

Odeuropa Semantic Technologies

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What is a **Knowledge Graph**?

It is a specific kind of **knowledge base** which is:

- a directed graph
connections between nodes are first-class citizens
- semantic
the meaning of the connections are part of the data itself
- smart
allows graph-computing techniques and algorithms
- alive
easy to extend, access, reuse

Semantic Web technologies enable to represent graphs in which nodes and properties (linking the nodes) are identified by **URIs**

PARRY'S
CYCLOPÆDIA
OF
PERFUMERY

A HANDBOOK

On the Raw Materials used by the Perfumer, their
Origin, Properties, Characters and Analysis; and
on other subjects of Theoretical and Scientific
Interest to the User of Perfume Materials, and to
those who have to Examine and Value such Materials

ERNEST
Analytical

OSPHRÉSIOLOGIE,
OU

TRAITÉ DES ODEURS, DU SENS ET DES ORGANES
DE L'OLFACTION;
AVEC L'HISTOIRE NÉCESSAIRE DES MALADIES DE NERF ET DES SENS PARALYSÉS,
ET DES OPÉRATIONS QUI LEUR SONT CONNEXES.

PAR HIPPOL. CLOQUET.

Docteur en médecine de la Faculté de Paris, Médecin titulaire de l'Hospice royal de
Médicines internes, médecin de l'École de Médecine d'Orléans, professeur de
Médecine de la même ville, et de la Société médicale d'Orléans, de celle d'Angers,
de celle de médecine de New-York, de la Société médicale d'Alger, de celle de la
Préfecture et de celle de l'École de Médecine de la Faculté de médecine de Paris,
et de celle de l'École de Médecine de Paris, Médecin de l'Hospice de la Pitié, et de
celui de la Faculté de Médecine de Paris, etc., etc.

SECONDE ÉDITION.
ENTièrement révisée et considérablement augmentée.



A PARIS,
CHEZ MÉQUIGNON-MARVIS, LIBRAIRE
POUR LA PARTIE DE MÉDECINE,
RUE DE L'ÉCOLE DE MÉDECINE, N° 3.
1851.

Text

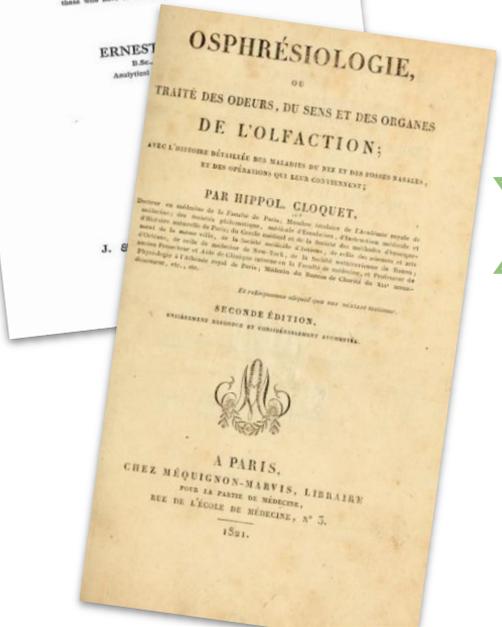
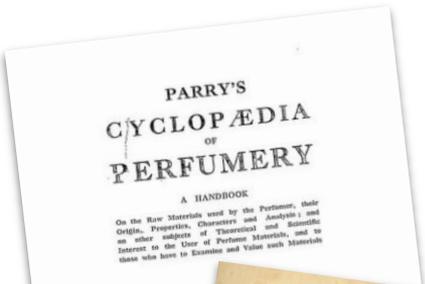
Centuries of collective smell memories



Heritage



Images



Text

Knowledge

Graph

Query + AI



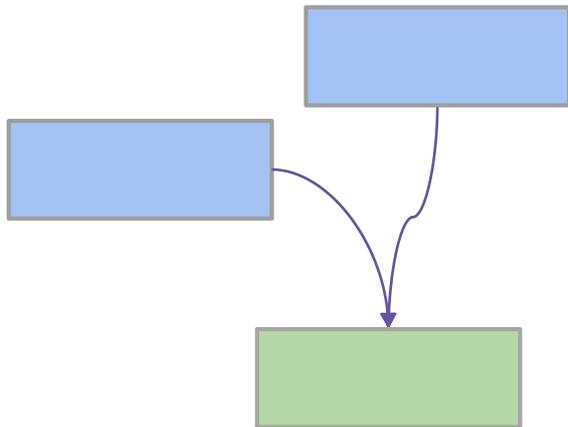
Odeuropa



Images

What is a **data model**?

