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FAIRification & Data modelling

[Andra Waagmeester](#)¹

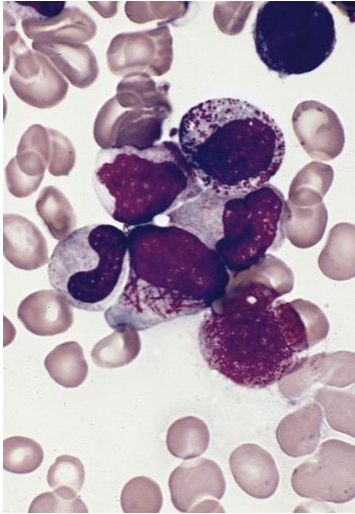
Micelio, Antwerp, Belgium | Email: andra@micelio.be, Twitter: @andrawaag

1) Micelio, Ekeren, Antwerp, Belgium

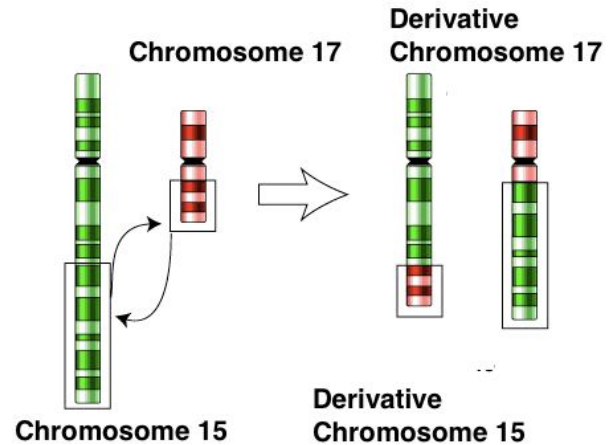


WHY? Acute promyelocytic leukemia

Cancer of the white blood cells



Chromosomal translocation on the RAR α gene



Randomized Phase III Trial of Retinoic Acid and Arsenic Trioxide Versus Retinoic Acid and Chemotherapy in Patients With Acute Promyelocytic Leukemia: Health-Related Quality-of-Life Outcomes

Fabio Efficace, Franco Mandelli, Giuseppe Avvisati, Francesco Cottoni, Felicetto Ferrara, Eros Di Bona, Giordina Specchia, Massimo Breccia, Alessandro Levis, Simona Sica, Olimpia Finizio, Maria Grazia Kropp, Giuseppe Fioritoni, Elisa Cerqui, Marco Vignetti, Sergio Amadori, Richard F. Schlenk, Uwe Platzbecker, and Francesco Lo-Coco

A B S T R A C T

Purpose

A randomized clinical trial compared efficacy and toxicity of standard all-*trans*-retinoic acid (ATRA) plus chemotherapy versus ATRA plus arsenic trioxide in patients with newly diagnosed, low- or intermediate-risk acute promyelocytic leukemia (APL). Here, we report health-related quality-of-life (HRQOL) results.

Patients and Methods

HRQOL was a secondary end point of this trial. The European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire–Core 30 was used to assess HRQOL at end of induction and after consolidation therapy. All analyses were based on 156 patients who received at least one dose of treatment, with groups defined according to randomly assigned treatment. Primary analysis was performed, estimating mean HRQOL score over time and differences between treatment arms using a linear mixed model.

Fabio Efficace, Franco Mandelli, Francesco Cottoni, and Marco Vignetti, Gruppo Italiano Malattie Ematologiche dell'Adulto; Giuseppe Avvisati, Università Campus BioMedico; Massimo Breccia, Università "La Sapienza"; Simona Sica, Università Cattolica Sacro Cuore; Sergio Amadori and Francesco Lo-Coco, Università Tor Vergata; Francesco Lo-Coco, Fondazione Santa Lucia, Roma; Felicetto Ferrara, Ospedale Cardarelli, Olympia Finizio, Ospedale Cardarelli, Napoli; Eros Di Bona, Ospedale San Bortolo, Vicenza; Giordina Specchia, Università di Bari, Bari; Alessandro Levis, Ospedale SS Antonio e Biagio, Alessandria; Maria Grazia Kropp, Azienda Ospedaliera Pugliese Ciccio, Catanzaro; Giuseppe Fioritoni, Ospedale Civile, Pescara; Elias Cerqui, Spedini Civile, Brescia, Italy; Richard F. Schlenk, University of Ulm, Ulm; and Uwe Platzbecker, Universitätsklinikum Carl Gustav Carus, Dresden, Germany.

Published online ahead of print at

Findings support the use of retinoic acid plus arsenic trioxide as preferred first-line treatment

Effects of arsenic trioxide known for decades in China

Original papers were published in the Chinese language and in journals that are obscure even to most Chinese readers

SCIENCE CHINA
Life Sciences

• REVIEW •

June 2013 Vol.56 No.6: 495–502
doi: 10.1007/s11427-013-4487-z

A drug from poison: how the therapeutic effect of arsenic trioxide on acute promyelocytic leukemia was discovered

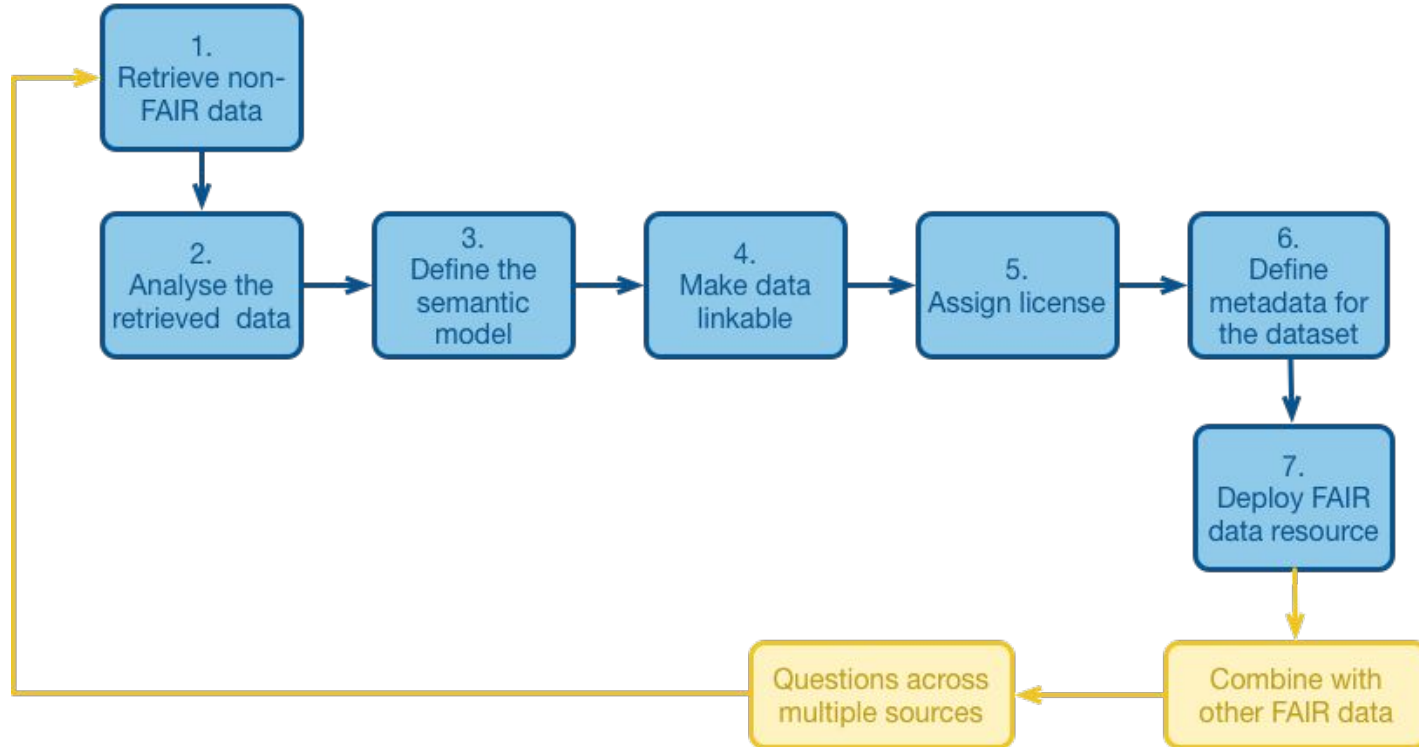
RAO Yi^{1*}, LI RunHong² & ZHANG DaQing²

¹Peking-Tsinghua Center for Life Sciences at Peking University School of Life Sciences, Beijing 100871, China;

²Peking University Health Sciences Center, Beijing 100871, China

Received March 27, 2013; accepted April 5, 2013; published online May 3, 2013

FAIRification process



Source: <https://www.go-fair.org/fair-principles/fairification-process/>

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Asenic trioxide is an **inorganic compound** with the formula **As₂O₃**. This commercially important **oxide of arsenic** is the main precursor to other arsenic compounds, including **organoarsenic compounds**. Approximately 50,000 tonnes are produced annually.^[4] Many applications are controversial given the high toxicity of arsenic compounds.

