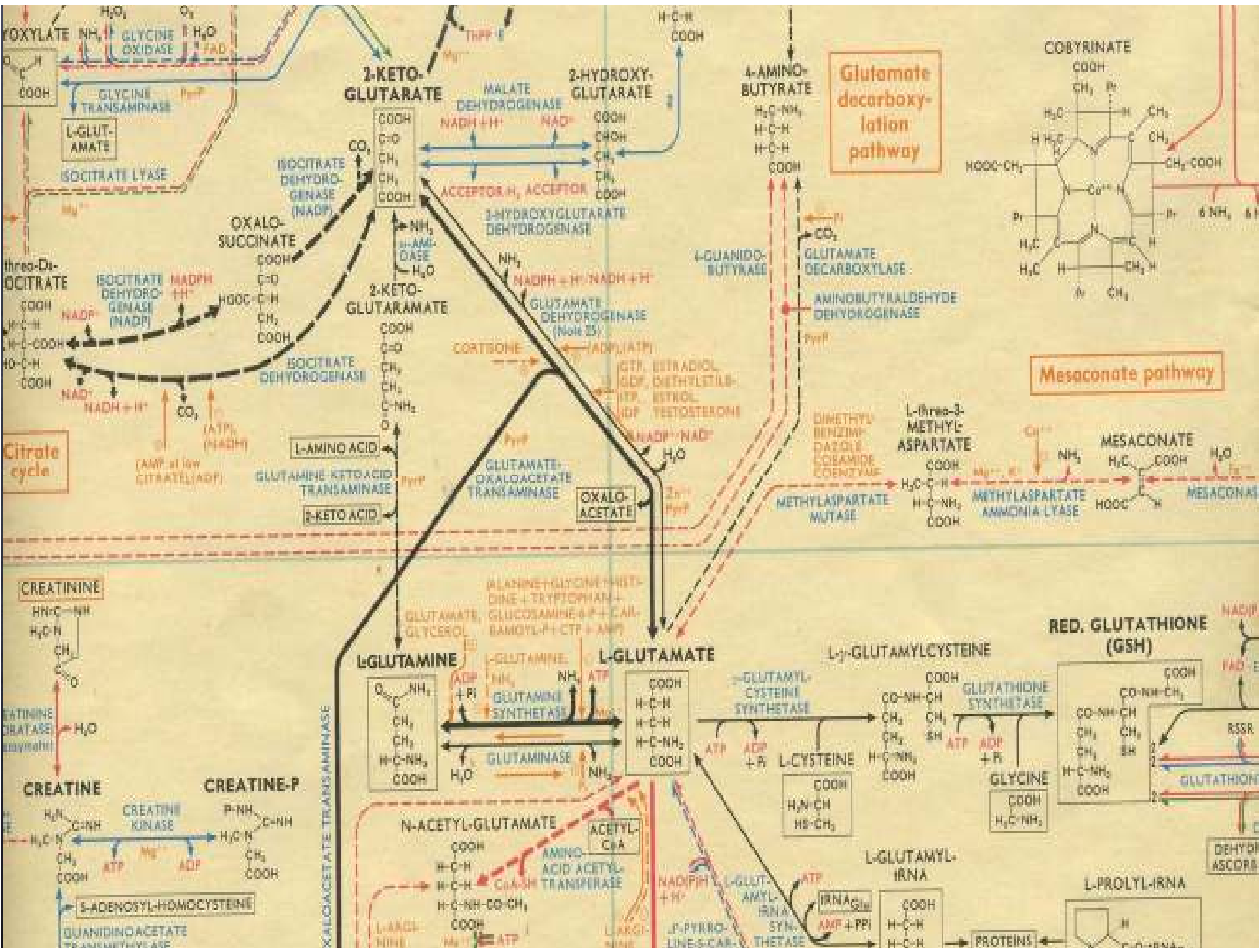


First steps towards WikiPathways RDF

Andra Waagmeester



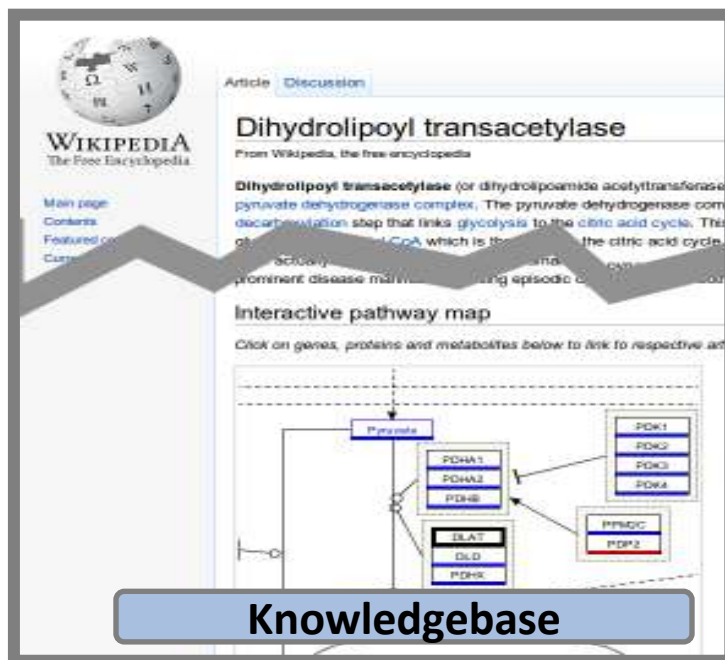


“A pathway is a set of interactions, or functional relationships, between the physical and/or genetic components