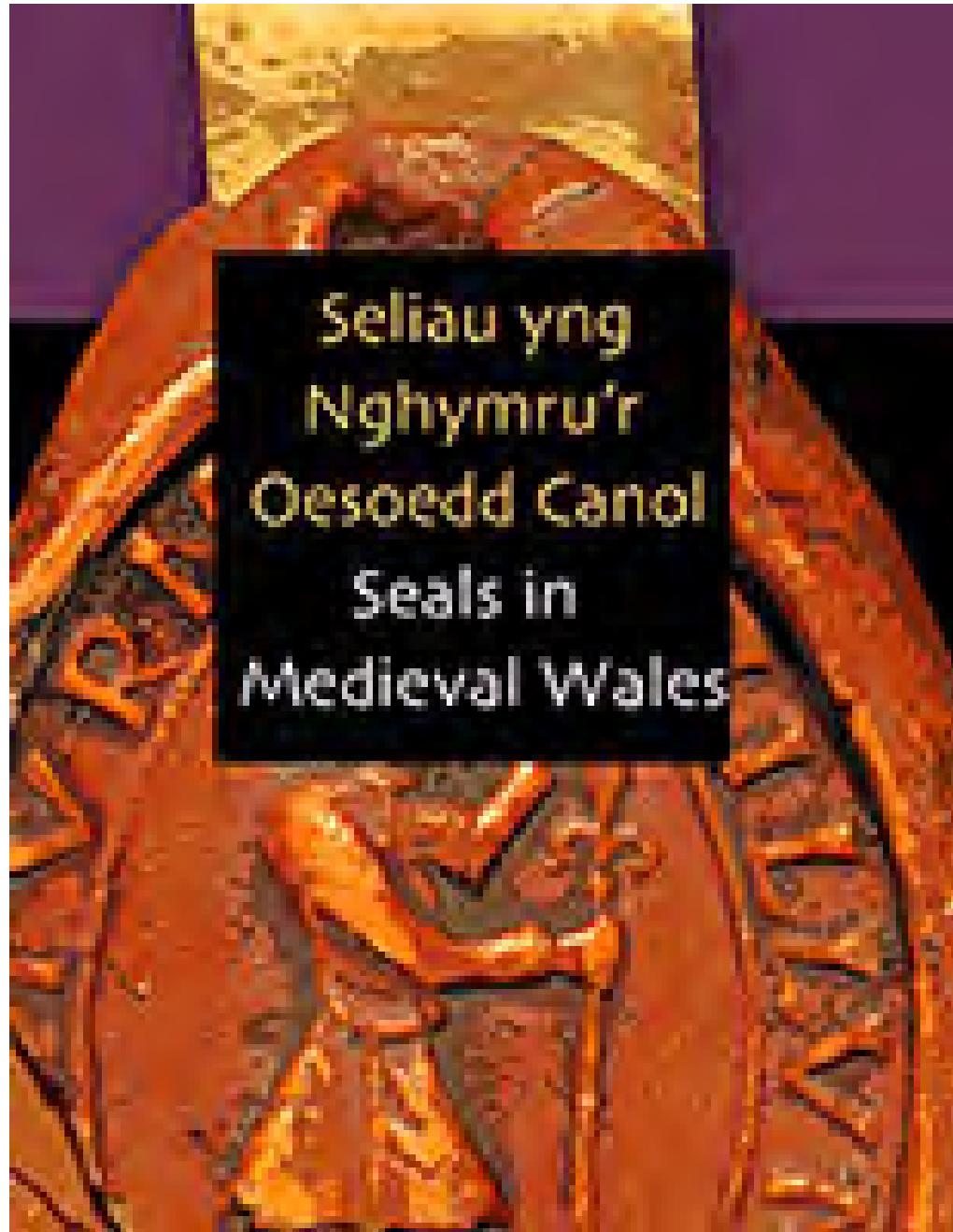
# Percentage of 'fleurs-de-lys' and 'shield of arms' seals by date, in Wales and the Welsh Marches







<https://www.digisig.org>



# *Seals in Medieval Wales*

*Enter*

Document

Seal

Seal (V2)