An **abstract** model that organizes elements for structuring the data and standardizes how they **relate** to each other and to the properties of real-world entities.



When a data model gain formal naming and definition, we can speak about an **ontology**, that can be developed in **OWL** (Web Ontology Language) following the Semantic Web technical stack.

State of Art

We can find KG, ontologies or data models representing:

Disciplines

- ✓ Cultural Heritage
- ✓ History
- ✓ Art
- ✓ Chemistry
- ✓ Scientific Observation

Senses

- ✓ Vision / Images
- ✓ Hearing / Sounds
- ✓ Taste
- Olfaction
(only from a chemical perspective)

- Olfactory experiences
- Sensory experiences

Competency questions (CQ)

74 questions, organised in 7 categories
defined by olfactory experts (history and heritage domain)

1. Smells

What smells were significant in the past?

2. Noses

How did people use their noses in the past and what types of smell expertise or experience can we find?

3. Identities

What meaning did smells have and how did they communicate identities or stereotypes?

4. Emotions

What feelings were associated with smells in parts of Europe at different times?

5. Practices

What kinds of practices produced smells?

6. Sites and contexts

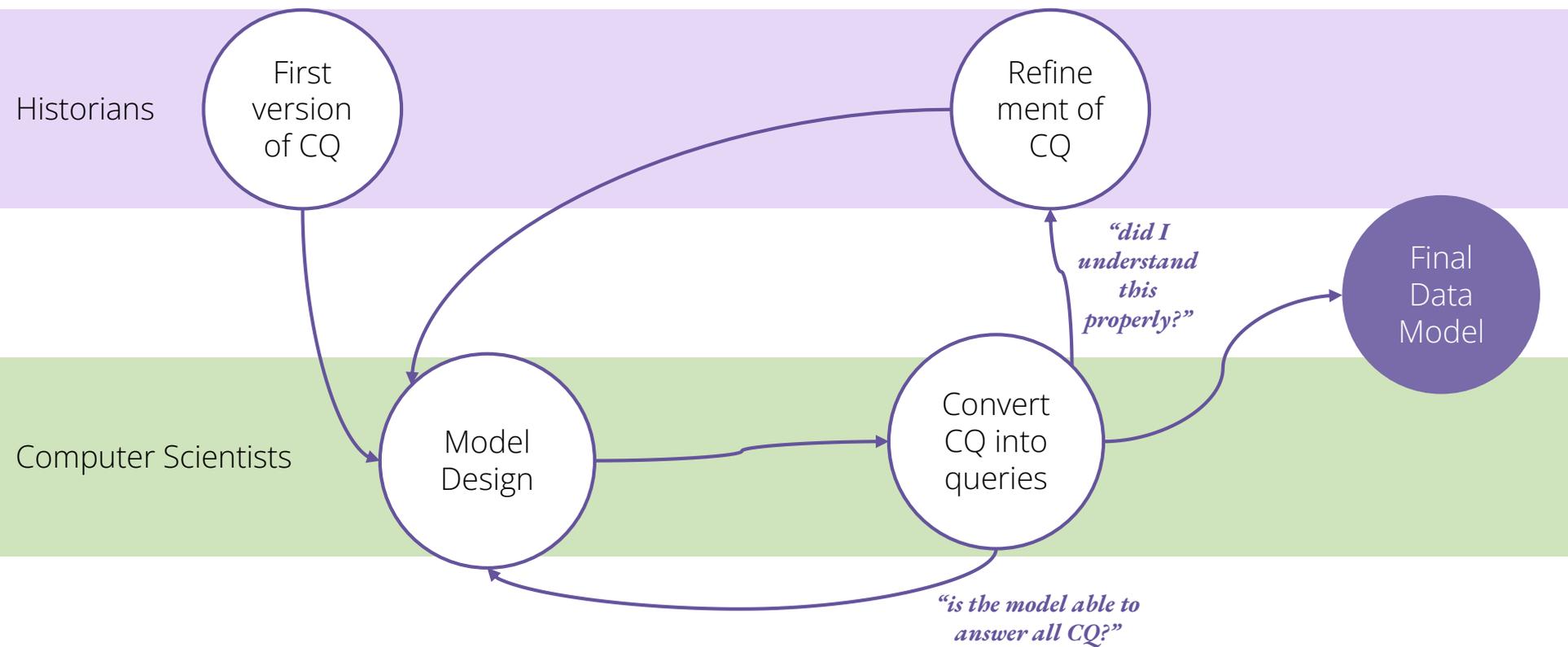
Which communities, institutions, or spaces were associated with particular smells?