Contents

- 1 Production and occurrence
- 2 Properties and reactions
- 3 Structure
- 4 Uses
- 5 Medical applications
- 6 Toxicology
- 7 Environmental problems
- 8 References
- 9 External links

Production and occurrence

Asenic trioxide can be generated via routine processing of arsenic compounds including the oxidation (combustion) of arsenic and arsenic-containing minerals in air. Illustrative

https://en.wikipedia.org/wiki/Main_Page

維基百科 自由的百科

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搜索

三氧化二砷

[编辑]

维基百科中的医学相关内容仅供参考，如需获取专业意见请咨询专业人士。

三氧化二砷（學名：Arsenic trioxide，藥品名：Asadin），俗稱砒霜、白砒^[1]，分子式As₂O₃，是最具商業價值的砷化合物及主要的砷化學開始物料，也是最古老的毒物之一，無臭無味，外觀為白色霜狀粉末，故稱砒霜。這是經某種指定的礦物處理過程所產生的高毒性副產品，例如採金礦、高溫蒸餾砷黃鐵礦（毒砂）並冷凝其白煙等。

目录 [隐藏]

- 1 化學特性
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- 3 毒物學
- 4 用途
 - 4.1 药剂
 - 4.2 工業
 - 4.3 醫學用途
 - 4.3.1 西醫
 - 4.3.2 中醫
- 5 参见

英文名	Arsenic trioxide
别名	亞砷酸酐；氧化砷(III)；砒霜；鶴頂紅
识别	

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 - 4.3.1 西醫
 - 4.3.2 中醫
- 5 参见

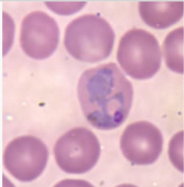
英文名	Arsenic trioxide
别名	亞砷酸酐；氧化砷(III)；砒霜；鶴頂紅
识别	

Language independent info boxes

Dutch

nl.m.wikipedia.org

Malaria




Rode bloedcel geïnfecteerd met *P. vivax*

Coderingen	
ICD-10	B50 ⓘ
ICD-9	084 ⓘ
OMIM	248310 ⓘ

Greek

el.m.wikipedia.org

Ελονοσία
Ταξινόμηση και εξωτερικές πηγές

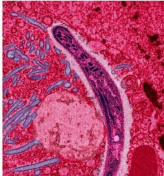


Ταξινόμηση	B50 ⓘ
ICD-10	084 ⓘ
ICD-9	248310 ⓘ
OMIM	248310 ⓘ
DiseasesDB	7728 ⓘ
MedlinePlus	000621 ⓘ
eMedicine	med/1385 ⓘ emerg/305 ⓘ ped/1357 ⓘ

English

en.m.wikipedia.org

Malaria



A Plasmodium from the saliva of a female mosquito moving across a mosquito cell

Classification and external resources

Specialty	Infectious disease
ICD-10	B50 ⓘ -B54 ⓘ
ICD-9-CM	084 ⓘ



Dutch

nl.m.wikipedia.org

Hoofdstad	Papiaments
Regeringsvorm	Constitutionele monarchie
Staatshoofd	Koning Willem-Alexander Fredis Refunjol (gouverneur)
Regeringsleider	Mike Eman (Arubaanse Volkspartij)
Religie	Katholiek 82%, protestant 8%

103,400 ^[2] (197th)

• Εκτίμηση 2014

Greek

el.m.wikipedia.org

Πολίτευμα

Συνταγματική Μοναρχία

Μονάρχης Γουλιέλμος-Κυβερνήτης Αλέξανδρος
Πρωθυπουργός Φρέντις Ρεφουνγιόλ
Μίκι Έμαν

Πλήρης αυτονομία από το Βασίλειο των Κάτω Χωρών
Σύνταγμα

Εκταση	180 km² (213η)
• Συνολο	68,5 km
• Ακτογραμμή	
Πληθυσμός	
• Εκτίμηση 2014	107.394 ^[1] (196η)
• Απογραφή 2000	103.065
• Πυκνότητα	556,4 κατ./km² (21η)
Α.Ε.Π. (PPP)	
• Ολικό (2005)	2,258 δισ. \$ ^[2]

107.394^[1] (196η)

English

en.m.wikipedia.org

Forma di gubernacion

Democracia pi Monarkia const

- Rei
- Gobernador
- Prome Minister

Fredis Refunjol
Mike Eman

Pais den Reino di Hulanda

Status aparte

1 januari di 19

Area

- Total

193 km² (n/a)

101.484 (2010)^[2]

110.663 (2014)^[3]

(614,8/km² (2014))

ICD-10

B50 [ⓘ](#)

ICD-10

B50 [ⓘ](#)-B54 [ⓘ](#)

Ταξινόμηση
ICD-10

B50 [ⓘ](#)

What does Wikipedia tells us about “Acute promyelocytic leukemia”

GOTO:

https://en.wikipedia.org/wiki/Acute_promyelocytic_leukemia

The Gene Wiki project, circa 2008

Summarized
knowledge via
crowdsourcing

The screenshot shows a Wikipedia article for IL2-inducible T-cell kinase (ITK). A green box highlights the main article content, including the function, structure, and interactions sections. A red box highlights a sidebar on the right containing structured data for the gene, including available structures, identifiers, external IDs, gene ontology, RNA expression pattern, protein domains, and orthologs.

IL2-inducible T-cell kinase

Available structures

1tk, 1tk, 1tkm, 1tkn, 1tkn2, 1tkn3, 1tkn4, 2eltz, 2eul0

Identifiers

External IDs
OMM: 106973 MGI: 96621 HomoloGene: 4051
GeneCards: ITK Gene

Gene ontology [show]

RNA expression pattern

21199_s_at

Protein domains

Orthologs

species	Human	Mouse
ntrez	3702	16428
ensembl	ENSG000000113263	ENSMUSG000000202195
uniprot	Q08881	A1A560
refseq	NM_005546	NM_010583
refseq	NP_065537	NP_034713

Function

This gene encodes an intracellular tyrosine kinase expressed in T-cells. The protein is thought to play a role in T-cell proliferation and differentiation.^{[2E][3]}

Structure

This protein contains the following domains, which are often found in intracellular kinases:^[4]

- N-terminus – FH (pleckstrin homology domain)
- BTK – Bruton's tyrosine kinase Cys-rich motif
- SH3 – (Src homology 3)
- SH2 – (Src homology 2)
- C-terminus – tyrosine kinase, catalytic domain

Interactions

ITK (gene) has been shown to interact with FYN,^{[5][6]} Wiskott-Aldrich syndrome protein,^{[7][8]} KHRBS1,^{[8][9][10]} PLCG1,^{[10][11]} Lymphocyte cytosolic protein 2,^{[11][12]} Linker of activated T cells,^{[12][13]} Karyopherin alpha 2,^[14] Grb2,^{[5][9]} and Peptidylprolyl isomerase A.^[15]

References

- Gibson S, Leung B, Squire JA, Hill M, Anra N, Goss P, Hogg D, Mills GB (September 1993). "Identification, cloning, and characterization of a novel human T-cell-specific tyrosine kinase located at the hematopoietin complex on chromosome 5q". *Blood* **82** (5): 1561–72. PMID 8354205.
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- Shan, X, Wang R L (Oct. 1999). "Itk/Emt6/Itk activation in response to CD3 cross-linking in Jurkat T cells requires ZAP-70 and Lat and is independent of membrane recruitment". *J. Biol. Chem. (UNITED STATES)* **274** (41): 29323–30. ISSN 0021-9258. PMID 10501192.
- Perez-Villar, Juan J; Whitehead, Steven

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Reelin

From Wikipedia, the free encyclopedia

Reelin is a large secreted [extracellular matrix glycoprotein](#) that helps regulate processes of [neuronal migration](#) and positioning in the developing brain by controlling [cell–cell interactions](#).

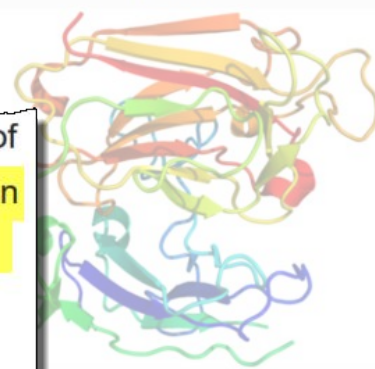
Besides this important role in early [development](#), reelin continues to work in the adult brain. It modulates [synaptic plasticity](#) by ^{[2][3]} It also stimulates dendrite^[4] migration of [neuroblasts](#) generation zones. It is found not only in the tissues.

Reelin has been suggested to be implicated in pathogenesis of several brain diseases. The expression of the protein has been found to be significantly lower in schizophrenia and psychotic bipolar disorder, but the cause of this observation remains uncertain as studies show that [psychotropic medication itself affects reelin expression](#). Moreover, epigenetic hypotheses aimed at explaining the changed levels of reelin expression^[6] are controversial.^{[7][8]} Total lack of reelin causes a form of [lissencephaly](#). Reelin may also play a role in [Alzheimer's disease](#), [temporal lobe epilepsy](#) and [autism](#).

Reelin's name comes from the abnormal reeling [gait](#) of *reeler* mice,^[9] which were later found to have a deficiency of this brain [protein](#) and were [homozygous](#) for mutation of the RELN gene. The

Reelin has been suggested to be implicated in pathogenesis of several brain diseases. The expression of the protein has been found to be significantly lower in schizophrenia and psychotic bipolar disorder, but the cause of this observation remains uncertain as studies show that psychotropic medication itself

Reelin



3D ribbon structure of the third reelin repeat domain.^[1]

Available structures

PDB Ortholog search: [PDBe](#) [RCSB](#)

List of PDB id codes [show]

Identifiers

Symbols RELN ; LIS2; PRO1598; RL

External OMIM: 600514 MGI: 103022

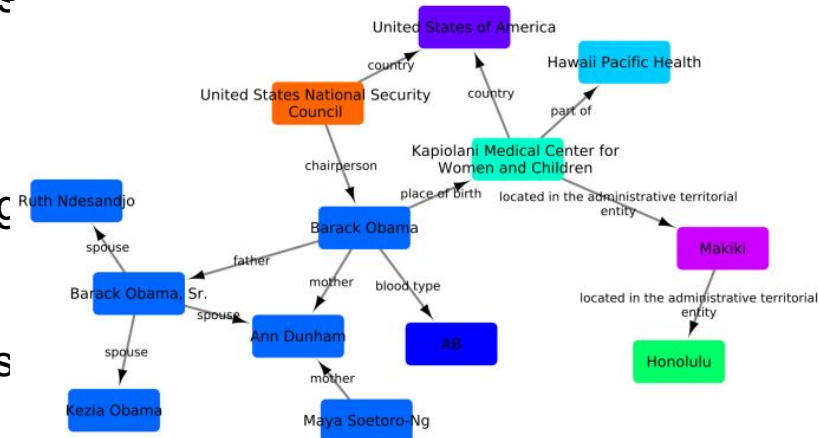
Wikidata is to data as Wikipedia is to text

Wikidata is a collaboratively edited knowledge base operated by the Wikimedia Foundation

- Completely free, even for commercial usage (CC0)
- Anybody can contribute
- Covers all domains of knowledge
- Extensive item history, talk pages, projects, users
- Integration with the semantic web
- High performance query engine (SPARQL)
- Stable! Long term support not dictated by funding cycles
- Actively developed
- Already has large number of active users, editors contributors!