Location

*Add*

Reference

Temporal Period

Seal Tag

Document Tag

Colour

Task

*Search*

Item

Document

Impression

Seal Tag

Document Tag

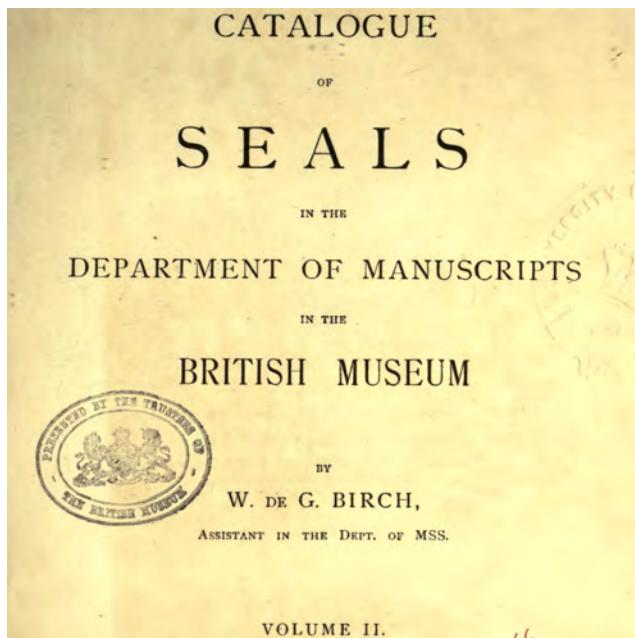
*Reference*

Manual

*Exit*

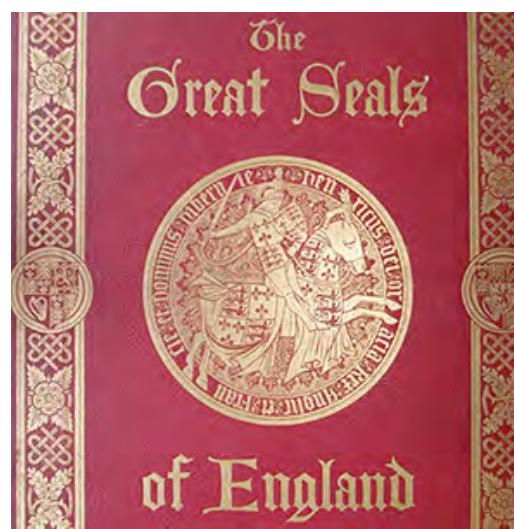
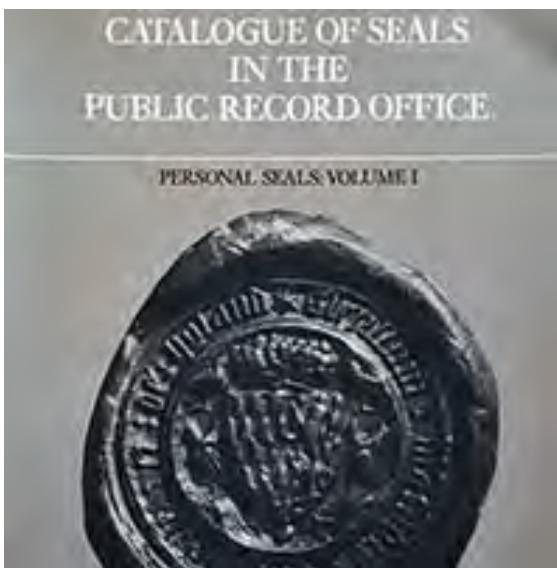
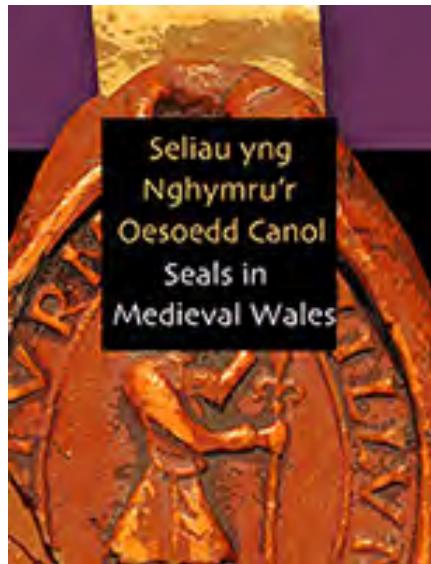
Database Version: 1.3  
Date: 10/11/2009  
Programming: Dr John McEwan





# SEALS IN MEDIEVAL LONDON 1050–1300

A CATALOGUE



DURHAM SEALS:  
VIII.—DURHAM SEALS.  
Seals at Durham from a manuscript by William Greenwell, D.C.L., F.R.S., and annotated by C. HUNTER BLAIR.  
[Read on 28th September, 1910.]  
... antiquities, and hath an art to spare these minor monuments.'

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digisig.org

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Search 27817 seal records and 10804 images from the following sources:

**PUBLICATIONS AND PROJECTS**

- Catalogue of Seals in the Department of Manuscripts in the British Museum
- Catalogue of Seals in the Public Record Office
- Portable Antiquities Scheme
- Seals in Medieval Wales and the Welsh Marches
- The National Archives, Kew, Catalogue of Seals

**REPOSITORIES**

- Bangor University, Archives and Special Collections
- British Library
- British Museum
- Canterbury Cathedral Archives
- Cheshire Archives and Local Studies
- Durham Cathedral Library
- Durham University Library, Special Collections
- East Sussex Record Office
- Eton College
- Exeter Cathedral Library and Archives
- Gwent Archives
- Gwynedd Archives, Caernarfon Record Office

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## SEARCH

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Exact Match?

GO

Search 27817 sea

### PUBLICATION

Catalogue of Se

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Portable Antiquit

DigiSig Entity

### Select Field

All Fields

Shelfmarks

Catalogue Identifiers

Motif Descriptions

Names

Places

Portable Antiquit

DigiSig Entity

Seals from the following sources:

manuscripts in the British Museum

Office

Seals in Medieval Wales and the Welsh Marches

### REPOSITORIES

Bangor University, Archives and Special Collections

British Library

British Museum

Canterbury Cathedral Archives

Cheshire Archives and Local Studies

Durham Cathedral Library

Durham University Library, Special Collections

East Sussex Record Office

Eton College

Exeter Cathedral Library and Archives

Gwent Archives

Gwynedd Archives, Caernarfon Record Office

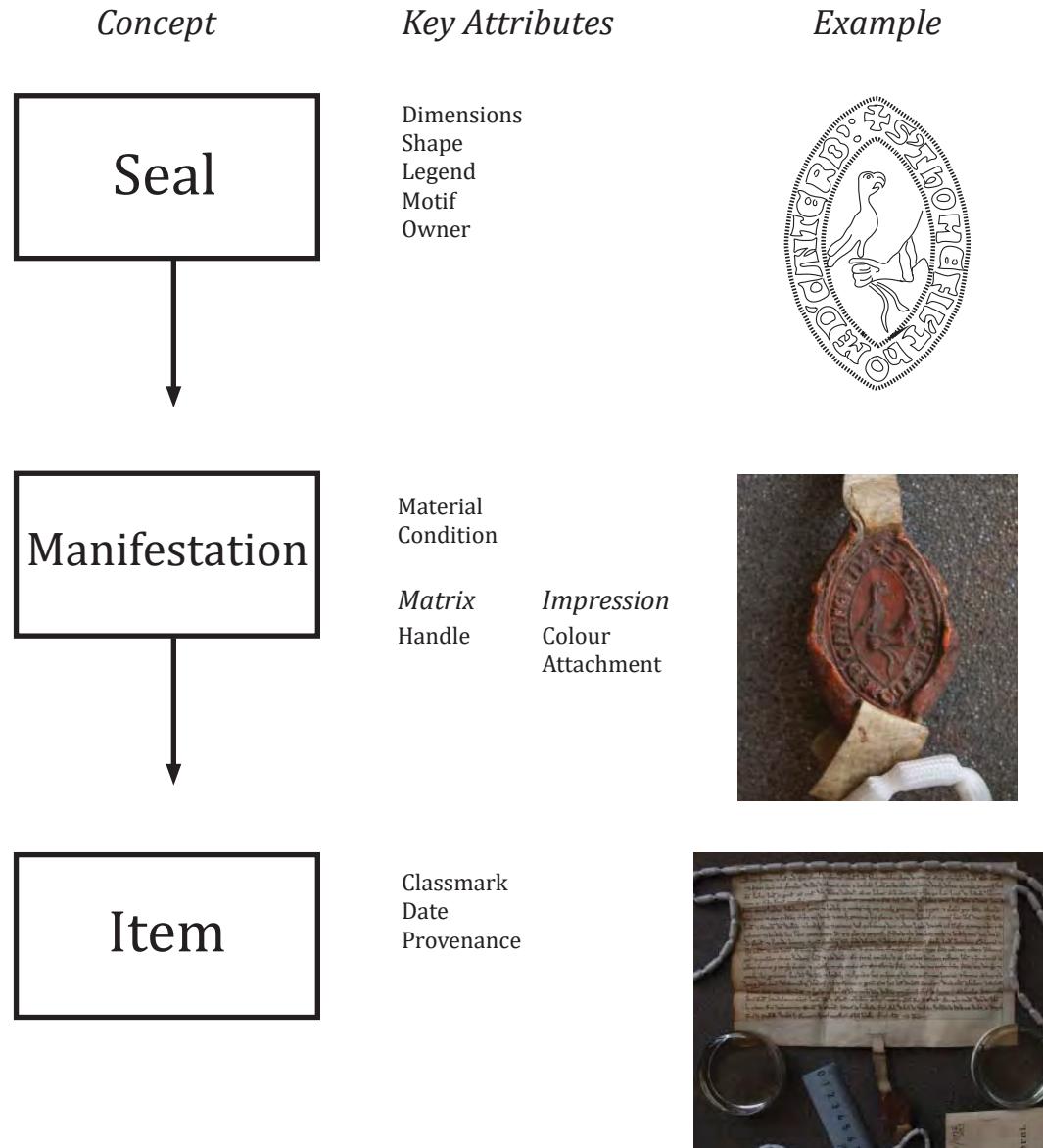


Search the web and Windows

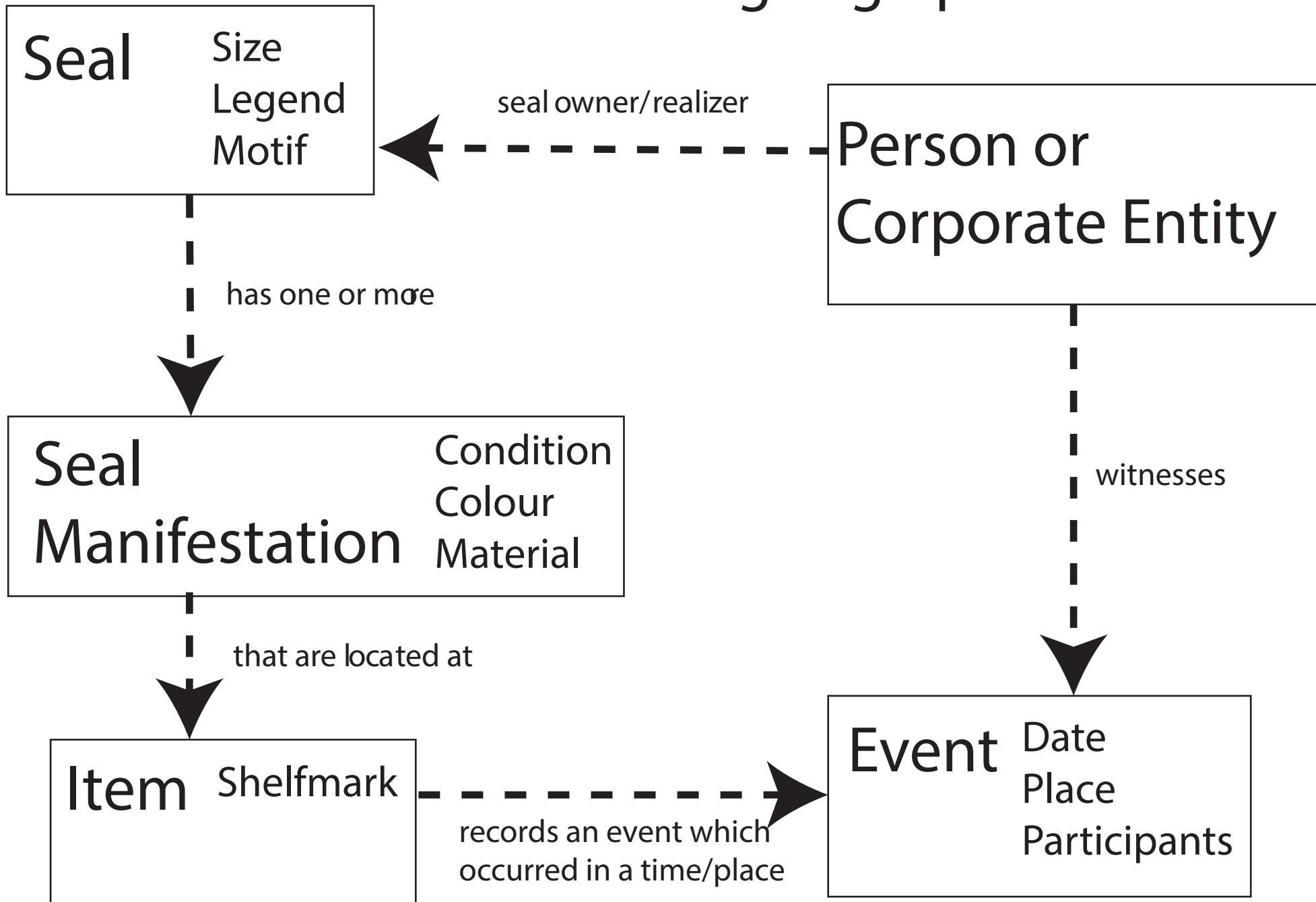


22:49  
23/11/2015

## *Seal Cataloguing Concepts*



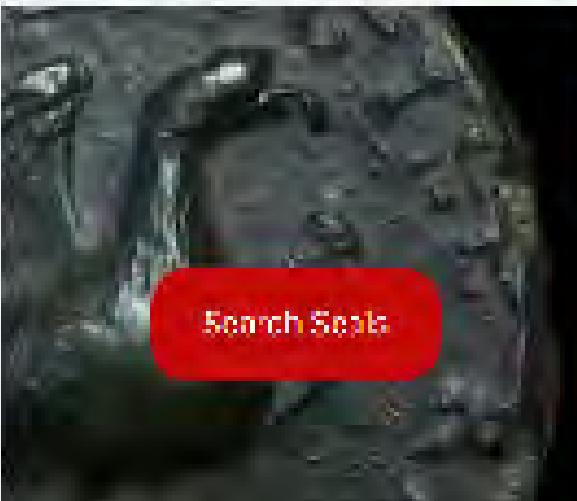
# Sigillographic Data Model



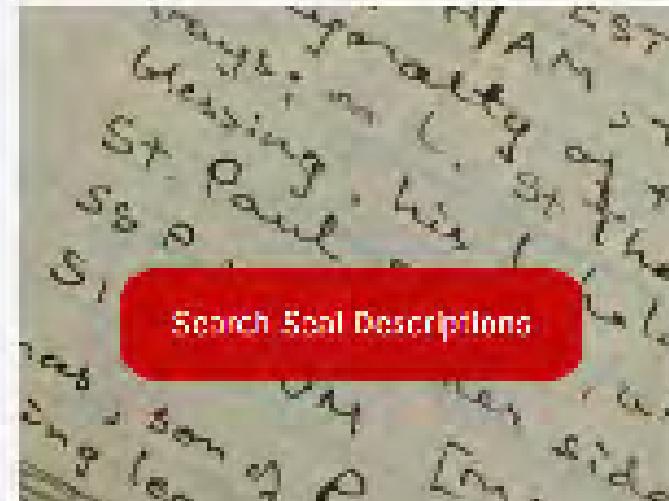


# Digital Sigillography Resource

[Register of Seal Catalogues, Seal Impressions, and Seal Matrices](#)



## Search Results



## Search Seal Descriptions



### Search Actors

<https://www.digisig.org>



**django**

*Leaflet* A stylized green leaf icon with a thin black stem, positioned at the end of the word "Leaflet".