7. Texts and images

How smells are represented in texts and images?

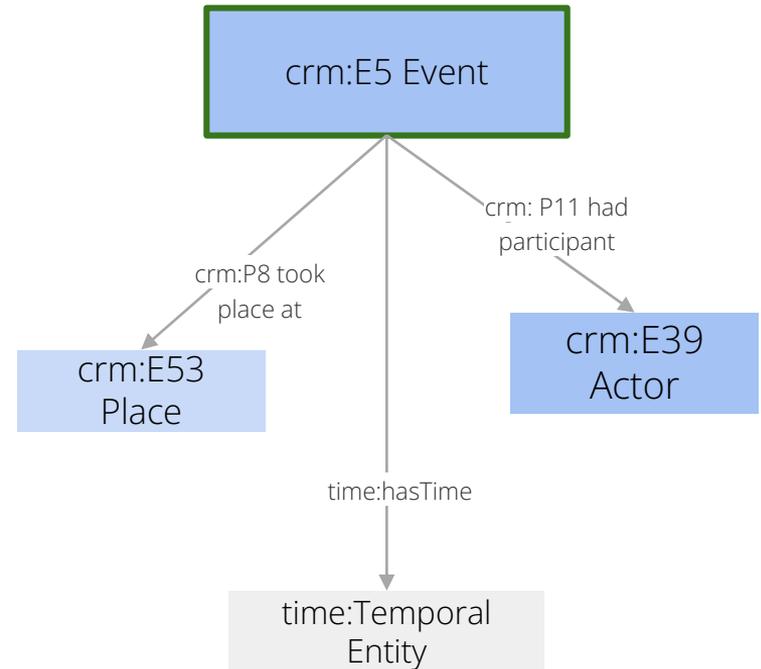


Collaboration between Disciplines



Extending CIDOC CRM and CRMsci

- CIDOC-CRM is an **event-based ontology**
 - Everything exists through an event (birth, production, etc.)
- Already **familiar** within Cultural Institutions
- It is a **bridge** to other cultural and heritage objects
- It is **expressive** and **flexible**
- It has an extension covering Scientific Observation: CRMsci