A giant graph of knowledge!



What if we want those translations in an app?

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Integrate art data with science data

GOTO:

<https://w.wiki/4NZ>

<https://w.wiki/4Na>

<https://w.wiki/4Nb>



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Reelin

From Wikipedia, the free encyclopedia

Reelin (RELN)^[5] is a large secreted **extracellular matrix glycoprotein** that helps regulate processes of **neuronal migration** and positioning in the developing brain by controlling **cell-cell interactions**. Besides this important role in early **development**, reelin continues to work in the adult brain. It modulates **synaptic plasticity** by enhancing the induction and maintenance of **long-term potentiation**.^{[6][7]} It also stimulates dendrite^[8] and **dendritic spine**^[9] development and regulates the continuing migration of **neuroblasts** generated in **adult neurogenesis** sites like **subventricular** and **subgranular zones**. It is found not only in the **brain**, but also in the **spinal cord**, **blood**, and other body organs and tissues. ^[citation needed]

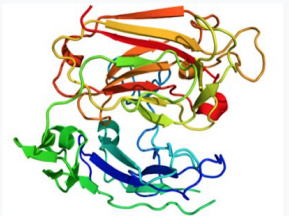
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Reelin's name comes from the abnormal reeling **gait** of **reeler** mice,^[14] which were later found to have a deficiency of this brain **protein** and were **homozygous** for mutation of the RELN gene. The primary phenotype associated with loss of reelin function is a failure of neuronal positioning throughout the developing **central nervous system** (CNS). The mice **heterozygous** for the reelin gene, while having little neuroanatomical defects, display the **endophenotypic** traits linked to psychotic disorders.^[15]

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- 2 **Tissue distribution and secretion**
- 3 **Structure**
- 4 **Function**
 - 4.1 **During development**
 - 4.2 **In adults**
- 5 **Evolutionary significance**
- 6 **Mechanism of action**

RELN



Available structures

PDB Ortholog search: [PDBe RCSB](#)

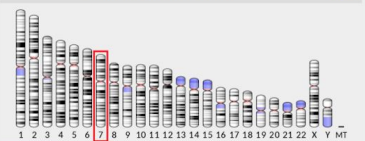
List of PDB id codes [show]

Identifiers

Aliases [RELN](#), [LIS2](#), [PRO1598](#), [RL](#), [reelin](#), [ETL7](#)

External IDs [OMIM: 600514](#) [MGI: 103022](#) [HomoloGene: 3699](#)
[GeneCards: RELN](#)

Gene location (Human) [hide]



Chr. [Chromosome 7 \(human\)](#)^[1]

Reelin - Wikidata x Andra

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Reelin (Q13561329)

mammalian protein found in Homo sapiens [edit](#)

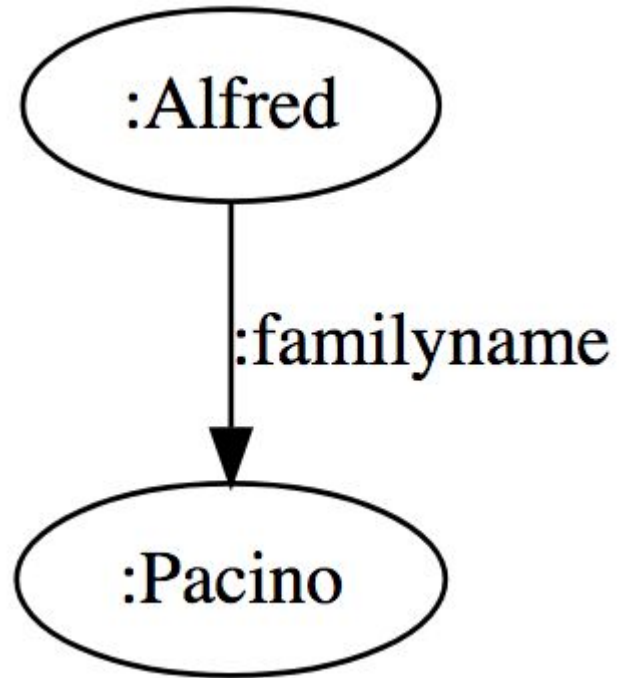
RELN | reelin | uniprot:P78509

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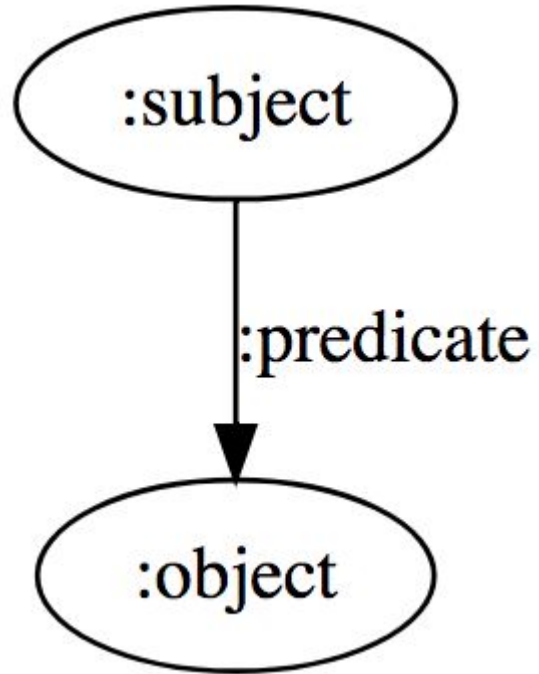
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instance of	protein edit 1 reference
+ add value	
subclass of	protein edit 1 reference
	Reelin edit 1 reference
+ add value	
image	2DDU.png edit 1 reference

Linked data



Linked data

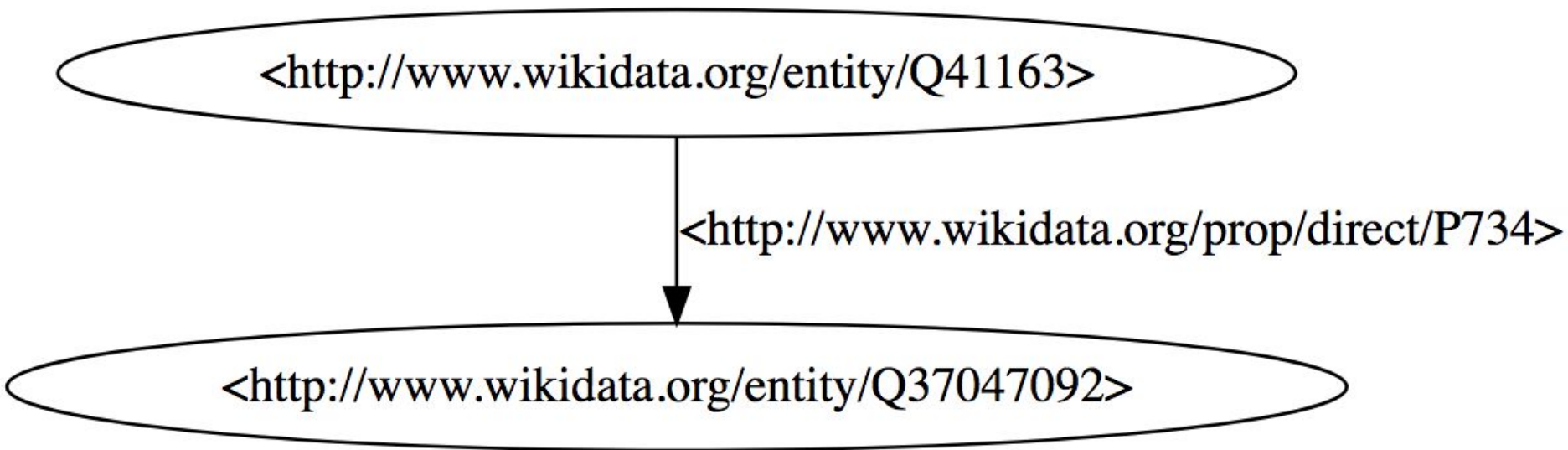


Linked Data

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Item Discussion

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Al Pacino (Q41163)

American film and stage actor and director
Alfredo James Steven Drew Duncan Pacino

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In more languages

Language	Label	Description	Also known as
English	Al Pacino	American film and stage actor and director	Alfredo James Steven Drew Du...
German	Al Pacino	US-amerikanischer Schauspieler, Filmregisseur und Produzent italienischer Abstammung	Alfredo James Pacino Pacino
French	Al Pacino	acteur américain	Alfredo James Pacino
Dutch	Al Pacino	Amerikaans acteur	
Sranan Tongo	Al Pacino	No description defined	Alfredo Pacino