# Search and Discovery tools

Impressions, Matrices and Casts	
Object ID	Description
10000	Saint Bartholomew's Hospital Archives
10001	Paraffin block
10002	Plaster
10003	Jan 1, 1850 - Jan 1, 1850
10004	Scalp details

Seal Descriptions	
Address/Name	
Seal Description	
Filter	
Reference ID:	Seal Description Details
Subject:	Title: 4004
Information:	Reference: Treasury Seal Reg. 5520
Language:	Description of: \$10,000.00
Period:	
Period:	Seal Description Details
Period:	Title: 4004
Period:	Reference: Treasury Seal Reg. 5520

The screenshot shows a user interface for a 'Places' application. At the top, there is a navigation bar with links for 'Items', 'Discover', 'Search', 'Analyze', 'Information', and 'About'. Below the navigation bar, the word 'Places' is displayed in a large, bold, black font. Underneath 'Places', there is a search bar with the placeholder text 'Search for places...'. To the right of the search bar is a red button with a white question mark icon. The main content area is titled 'Results (1 result)' and contains a table with one row. The table has three columns: 'Filter', 'Place', and 'Sal count'. The 'Filter' column contains dropdown menus for 'Status' (set to 'None') and 'Owner' (set to 'None'). The 'Place' column lists 'Aboriginal Salmon-  
Cannery Lissage' with a sal count of 1. The 'Owner' column lists 'Aboriginal' with a sal count of 2. To the right of the table is a map of the British Isles with a legend showing a blue circle and a red square.

Search Actors

---

[Catholic](#)

[Protestant](#)

**Filter**

**Age:**   
 18-25  
 26-35  
 36-45  
 46-55  
 56-65  
 66+  
 All

**Active Time:**   
 None  
 Before 1500  
 Between 1500-1600  
 Between 1600-1700  
 Between 1700-1800  
 Between 1800-1900  
 Between 1900-2000  
 After 2000  
 All

**Gender:**  Male  Female

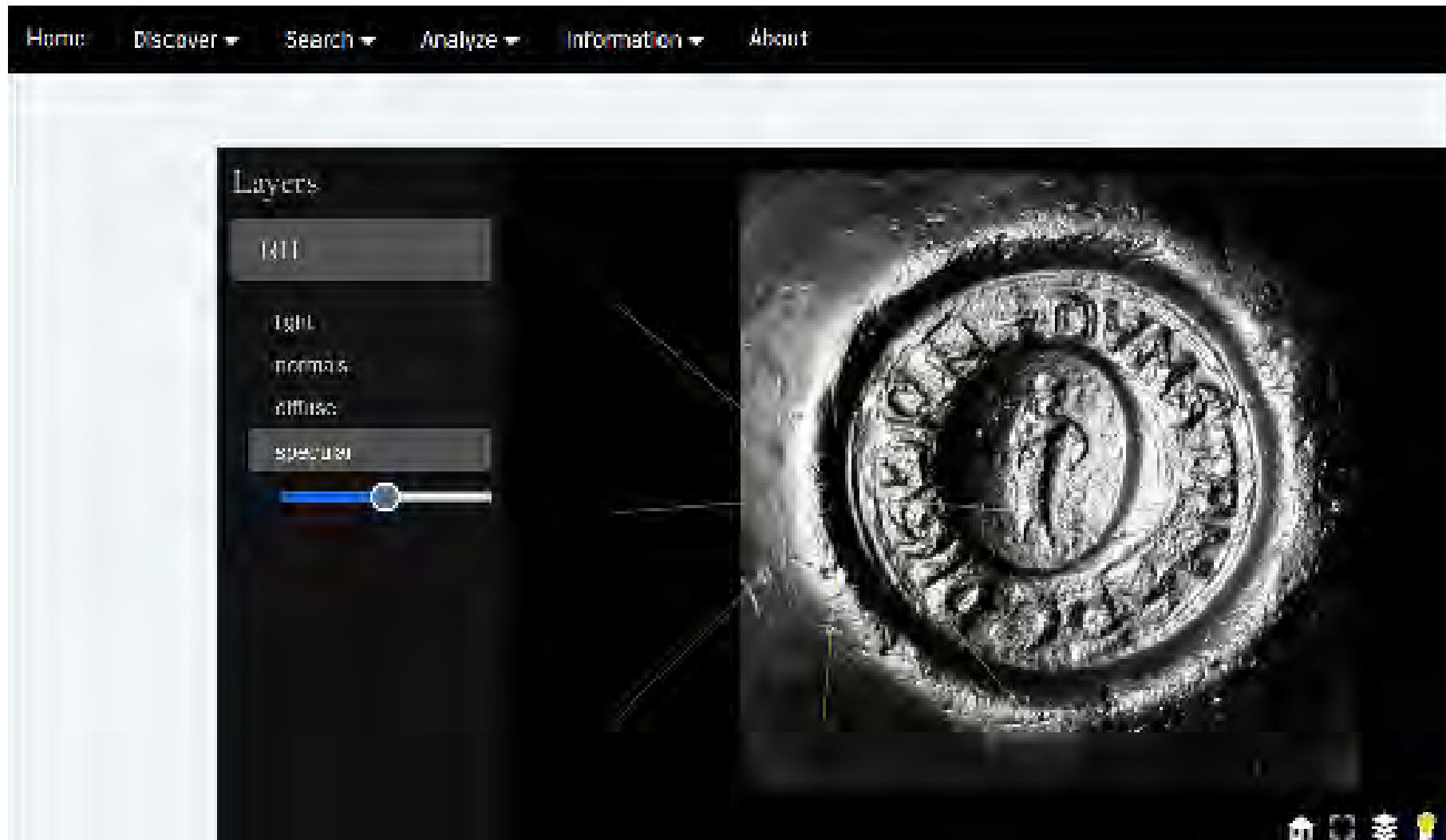
**Religion:**  Catholic  Protestant  Other

**Order:**  Name  Active Time  Birth Date  Death Date  Random

**Sort by:**  Name  Active Time  Birth Date  Death Date  Random

**Search:**

# Reflectance Transformation Images



<https://www.digisig.org/discover/exhibit>

# Computer Catalogue of Seals in the Public Record Office, London

## Collection details

[Permalink](#)

Title Computer Catalogue of Seals in the Public Record Office, London

Credit Harvey, Paul Dean Adshead (Author) [External Link](#)

Chalmers, T. M. (Contributor)



Publication details [computer file]. London: The National Archives[distributor], 1996

Total Entries 3111

Total Seals 3112

Notes Information from this dataset has been adapted into entries in TNA's online catalogue.