The Odeuropa Data Model

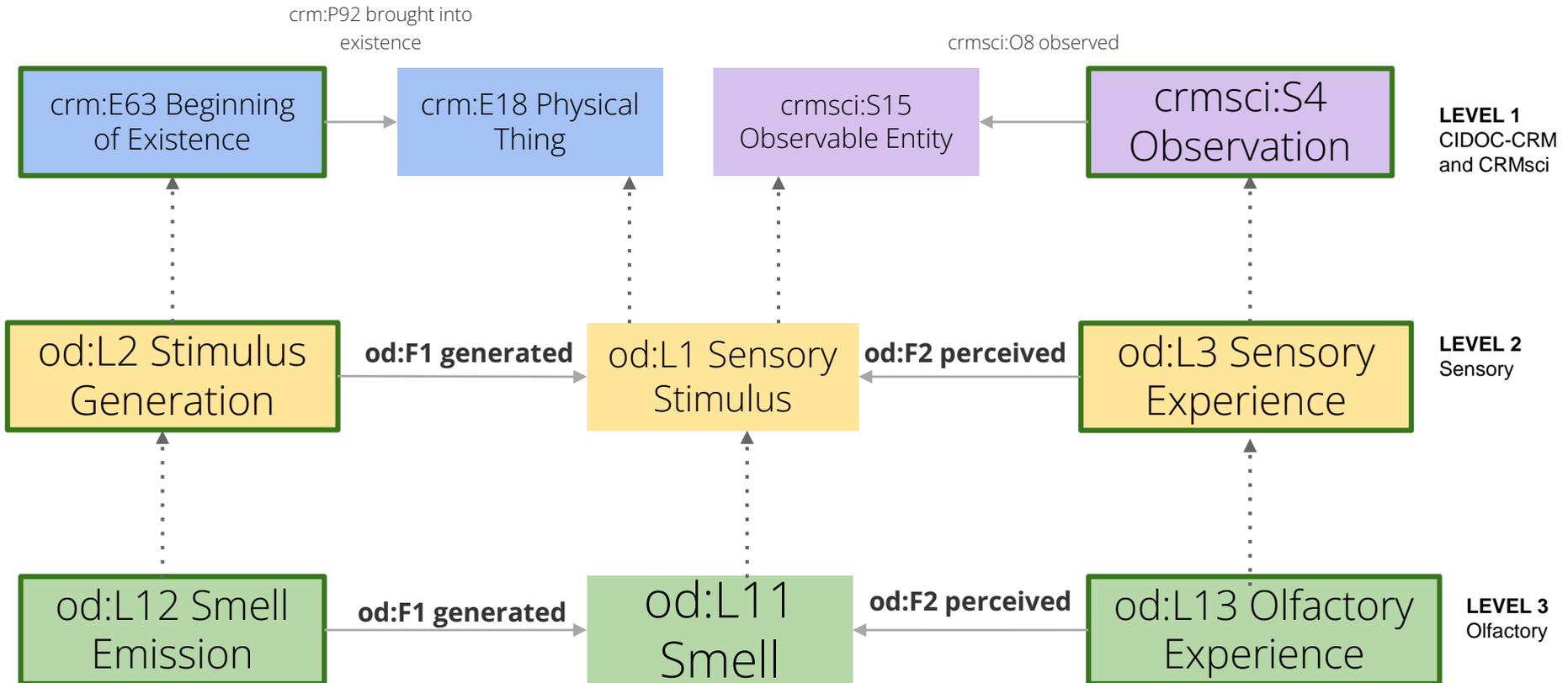
Core



Event



subclass of
property



What is a Smell?

- In this model, we consider a **smell as a unique and non-repeatable entity**
 - Two roses have two distinct (but similar) smells
 - A smell is normally connected to time and space
 - The “smell of roses” exists only as a generalisation of the smells of all roses
- A given smell can be experienced by multiple people
 - Each person can describe the same smell differently



What the model enables to represent

Smell
Emission

Olfactory
Experience

Odorizing

- Provenance of the information (which document, which tool)
 - **Space & Time**
 - Co-occurring event

- **Source**
- **Carrier**
- Smell Transformation
- Smells Interaction
- Connection with multiple experiences

- Perceiver
- **Gesture**
- **Attributes/Qualities** used for describing it
- **Emotion**
- Evoked entities
- Multi-sensory experiences

- User
- Technique
- Purpose

Controlled vocabularies in SKOS

Multilingual Vocabularies (6 langs)

realised during the project



Olfactory Objects

420 Concepts



Olfactory Gestures

35 Concepts

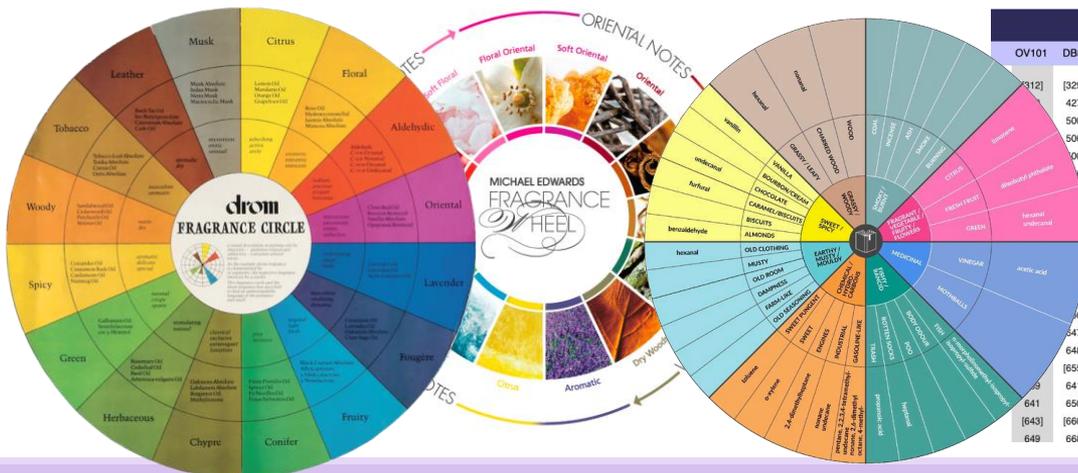


Fragrant spaces

110 Concepts

- hierarchy
- bridges between vocabularies
- interlinks with Wikidata and Iconclass