All entered languages

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[Al Pacino.jpg](#)
349 × 500; 48 KB

[point in time](#) 2004

Wikipedia (97 entries) [edit](#)

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- an Al Pacino
- ar آل باتشينو
- arz ال باتشينو
- ast Al Pacino
- azb آل پاچینو
- az Al Paçino
- be_x_old Аль Пачына
- be Аль Пачына
- bg Ал Пачино
- bn আল পাচিনো
- bs Al Pacino
- ca Al Pacino
- ckb ئال پاچینۆ
- co Al Pacino
- csb Al Pacino
- cs Al Pacino
- cy Al Pacino
- da Al Pacino
- de Al Pacino
- el Άλ Πατσίνω
- eml Al Pacino
- en Al Pacino 
- eo Al Pacino
- es Al Pacino
- et Al Pacino
- eu Al Pacino
- fa آل پاچینو
- fi Al Pacino
- fr Al Pacino
- ga Al Pacino
- gd Al Pacino



- Main page
- Community portal
- Project chat
- Create a new item
- Recent changes
- Random item
- Query Service
- Nearby
- Help
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- Print/export
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- What links here
- Related changes
- Special pages
- Permanent link
- Page information
- Concept URI
- Import interwiki

Property Discussion

Read View history More Search Wikidata

family name (P734)

surname or last name of a person edit
last name I has surname I surname

In more languages

Language	Label	Description	Also known as
English	family name	surname or last name of a person	last name has surname surname
German	Familiename	Ergänzung zum Vornamen	Nachname Name Zuname
French	nom de famille	nom de famille d'une personne	patronyme
Dutch	achternaam	laatste naam van een persoon	familienaam
Sranan Tongo	No label defined	No description defined	

All entered languages

Data type

Item

Statements

instance of	Wikidata property for items about people edit
	<p>▼ 0 references</p> <p>+ add reference</p>
	Wikidata property to indicate a name edit
	<p>▼ 0 references</p> <p>+ add reference</p>
	Wikidata property encoding a vCard value edit
	<p>▼ 0 references</p>



Item Discussion

Read View history More

Search Wikidata

Pacino (Q37047092)

family name

[edit](#)

In more languages

Language	Label	Description	Also known as
English	Pacino	family name	
German	Pacino	Familienname	
French	Pacino	nom de famille	
Dutch	Pacino	achternaam	
Sranan Tongo	Pacino	No description defined	

All entered languages

Wikipedia (0 entries) [edit](#)

Wikibooks (0 entries) [edit](#)

Wikinews (0 entries) [edit](#)

Wikiquote (0 entries) [edit](#)

Wikisource (0 entries) [edit](#)

Wikiversity (0 entries) [edit](#)

Wikivoyage (0 entries) [edit](#)

Wiktionary (0 entries) [edit](#)

Other sites (0 entries) [edit](#)

Statements

instance of [family name](#) [edit](#)

↳ 1 reference

[+ add value](#)

native label [Pacino \(multiple languages\)](#) [edit](#)

↳ 0 references

[+ add reference](#)

[+ add value](#)

writing system [Latin script](#) [edit](#)

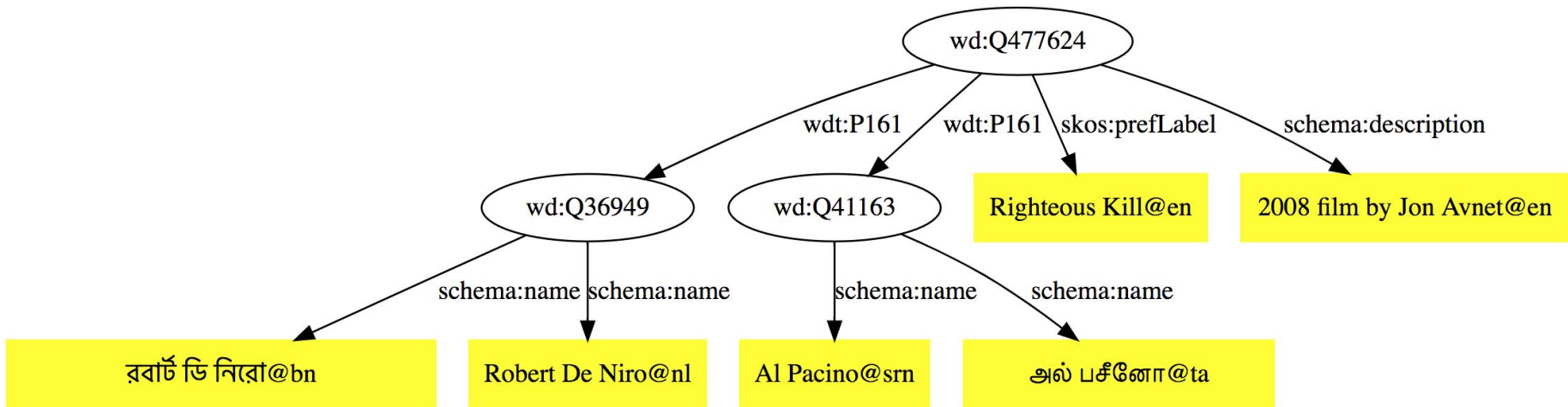
↳ 0 references

[+ add reference](#)

[+ add value](#)

- Main page
- Community portal
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- Create a new item
- Recent changes
- Random item
- Query Service
- Nearby
- Help
- Donate

- Tools
- What links here
- Related changes
- Special pages
- Permanent link
- Page information
- Concept URI
- Cite this page
- Import interwiki



Retinoic acid receptor alpha (Q254943)

mammalian protein found in Homo sapiens

Nuclear receptor subfamily 1 group B member 1 | RARA

Statements

molecular function

molecular function (P680)

represents gene ontology function annotations

Wikipedia (7 entries) [edit](#)

- ar مستقبل حمض الريبتيويك ألفا
- en Retinoic acid receptor alpha
- es Receptor de ácido retinoico alfa
- sh Receptor retinoinske kiseline alfa
- sr Receptor retinoinske kiseline alfa
- uk RARA
- zh 视黄酸受体α

retinoic acid binding (Q14901431)

Interacting selectively and non-covalently with retinoic acid, 3,7-
GO:0001972

Statements

subclass of [retinoid binding](#)
1 reference

[edit](#)

IDA

retinoic acid binding

determination method

1 reference

retrieved

3 January 2017

stated in

A human retinoic acid receptor which belongs to the family of nuclear receptors

UniProt-GOA

curator

British Heart Foundation

reference URL

<http://www.ebi.ac.uk/QuickGO/GAnotation?protein=P10276>

determination method

IDA

[+ add reference](#)

transcription corepressor activity

[edit](#)

determination method

IDA

1 reference

IDA (Q23174122)

Gene Ontology evidence code
Inferred from Direct Assay

Statements

instance of [Gene Ontology Evidence code](#)
manual assertion

A human retinoic acid receptor which belongs to the family of nuclear receptors (Q24339631)

Statements

instance of [scientific article](#)

Identifiers

PubMed ID [2825025](#)

British Heart Foundation (Q4970039)

Statements

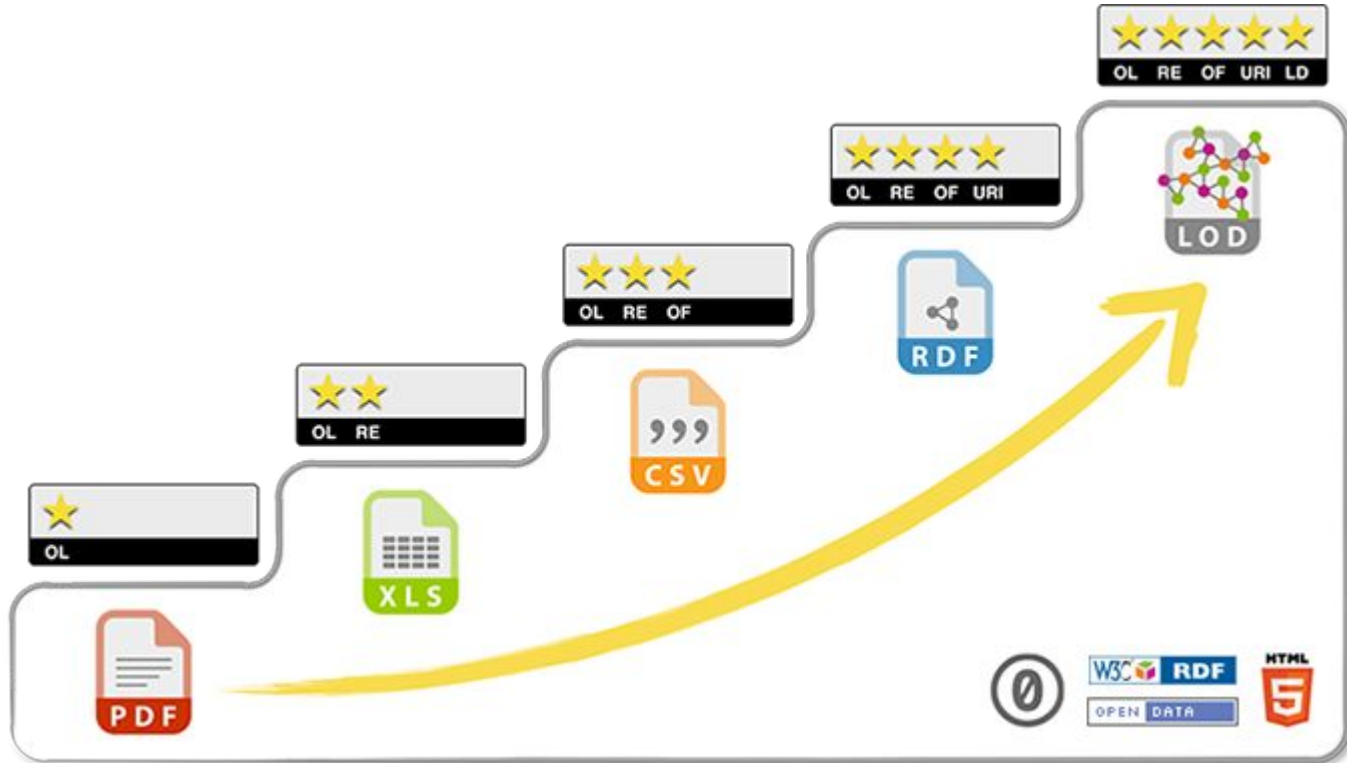
instance of [organization](#)

official website <http://www.bhf.org.uk/>

Identifiers

GRID ID [grid.452924.c](#)