## Select

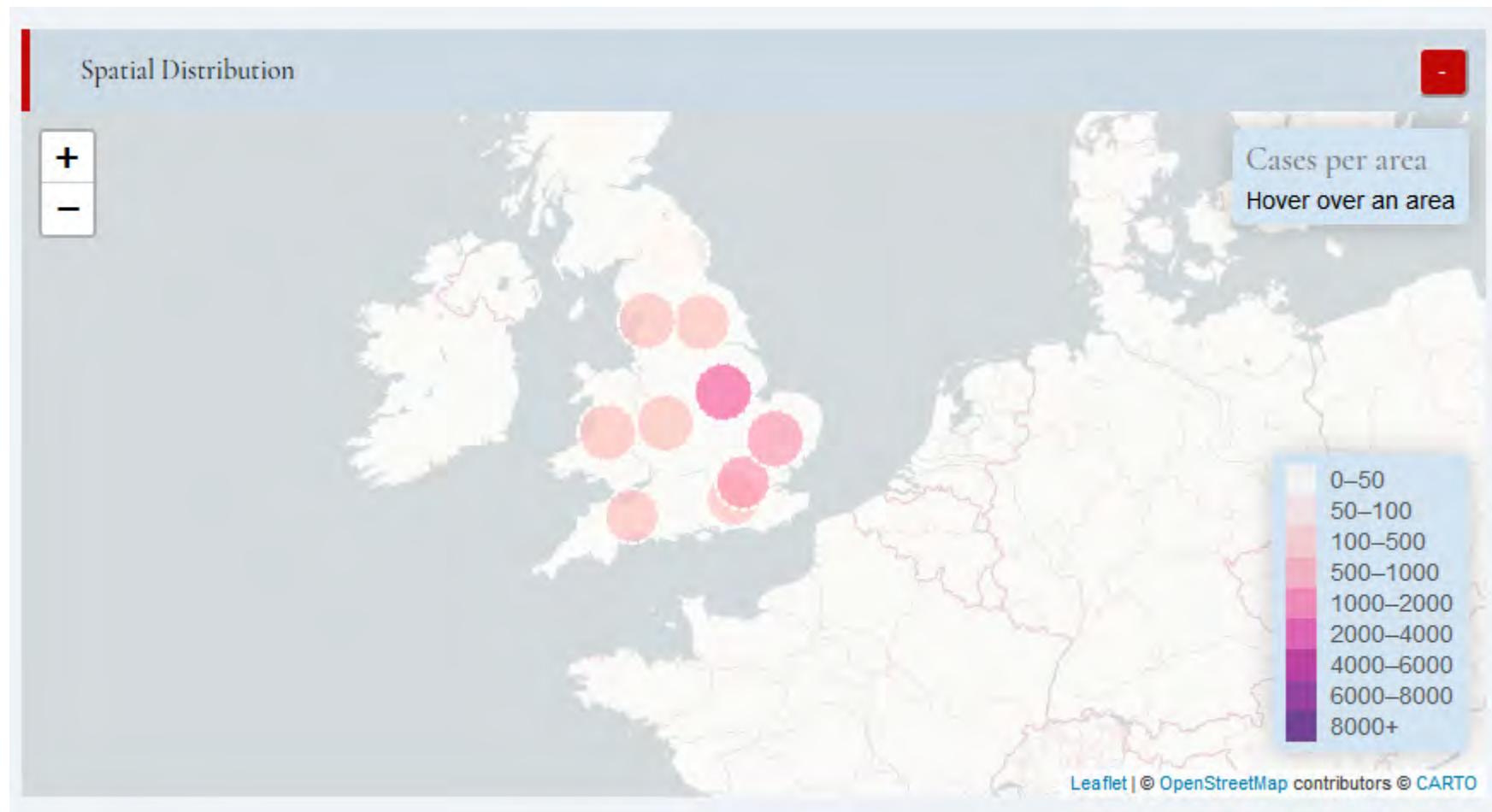
**COLLECTION**

Harvey, Computer Catalogue

Submit

Percentage of complete entries in Digisig, by field, for the selected collection





# The problem --- DATES

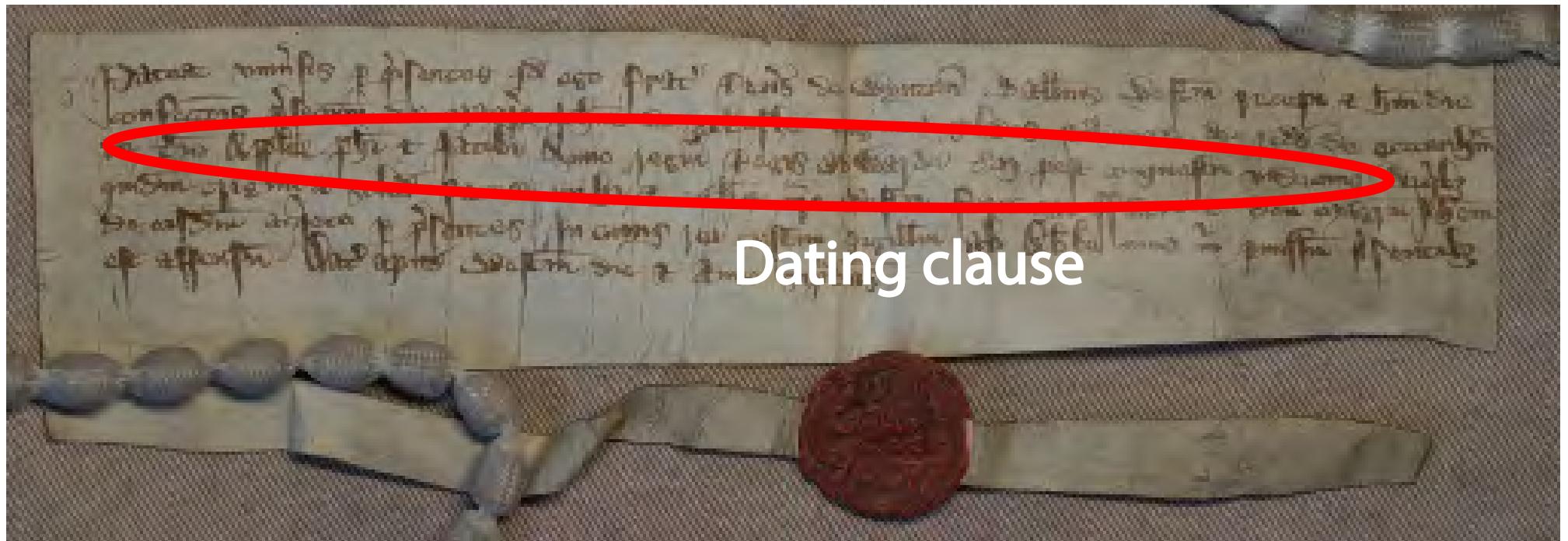
Seal matrices lack contextualizing temporal information



Date ?