Olfactory taxonomies published in SKOS



Flavornet Home					Kovats RI	
OV101	DB5	OV17	C20M	Odorant	Odor	
[312]	[329]	[420]	677	trimethylamine	fish	
427	[518]	714	ethanal	pungent, ether		
500	[591]	696	methanethiol	solvent, pungent, ga		
506	[597]	571	propanal	solvent, pungent		
500	500	500	pentane	alkane		
5	[827]	1037	propanol	alcohol, pungent		
	[596]	716	dimethyl sulfide	cabbage, sulfur, ga		
	[591]	848	ethyl formate	pungent		
	[688]	[945]	methyl ethyl ketone	ether		
	[700]	[957]	methyl ethyl sulfide	sulfur, garlic		
	600	600	hexane	alkane		
	[719]	907	ethyl acetate	pineapple		
	[711]	[968]	methylbutenol	herb		
	[6]	[727]	984	pentanone	ether	
	547	[738]	1099	isobutanol	wine, solvent, bitter	
	648	[739]	1047	trans-crotonaldehyde	flower	
	[655]	[746]	1003	methylpentanone	mint	
	641	729	912	methylbutanal	cocoa, almond	
	641	650	728	910	methylbutanal	malt
	[643]	[660]	[751]	1008	pyrrolidine	alkaline
	649	668	17591	929	ethanol	sweet

A text example

A text example

From somewhere there came a **rich oriental odor**. It intoxicated me with its **subtle perfume**. [...] I turned again to the **table**, and carelessly reached out for a pair of dainty, pale tan-colored **gloves**. Then I seized them eagerly and **brushed them against my face**; I had found the odor. The gloves were perfumed.

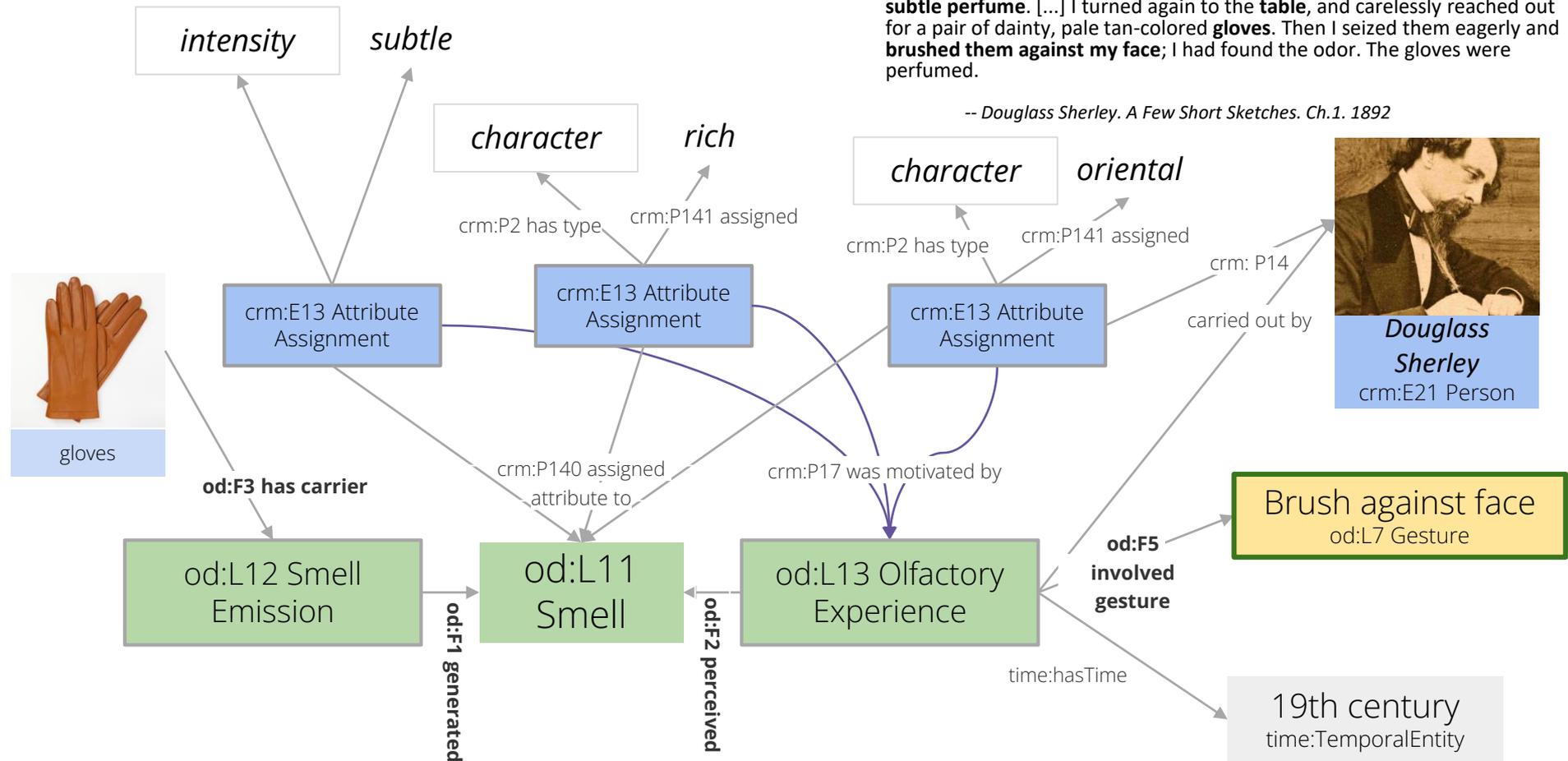
-- Douglass Sherley. A Few Short Sketches. Ch.1. 1892