5 star <https://5stardata.info/en/>



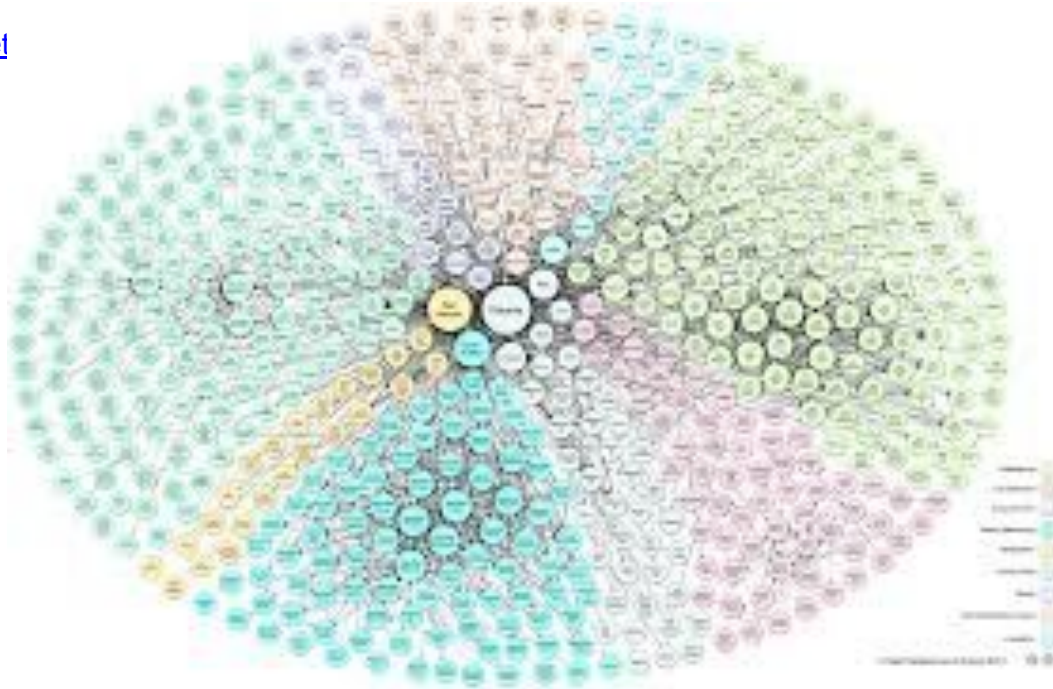
5 Star of Data

GOTO:

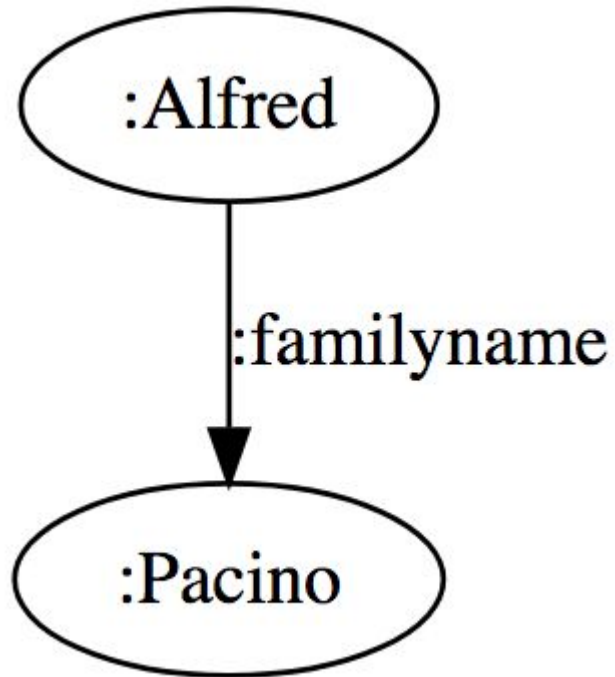
<https://5stardata.info/en/>

Linked data Cloud

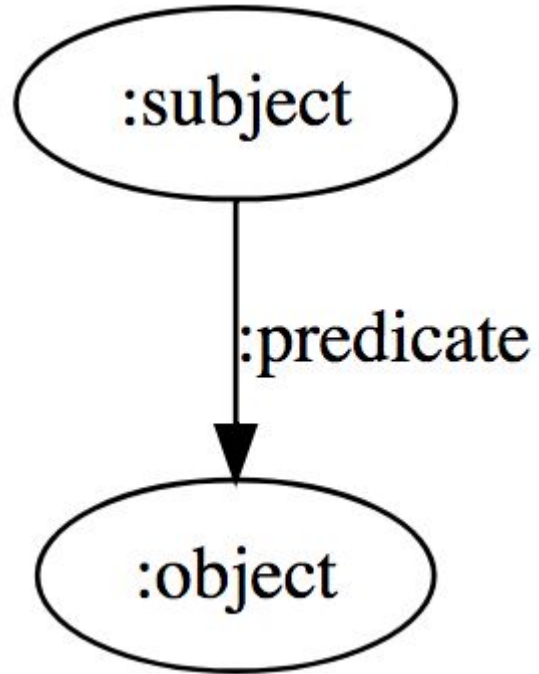
<https://www.lod-cloud.net>



Linked data



Linked data

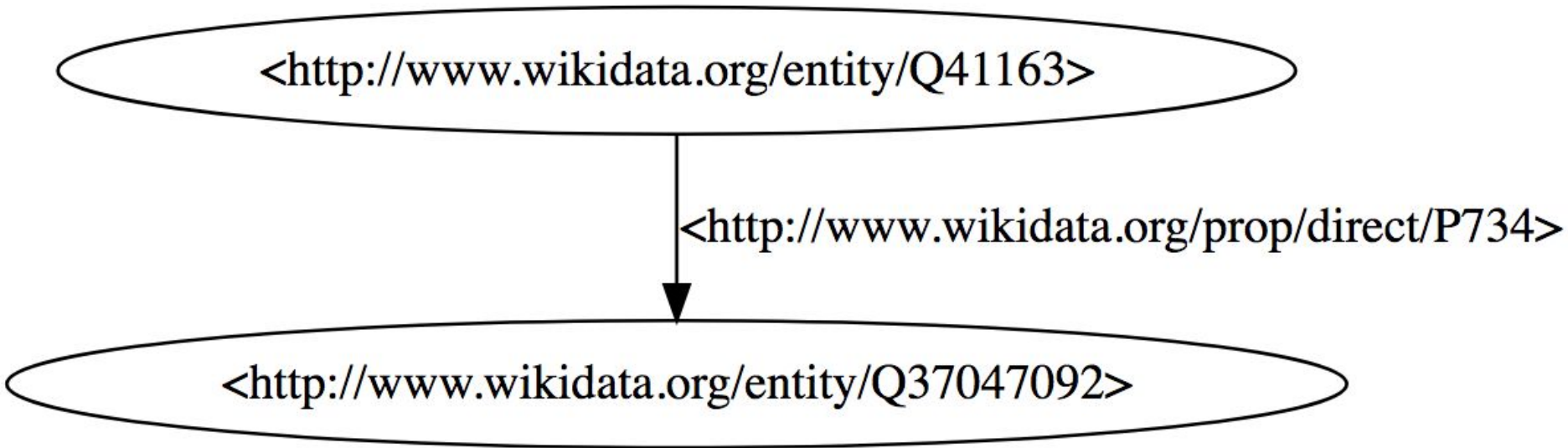


Linked Data

<http://www.wikidata.org/entity/Q41163>

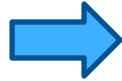
<http://www.wikidata.org/prop/direct/P734>

<http://www.wikidata.org/entity/Q37047092>



Simple data retrieval

“Retrieve genes with
GWAS association
with asthma”



39 genes

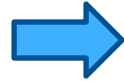
gene	geneLabel	gene	geneLabel	gene	geneLabel	gene	geneLabel
Q5013317	COL22A1	Q18027370	IGSF3	Q18053559	CDHR3	Q14903974	SMAD3
Q14912759	SLC22A5	Q18045382	HPSE2	Q18045669	ATG3	Q18033889	IL1RL1
Q14914243	PSAP	Q18048437	IL33	Q18035037	RAD50	Q17917202	ERBB4
Q14907990	SLC30A8	Q18051900	PYHIN1	Q18036984	FBXL7	Q18027836	IL6R
Q18025002	GAB1	Q17709208	ACO1	Q18033919	XPR1	Q18030185	NOTCH4
Q18035589	C6orf10	Q18027822	IL2RB	Q15326496	RORA	Q18030409	PDE4D
Q18054256	GSDMA	Q18030364	PBX2	Q18042132	GSDMB	Q18045645	IKZF4
Q18058487	C5orf56	Q18037773	ABI3BP	Q18029145	MKLN1	Q18039979	KLHL5
Q18030785	PRKG1	Q18039623	CTNNA3	Q18036729	RAP1GAP2	Q18026947	HLA-DQA1
Q18033424	IL18R1	Q18046350	ZNF665	Q14878303	IL13		

```

1 SELECT DISTINCT ?gene ?geneLabel where {
2   ?gene wdt:P2293 wd:Q35869 . # gene has genetic association to "asthma"
3   ?gene wdt:P31 wd:Q7187 . # gene is subclass of "gene"
4   SERVICE wikibase:label { bd:serviceParam wikibase:language "en". }
5 }
```