# The problem --- DATES

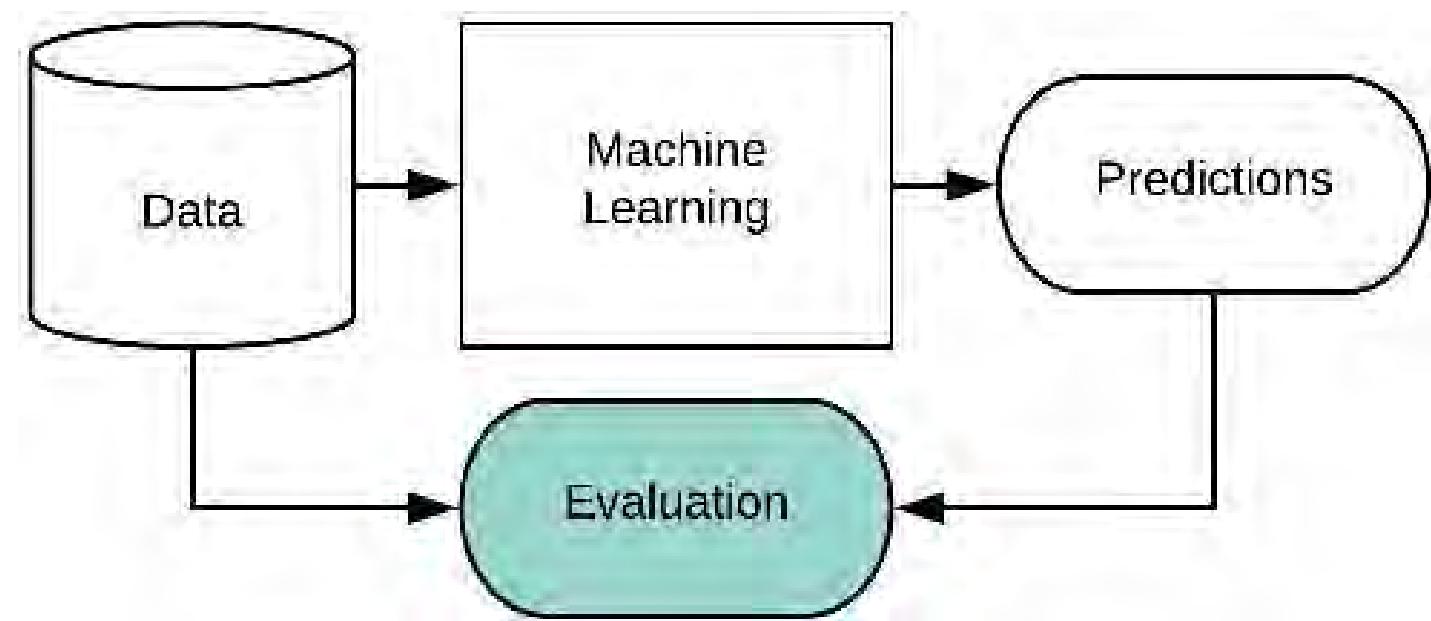
Seal impressions are often easy to set in a temporal context



The text may include a dating clause, or other information that allows the document to be dated with some precision

# Machine Learning

A machine learning program builds a predictive model based on training data, in order to make predictions or decisions without being explicitly programmed to do so.



```
def mltrainmodel():
    ## function handles the creation of the ML model

    # to make this output stable
    np.random.seed(42)

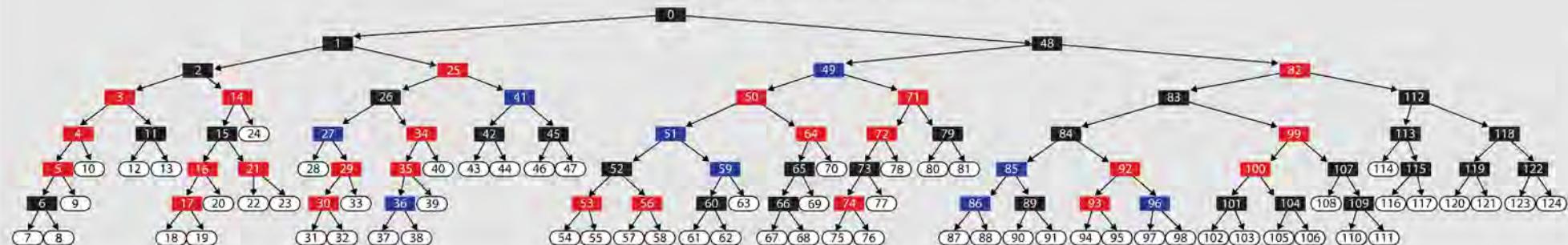
    datain, trainingset = mlloaddata()

    dataset = pd.DataFrame(datain)
    shapeofdataset = dataset.shape
    print ("shapeofdataset", shapeofdataset)

    X = dataset.iloc[:,0:111]
    y = dataset.iloc[:,111:112]

    tree_clf = DecisionTreeRegressor(max_depth=7, min_samples_leaf=20, criterion="squared_error", random_state=42)
    tree_out= tree_clf.fit(X, y)
```

## Shape of the decision tree



Legend

Decision node	[Black Box]
Area	[Blue Box]
Shape	[Red Box]
Class	[Red Oval]