From somewhere there came a **rich oriental odor**. It intoxicated me with its **subtle perfume**. [...] I turned again to the **table**, and carelessly reached out for a pair of dainty, pale tan-colored **gloves**. Then I seized them eagerly and **brushed them against my face**; I had found the odor. The gloves were perfumed.

-- Douglass Sherley. *A Few Short Sketches*. Ch.1. 1892



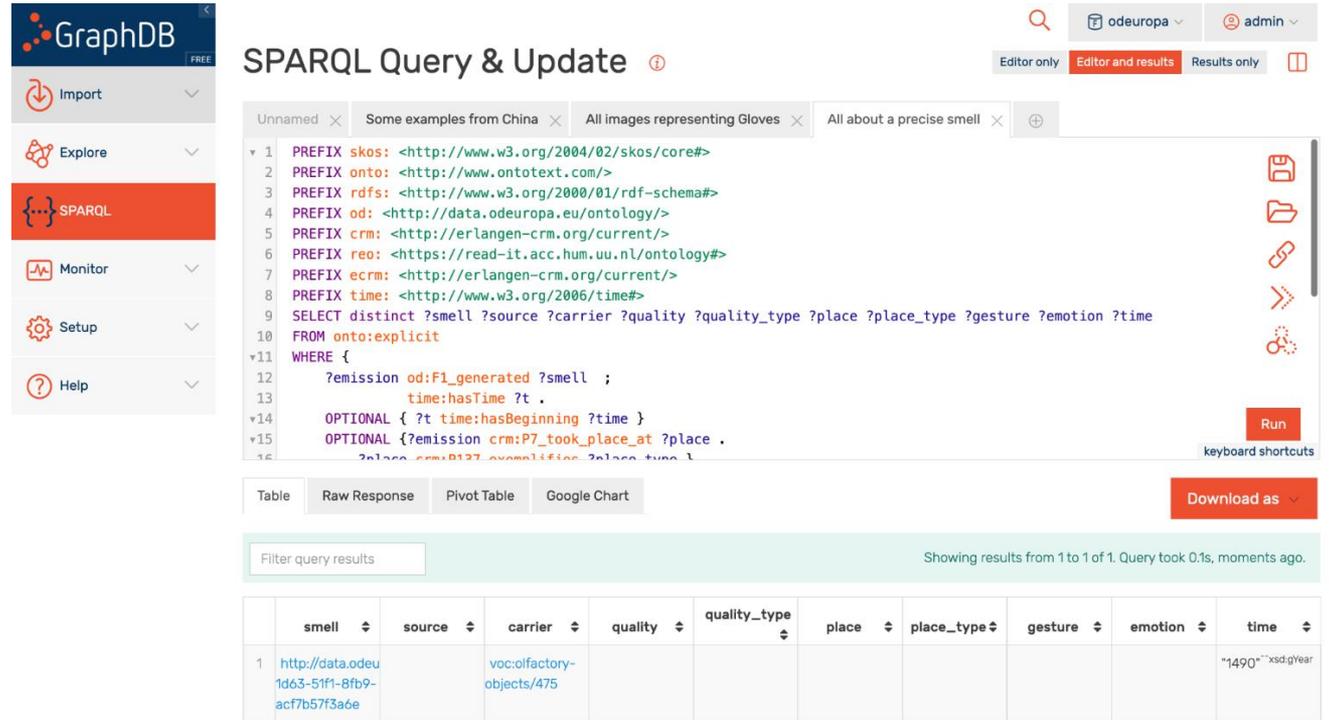
Douglass Sherley
crm:E21 Person



How to Access Data

Query the SPARQL Endpoint

<https://data.odeuropa.eu/sparql>



GraphDB FREE

Import

Explore

SPARQL

Monitor

Setup

Help

SPARQL Query & Update

odeuropa admin

Editor only Editor and results Results only

Unnamed Some examples from China All images representing Gloves All about a precise smell

```
1 PREFIX skos: <http://www.w3.org/2004/02/skos/core#>
2 PREFIX onto: <http://www.ontotext.com/>
3 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
4 PREFIX od: <http://data.odeuropa.eu/ontology/>