Data integration

“Retrieve genes with GWAS association with asthma and gene product is localized to membrane”



22 genes

gene	geneLabel	gene	geneLabel	gene	geneLabel	gene	geneLabel
Q1491275		Q1802737		Q1803503		Q1802783	
9	SLC22A5	0	IGSF3	7	RAD50	6	IL6R
Q1491424		Q1803342		Q1803391		Q1803040	
3	PSAP	4	IL18R1	9	XPR1	9	PDE4D
Q1490799		Q1804538		Q1804213		Q1803018	
0	SLC30A8	2	HPSE2	2	GSDMB	5	NOTCH4
Q1803558		Q1802782		Q1803672		Q1802694	
9	C6orf10	2	IL2RB	9	RAP1GAP2	7	HLA-DQA1

```

1 SELECT DISTINCT ?gene ?geneLabel where {
2   ?gene wdt:P2293 wd:Q35869 . # gene has genetic association to "asthma"
3
4   ?gene wdt:P31 wd:Q7187 . # gene is subclass of "gene"
5
6   ?gene wdt:P688 ?protein . # gene encodes a protein
7   ?protein wdt:P681 ?cc . # protein has a cellular component
8   ?cc wdt:P279*|wdt:P361* wd:Q14349455 . # cell component is 'part of' or 'subclass of' membrane
9
10  SERVICE wikibase:label { bd:serviceParam wikibase:language "en". }
11 }
```

http://bit.ly/bosc2017_wikidata

Computing on provenance

“Retrieve genes with GWAS association with asthma and gene product is localized to membrane (non-IEA)”



15 genes

gene	geneLabel	gene	geneLabel	gene	geneLabel
Q14912759	SLC22A5	Q18045382	HPSE2	Q17917202	ERBB4
Q14914243	PSAP	Q18027822	IL2RB	Q18027836	IL6R
Q14907990	SLC30A8	Q14903974	SMAD3	Q18030409	PDE4D
Q18027370	IGSF3	Q18035037	RAD50	Q18030185	NOTCH4
Q18033424	IL18R1	Q18036729	RAP1GAP2	Q18026947	HLA-DQA1

```

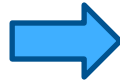
6  ?gene wdt:P31 wd:Q7187 ;      # gene is subclass of "gene"
7      wdt:P688 ?protein ;      # gene encodes a protein
8      rdfs:label ?geneLabel .
9  FILTER (lang(?geneLabel) = "en")
10 ?protein p:P681 ?s .          # protein's cell component statement
11   ?s ps:P681 ?cp .           # get statement value
12   FILTER NOT EXISTS {?s pq:P459 wd:Q23190881 .} # determination method is not IEA
13   ?cp wdt:P279*|wdt:P361* wd:Q14349455 .      # statement value is 'part of' or 'subclass of' membrane
14

```

http://bit.ly/bosc2017_wikidata

Leveraging the Disease Ontology structure

“Retrieve genes with GWAS association with any respiratory disease and gene product is localized to membrane (non-IEA)”



31 genes / 8 diseases

diseaseGALabel	gene_counts	geneList
asthma	15	SMAD3, RAP1GAP2, IL18R1, HPSE2, SLC30A8, SLC22A5, PSAP, ERBB4, HLA-DQA1, IGSF3, IL2RB, IL6R, NOTCH4, PDE4D, RAD50
chronic obstructive pulmonary disease	5	HLA-C, SFTPD, ANXA5, ANXA11, ATP2C2
lung cancer	3	TGM5, VTI1A, PHACTR2
interstitial lung disease	2	DSP, ATP11A
non-small-cell lung carcinoma	2	NALCN, DLST
nasopharynx carcinoma	2	ITGA9, TNFRSF19
adenocarcinoma of the lung	1	BTNL2
pulmonary emphysema	1	BICD1

```

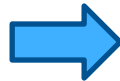
1 SELECT ?diseaseGALabel (count (DISTINCT ?geneLabel) as ?gene_counts)
2 (group_concat(DISTINCT ?geneLabel; separator="," as ?geneList)
3   ?gene wdt:P2293 ?diseaseGA . # gene is subclass of "gene" and encodes protein
4   ?diseaseGA wdt:P279* wd:Q3286546 . # to a type of respiratory system disease
5
6   ?gene wdt:P31 wd:Q7187 ; wdt:P688 ?protein ; # gene is subclass of "gene" and encodes protein
7     rdfs:label ?geneLabel .
8   FILTER (lang(?geneLabel) = "en")
9   ?protein p:P681 ?s . # protein's cell component statement
10  ?s ps:P681 ?cp . # get statement value
11  FILTER NOT EXISTS (

```

http://bit.ly/bosc2017_wikidata

Opportunistic integration

“Retrieve genes with GWAS association with any respiratory disease and gene product is localized to membrane (non-IEA) **and show causative chemical hazards**”



4 diseases / 6 chemical hazards

diseaseGALabel	exposureLabel
lung cancer	arsenic pentoxide exposure
lung cancer	HN1 exposure
lung cancer	mechlorethamine exposure
lung cancer	HN3 exposure
asthma	Phenacyl chloride exposure
pulmonary emphysema	phosgene exposure

```

11 .cp wdt:P279 | wdt:P501 wd:Q1167512 . # statement value is part of or is
12
13 ?exposure wdt:P1542 ?diseaseGA . # something causes disease
14 ?exposure wdt:P279 wd:Q21167512 . # and that something is a chemical hazard
15
16 SERVICE wikibase:label { bd:serviceParam wikibase:language "en". }
17 }

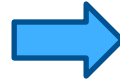
```

http://bit.ly/bosc2017_wikidata

... and show associated pathways

16 genes / 59 pathways

“Retrieve genes with GWAS association with any respiratory disease and gene product is localized to membrane (non-IEA), show causative chemical hazards and **show pathways where they have a role.**”



gene	pathway
SMAD3	Androgen receptor signaling pathway
SMAD3	TGF-beta Receptor Signaling
SMAD3	mechlorethamine exposure
HLA-C	Allograft Rejection
SFTPD	Regulation of toll-like receptor signaling pathway
.....

```

11 .cp wdt:r279 | wdt:P501 wd:Q1449499 . # statement value is part of or s
12
13 ?pathway wdt:P31 wd:Q4915012 ; # instance of a biological pathway
14 wdt:P527 ?gene .
15
16 SERVICE wikibase:label { bd:serviceParam wikibase:language "en". }
17 }

```

http://bit.ly/bosc2017_wikidata

PREFIX wp: <http://vocabularies.wikipathways.org/wp#>

PREFIX dcterms: <http://purl.org/dc/terms/>

PREFIX dc: <http://purl.org/dc/elements/1.1/>

SELECT DISTINCT ?metabolite1Label ?metabolite2Label ?mass1 ?mass2 WITH {

```
SELECT ?metabolite1 ?metabolite2 WHERE {  
  ?pathwayItem wdt:P2410 "WP706";  
  wdt:P2888 ?pwIri.
```

Wikidata

```
SERVICE <http://sparql.wikipathways.org/> {  
  ?pathway dc:identifier ?pwIri.  
  ?interaction rdf:type wp:Interaction;  
    wp:participants ?wpmb1, ?wpmb2;  
    dcterms:isPartOf ?pathway.  
  
  FILTER (?wpmb1 != ?wpmb2)  
  ?wpmb1 wp:bdbWikidata ?metabolite1.  
  ?wpmb2 wp:bdbWikidata ?metabolite2.  
}
```

Wikipathways

} AS %metabolites WHERE {

```
INCLUDE %metabolites.
```

```
?metabolite1 wdt:P2067 ?mass1.
```

```
?metabolite2 wdt:P2067 ?mass2.
```

```
SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }
```

Wikidata

[Try me....](#)

From a remote SPARQL endpoint to Wikidata



SPARQL Downloads

Documentation/Help Contact

Your query

Add common prefixes

```
20 SELECT DISTINCT ?wd_item ?physically_interacts_with ?interactswithLabel ?type ?iri ?uniprot ?text WHERE {
21   {SELECT * WHERE { ?iri a up:Protein ;
22     up:organism taxon:9606 ;
23     up:annotation ?annotation .
24     ?annotation a up:Natural_Variant_Annotation ;
25     rdfs:comment ?text .
26     FILTER (CONTAINS(?text, 'loss of function'))
27   }}
28   SERVICE <https://query.wikidata.org/bigdata/namespace/wdq/sparql> {
29     VALUES ?use {wd:Q427492}
30     ?wd_item wdt:P352 ?uniprot ;
31     wdt:P129 ?physically_interacts_with ;
32     wdt:P2888 ?iri ;
33     wdt:P703 wd:Q15978631 .
34     ?wd_item p:P129 ?phys_interacts_with_node .
35     ?phys_interacts_with_node ps:P129 ?physically_interacts_with ;
36     pq:P366 ?use .
37     ?physically_interacts_with wdt:P31 ?type ;
38     rdfs:label ?interactswithLabel .
39     FILTER (lang(?interactswithLabel) = "en")
40   }}
```