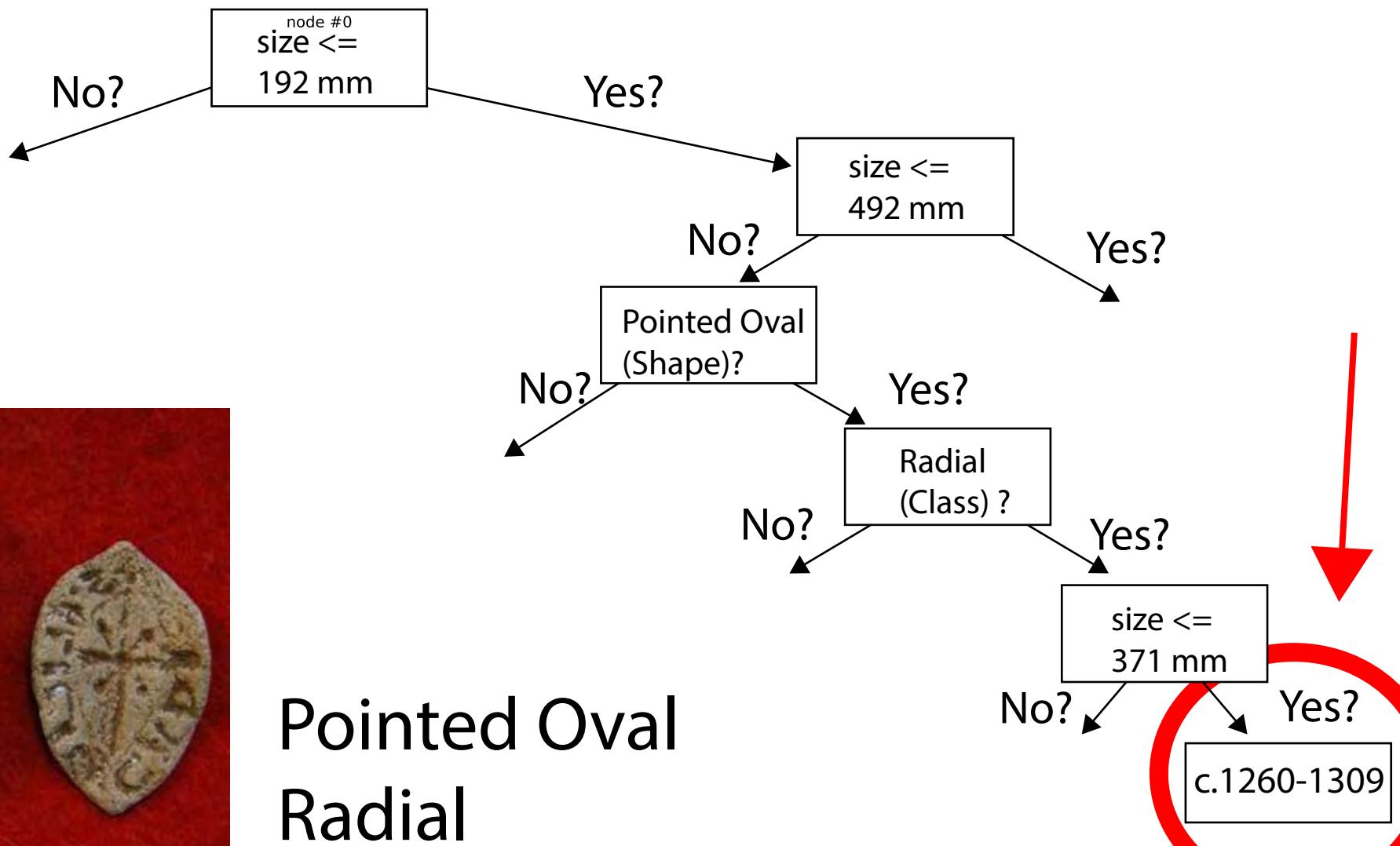
Leaf node

May, 2024 (Digisig, v.160)

# Decision Path



Pointed Oval  
Radial  
390 mm sq



## Decision path

Node	Question	Answer
0	Is size greater than 192.0 mm <sup>2</sup> ?	Yes
48	Is size greater than 492.12 mm <sup>2</sup> ?	No
49	Is it shape/class 'pointedoval'?	Yes
71	Is it shape/class 'radial'?	Yes
79	Is size greater than 371.42 mm <sup>2</sup> ?	Yes
81	Prediction: c.1260-1309	