5 PREFIX crm: <http://erlangen-crm.org/current/>
6 PREFIX reo: <https://read-it.acc.hum.uu.nl/ontology#>
7 PREFIX ecrm: <http://erlangen-crm.org/current/>
8 PREFIX time: <http://www.w3.org/2006/time#>
9 SELECT distinct ?smell ?source ?carrier ?quality ?quality_type ?place ?place_type ?gesture ?emotion ?time
10 FROM onto:explicit
11 WHERE {
12   ?emission od:F1_generated ?smell ;
13     time:hasTime ?t .
14   OPTIONAL { ?t time:hasBeginning ?time }
15   OPTIONAL { ?emission crm:P7_took_place_at ?place .
16     ?place crm:P127_exemplifies ?place_type .
```

Run

keyboard shortcuts

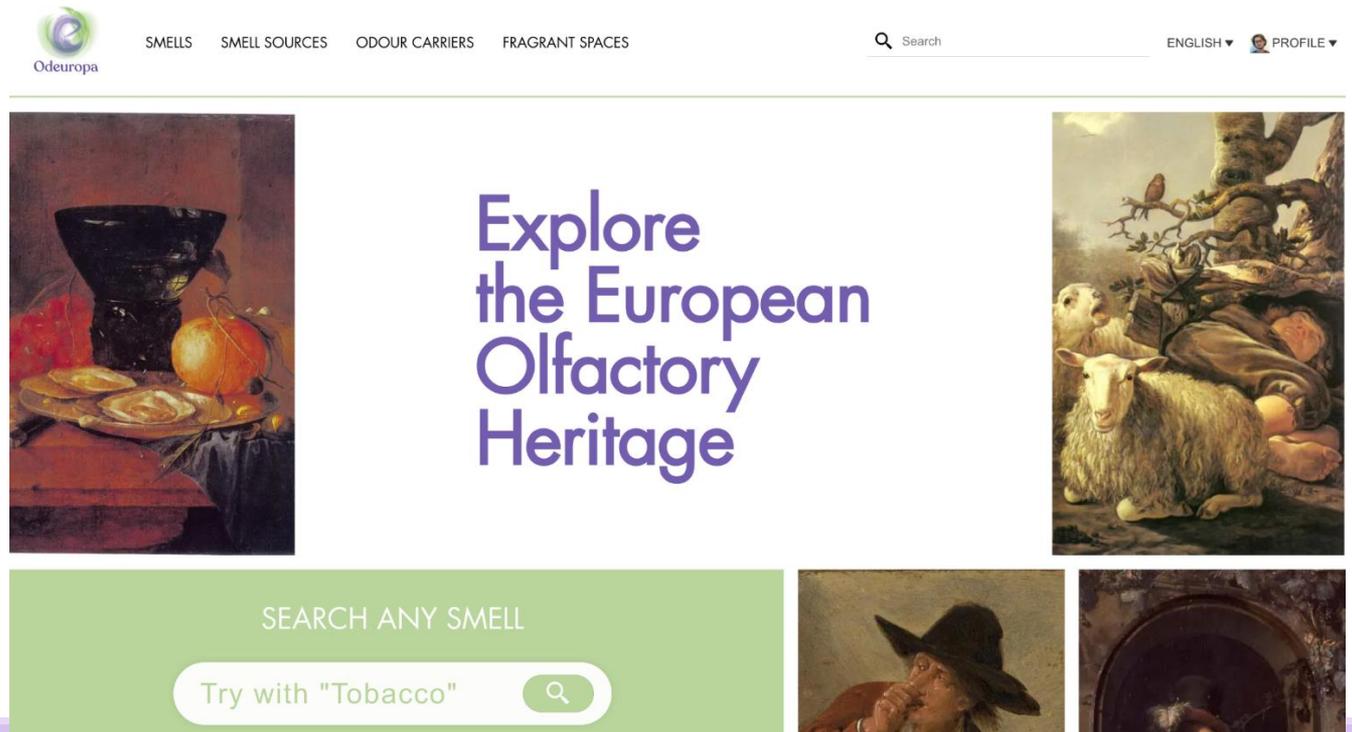
Table Raw Response Pivot Table Google Chart Download as

Filter query results Showing results from 1 to 1 of 1. Query took 0.1s, moments ago.

	smell	source	carrier	quality	quality_type	place	place_type	gesture	emotion	time
1	http://data.odeuropa.eu/1d63-51f1-8fb9-acf7b57f3a6e		voc:ofactory-objects/475							"1490"^^xsd:gYear