UniProt

Wikidata

Submit Query

Cancel

“People think RDF is a pain because it is complicated. The truth is even worse. RDF is painfully simplistic, but it allows you to work with real-world data and problems that are horribly complicated. While you can avoid RDF, it is harder to avoid complicated data and complicated computer problems.” Dan Brickley, Schema.org and Google Libby Miller, BBC

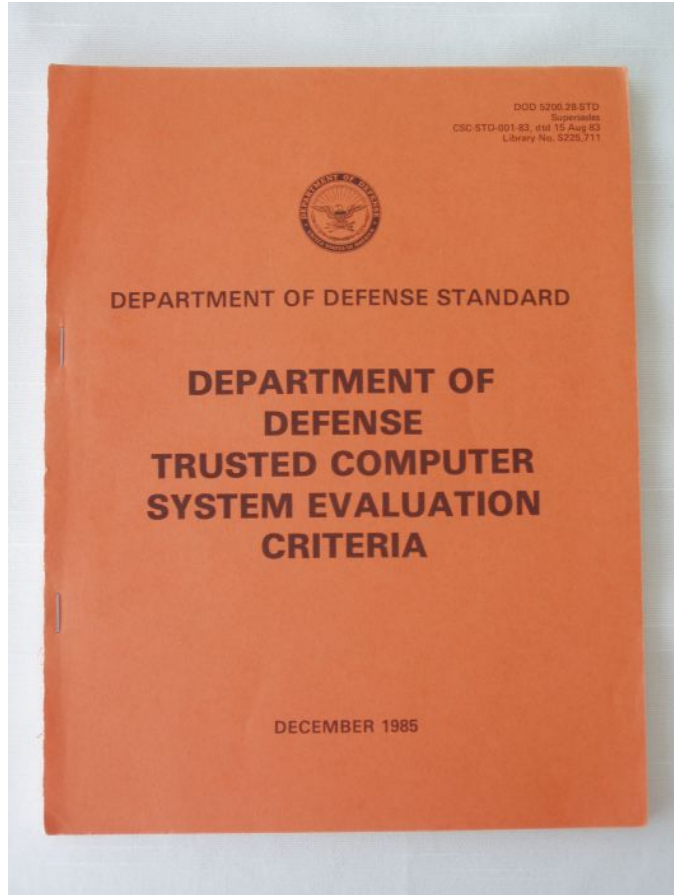
Choose a license



	Add to iNaturalist	Wikimedia compatible
CC0	+	+
CC-BY	+	+
CC-BY-NC	+	-
CC-BY-SA	+	+
CC-BY-ND	+	-
CC-BY-NC-SA	+	-
CC-BY-NC-ND	+	-

* Licenses copied from the filter page of iNaturalist. Assuming the latest version (4.0).

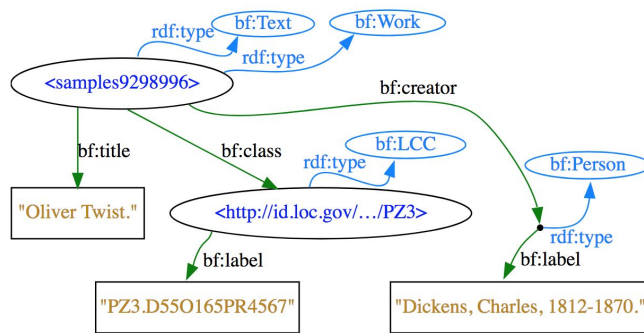
Define access rights



Formally capture and describe model and community consensus

Model development

- Legacy review – develop punch lists for existing data issues that needs fixing
- Documentation – terse, human-readable representation helping contributors and maintainers quickly grok the model
- Client pre-submission – submitters test their data before submission to make sure they're saying what they want to say and that the receiving schema can accommodate all of their data
- Server pre-ingestion – submission process checks data as it comes in and either rejects or warns about non-conformant data

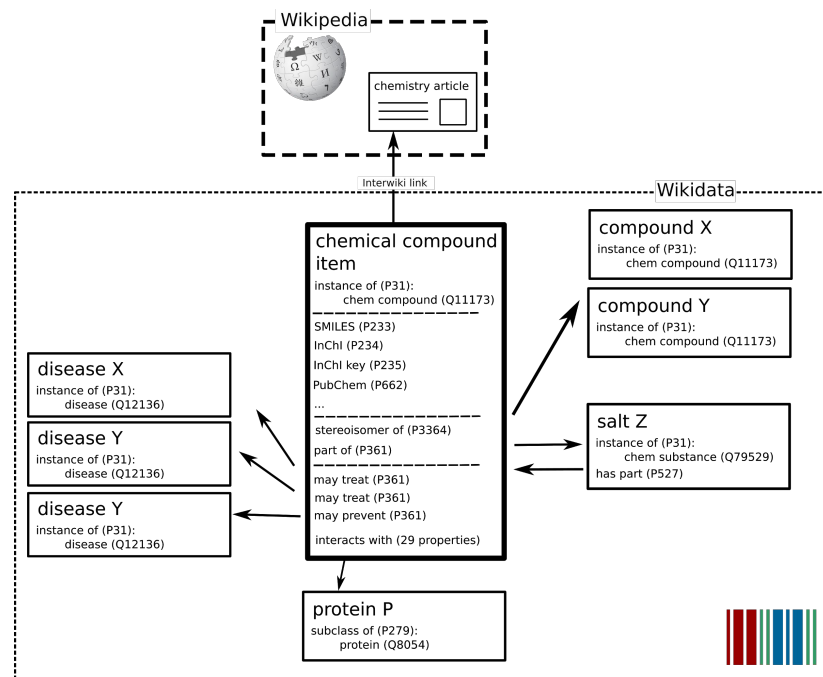


```
Data (Turtle)
<samples9298996>
  rdf:type bf:Text ;
  rdf:type bf:Work ;
  bf:title "Oliver Twist." ;
  bf:class <id.loc.gov/.../PZ3> ;
  bf:creator [
    rdf:type bf:Person ;
    bf:label "Dickens, Charles, 1812-1870." ;
  ] .

<id.loc.gov/.../PZ3>
  rdf:type bf:LCC ;
  bf:label "PZ3.D55O165PR4567" .
```

Seeding with data

- Model structure of items (genes, drugs, diseases, .. etc) & relationships between items
- Import data from many sources and ontologies
- Linked to many identifiers from external databases
- Architecture for maintaining data from external sources



[Code](#)
[Issues 4](#)
[Pull requests 1](#)
[Projects 0](#)
[Pulse](#)
[Graphs](#)

A Wikidata Python module integrating the MediaWiki API and the Wikidata SPARQL endpoint

397 commits

2 branches

1 release

7 contributors

MIT

Branch: **master** ▾

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sebotic fixed an omission where new items don't get created when domain not s... [...](#)

Latest commit 2f5d2fd 22 hours ago

doc Wikidata to Wikipedia mapping prototype for diseases added.

2 years ago

wikidataintegrator fixed an omission where new items don't get created when domain not s...

22 hours ago

Jenkins

Jenkins > Running >

New Item

People

Build History

Edit View

Delete View

Manage Jenkins

My Views

Credentials

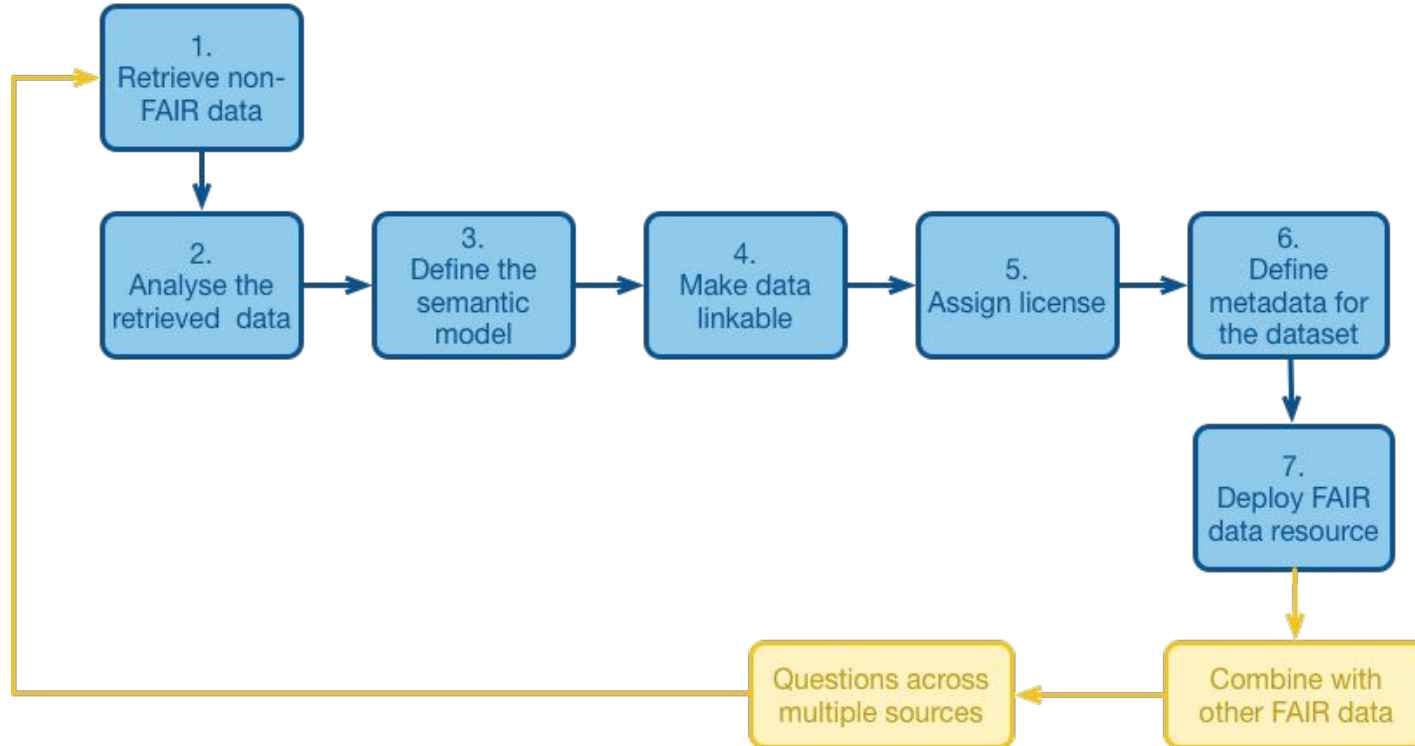
Build Queue

Running Bots

All **Running** +

S	Name	Last Success ↑	Last Failure
	ProteinBot_homo_sapiens	1 day 21 hr - #12	N/A
	GOBot_bigmem	2 days 15 hr - #15	9 days 15 hr - #14
	GeneBot_Homo_sapiens	2 days 19 hr - #25	2 days 20 hr - #24
	Disease_Ontology	2 days 23 hr - #11	4 days 13 hr - #8
	GeneDiseaseBot	2 days 23 hr - #9	1 mo 6 days - #2