of the cell which operate in concert to carry out a biological process.”

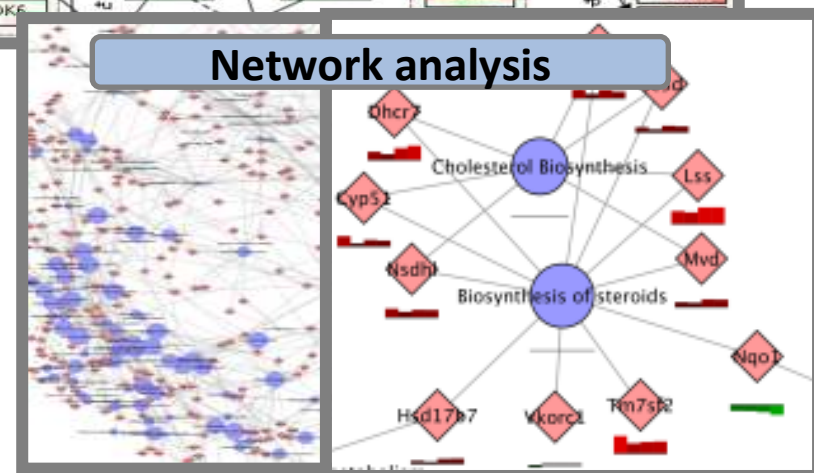
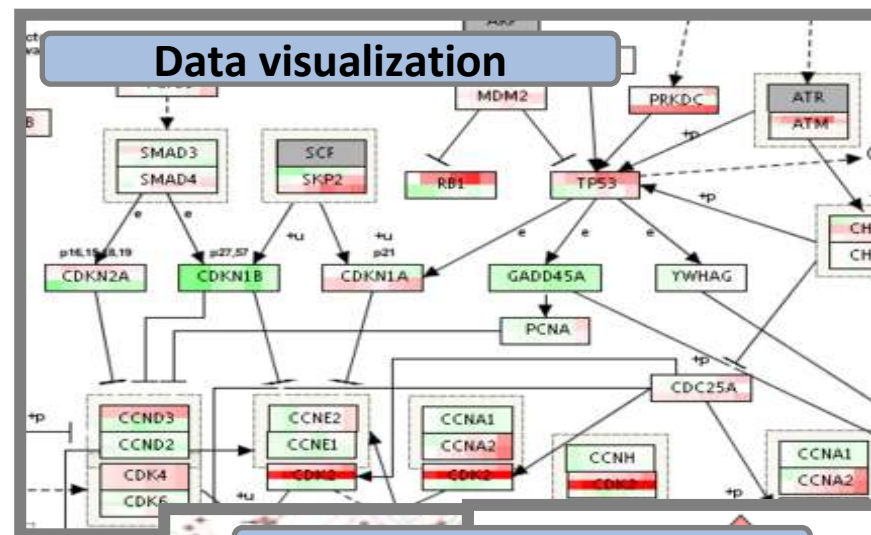
Cary et al. Pathway information for systems biology. FEBS Lett (2005) vol. 579 (8) pp. 1815-20