Use the Odeuropa Explorer

<https://explorer.odeuropa.eu>



The screenshot shows the Odeuropa Explorer website interface. At the top left is the Odeuropa logo, a stylized 'e' with a green leaf. To its right are navigation links: SMELLS, SMELL SOURCES, ODOUR CARRIERS, and FRAGRANT SPACES. On the top right, there is a search bar with a magnifying glass icon and the text 'Search', followed by language and profile options: ENGLISH and PROFILE. The main content area features a large central text 'Explore the European Olfactory Heritage' in purple. To the left of this text is a still life painting of a black mortar and pestle with various fruits. To the right is a painting of a sheep in a landscape. Below the central text is a green search bar with the text 'SEARCH ANY SMELL' and a search button. Below the search bar is a white input field with the text 'Try with "Tobacco"' and a search button. At the bottom right, there are two small thumbnail images: one of a man in a hat and one of a person in a dark setting.

Advanced search of text and images



SMELLS SMELL SOURCES ODOUR CARRIERS FRAGRANT SPACES

Search

ENGLISH PROFILE

CLEAR

In text In images **Both**

Full text search

Search by concept

Place

Time

Smell Source

Carrier

223593 search results

Show as cards

Sort by Select...

SMELLS

CREATION DATE 1657
AUTHOR Marin Cureau de La Chambre

[SEE MORE](#)

FETORE

CREATION DATE 1847
AUTHOR Ludovico [vedi note] Muratori
OLFACTORY EXPERIENCE
DEFINED AS incomportabile

[SEE MORE](#)

WEL RIECKENDE

CREATION DATE 1655
AUTHOR volkerus van oosterwyck

[SEE MORE](#)

ÉÉE

CREATION DATE 1616
AUTHOR

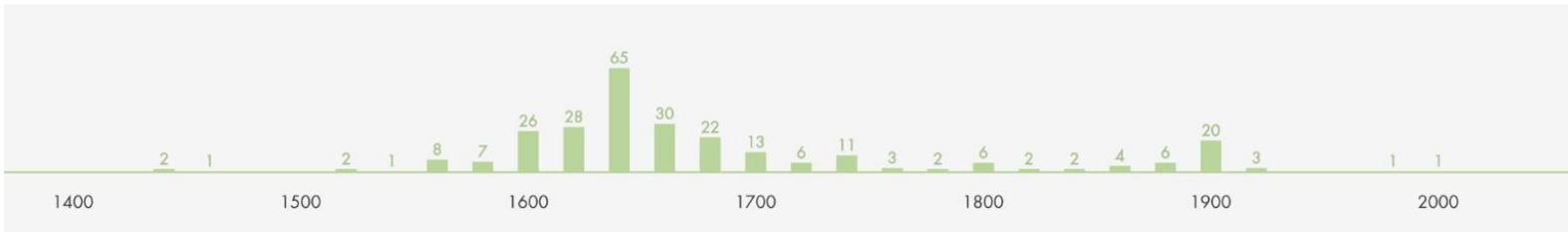
[SEE MORE](#)

Previous 1 2 3 4 5 ... 11179 11180 Next

Focus on particular smell sources



Smell of Bread



hepatic seductive acido nesch zonderlingen lekker

pravo

Save textual excerpts in a personalized list

The screenshot shows a digital library interface. At the top, there are navigation links: « Previous result, [Back to search results](#), 1 / 86, and [Next result »](#). The main content area displays a 'Textual resource' titled 'Flush: A biography of Virginia Woolf'. Below the title, there is a 'Save' button and a source link: 'Odeuropa benchmark (permalink) Source: <http://gutenberg.net.au/eb...>'. A metadata section titled 'Smell Emission' lists 'SOURCE: [Garlic, Wine, Bread, Leather](#)' and 'CREATION DATE: 1933'. Below this is an 'Excerpt 1' section with a quote: 'He went in and out, up and down, where they beat brass, where they bake bread, where the women sit combing their hair, where the bird-cages are piled high on the causeway, where the wine spills itself in dark red stains on the pavement, where leather **smells** and harness and garlic, where cloth is beaten, where vine leaves tremble, where men sit and drink and spit and dice--he ran in and out, always with his nose to the ground, drinking in the essence; or with his nose in the air vibrating with the aroma.'

A white dialog box titled 'Save to a list' is overlaid on the page. It contains a 'Create a new list' button and two existing lists: 'My test list' and 'Tobacco', each with a heart icon.