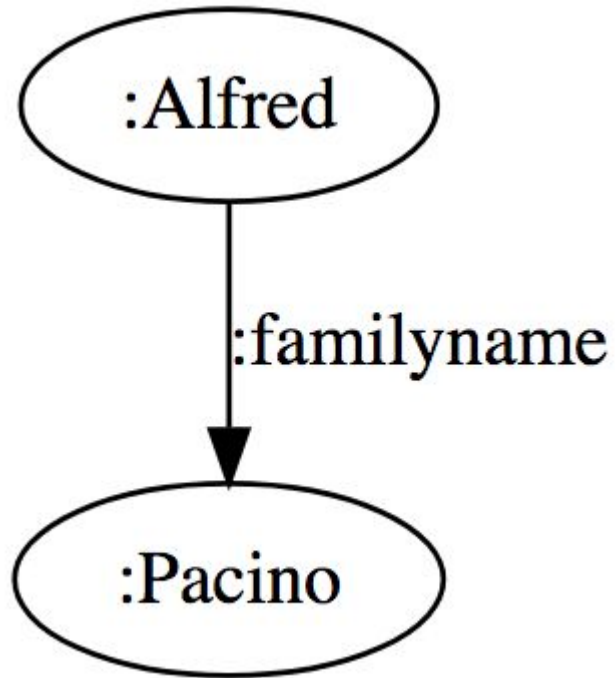
FAIRification process



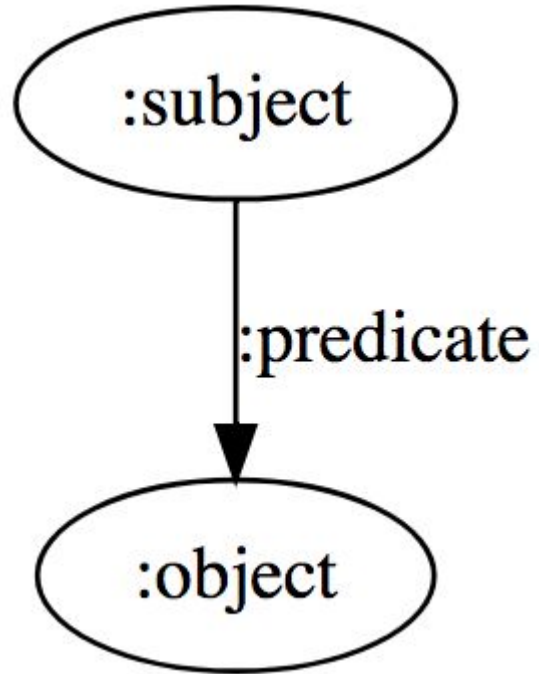
Source: <https://www.go-fair.org/fair-principles/fairification-process/>



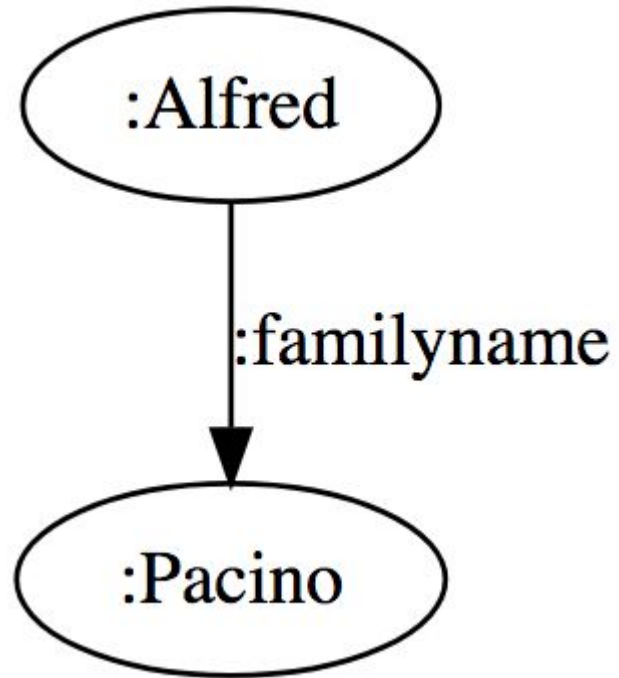
Linked data



Linked data



Linked data

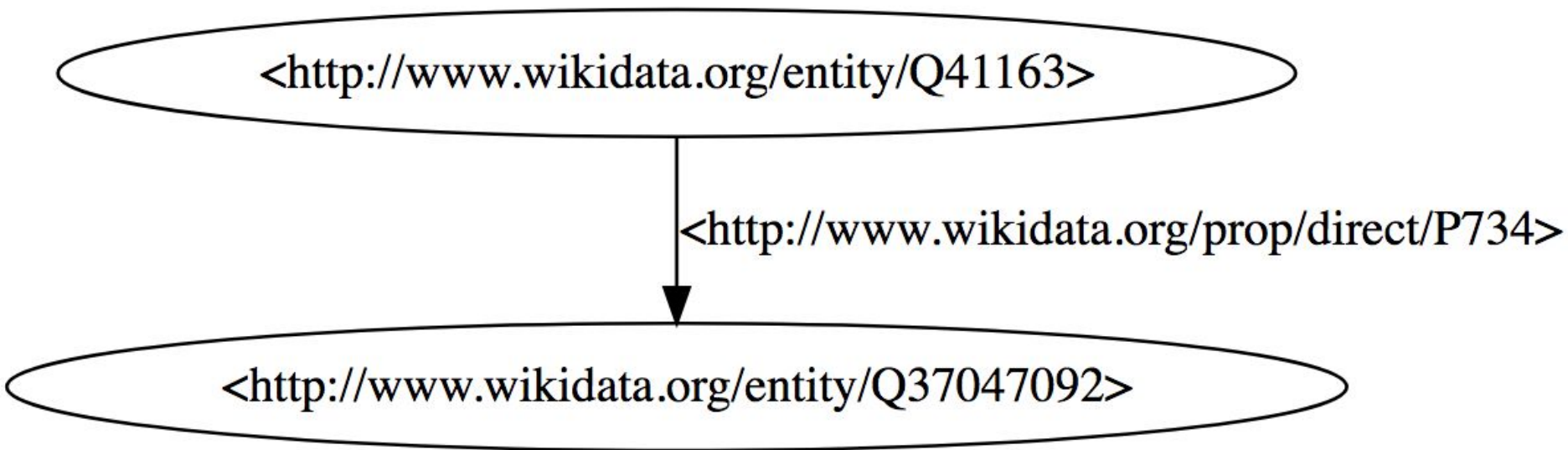


Linked Data

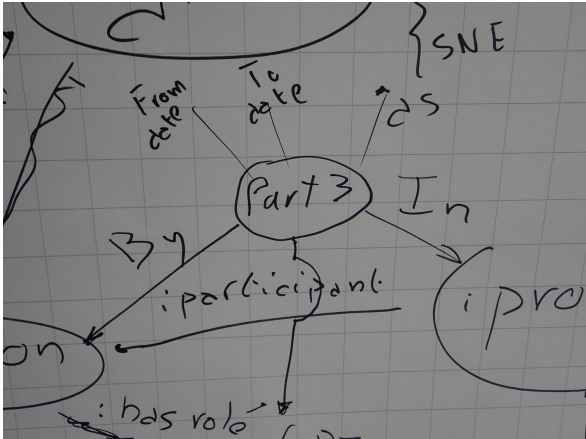
<http://www.wikidata.org/entity/Q41163>

<http://www.wikidata.org/prop/direct/P734>

<http://www.wikidata.org/entity/Q37047092>



Modelling



Linked Open Vocabularies

Link: <https://lov.linkeddata.es/dataset/lov/>

EBI Ontology Lookup Service

Link: <https://www.ebi.ac.uk/ols/index>

Let's make FAIR data. Introducing iNaturalist



Who you are

You'll need to make an **iNaturalist account** and please only post your own personal observations



What you saw

Choose a group of organisms like **butterflies** or better yet a specific organism like the **Monarch butterfly**. If you provide evidence you can leave this blank and the **community can help**



Where you saw it

Record both the coordinates of the encounter as well as their accuracy. You can obscure the location from the public



When you saw it

Record the date of your encounter, not the date you post it to iNaturalist



Evidence of what you saw

By including evidence like a **photo or sound**, the community can help add, improve, or confirm the identification of the organism you encountered. Help the community by taking clear well framed photos, by including multiple photos from different angles



How to FAIRify iNaturalist data.