## Seal Features

Prediction: c.1260-1309

## SHAPE

Pointed Oval

## CLASS

Radial

## VERTICAL (MM)

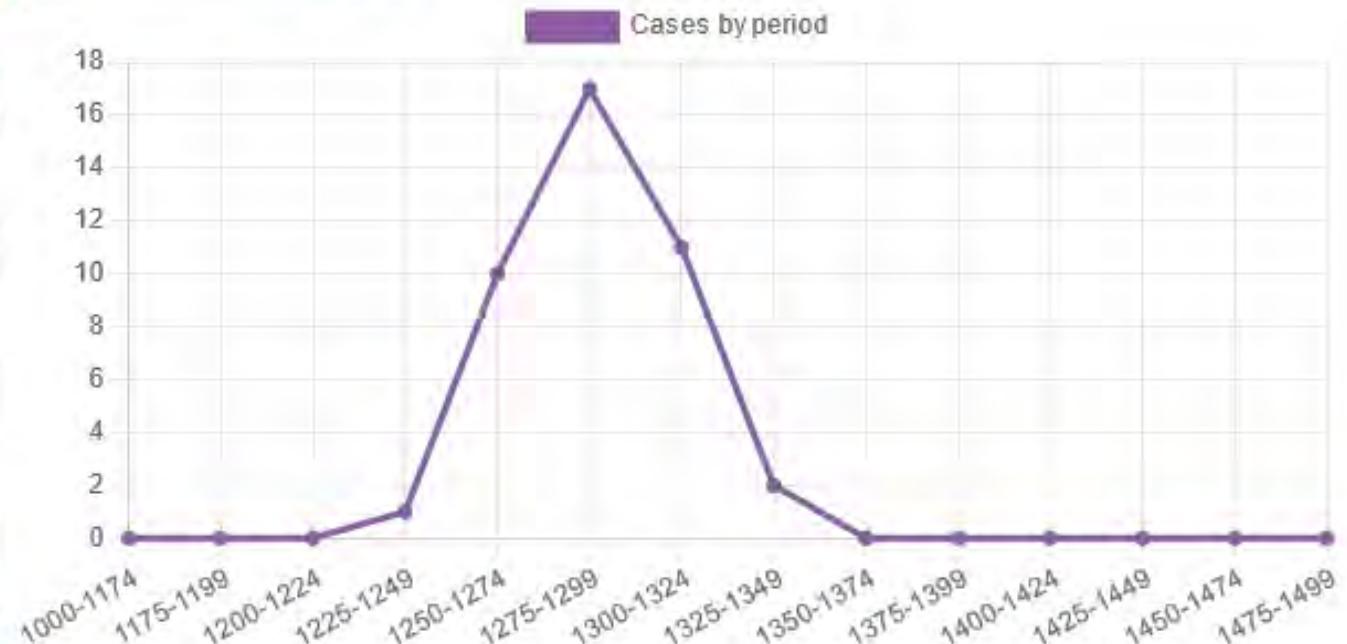
29

## HORIZONTAL (MM)

19

Submit

Clear filter



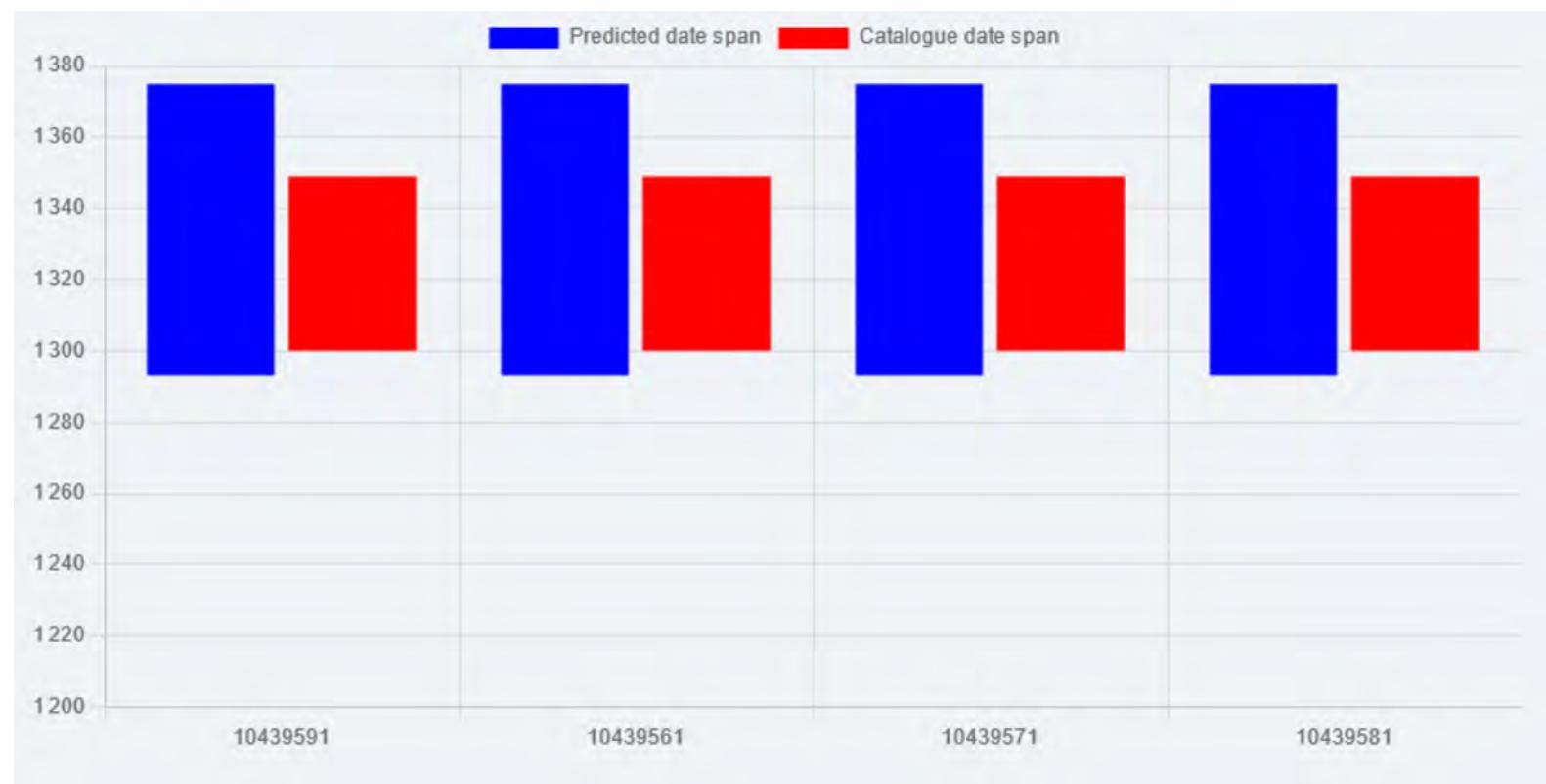




# MEDIEVAL SEAL MATRICES IN THE SCHØYEN COLLECTION

Catalogued by  
RICHARD LINENTHAL  
and WILLIAM NOEL

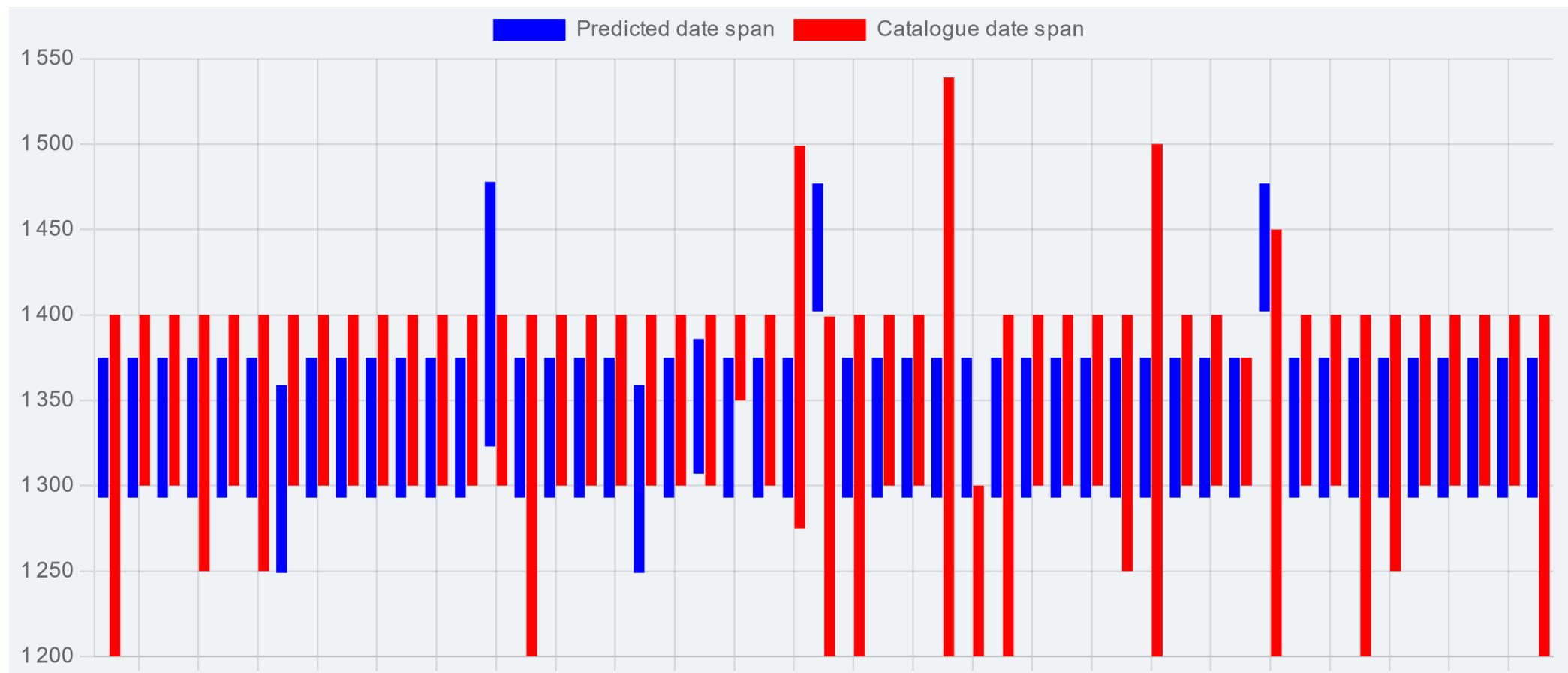
# Comparison of Linenthal & Noel and DIGISIG (ML) dating of seal matrices displaying the hare riding on the hound motif



# Portable Antiquities Scheme

[www.finds.org.uk](http://www.finds.org.uk)

# Comparison of PAS and DIGISIG (ML) dating of seal matrices displaying the hare riding on the hound motif





<https://www.digisig.org>