How pathway information is used



Knowledgebase



Pathway	positive...	measur...	total	%
TCA Cycle	14	28	29	50.00%
TGF Beta Signaling Pathway	19	43	52	44.19%
Cholesterol Biosynthesis	7	12	15	58.33%
Prostaglandin Synthesis and Regulation	12	28	31	42.86%
TGF-beta Receptor Signaling Pathway	41	135	149	30.37%
Adipogenesis	35	113	132	30.97%
Androgen Receptor Signaling Pathway	28	90	108	31.11%
Fatty Acid Biosynthesis				
Fatty Acid Beta Oxidation				
mRNA processing				

Enrichment analysis

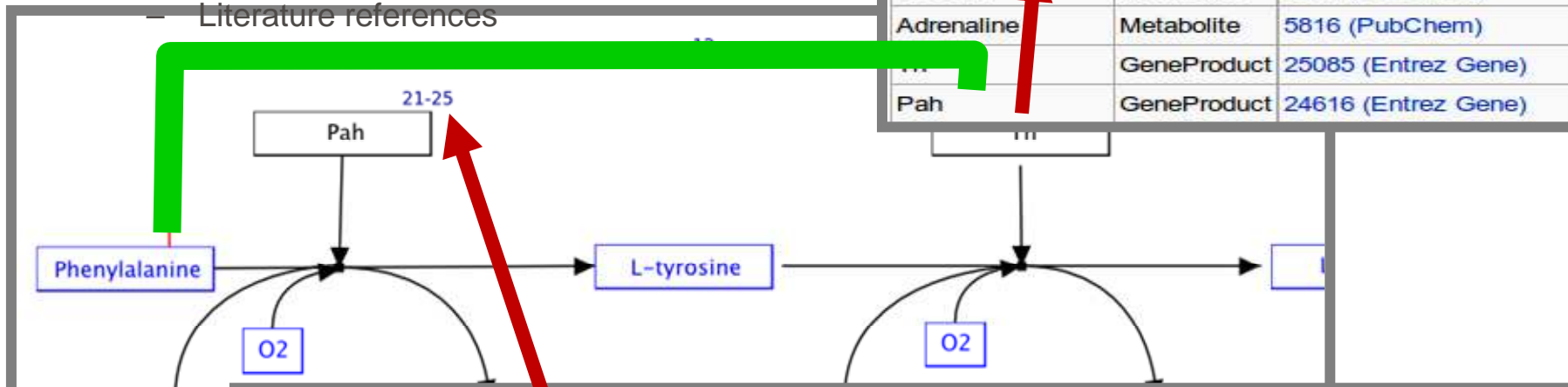


Challenges of curating pathways

- ✦ Not just an image
 - Relations
 - Annotations
 - Literature references

DataNodes
[View all 21 DataNodes](#)

Name	Type	Database reference
Dehydroascorbate	Metabolite	10280 (PubChem)
L-DOPA	Metabolite	6047 (PubChem)
Adrenaline	Metabolite	5816 (PubChem)
...	GeneProduct	25085 (Entrez Gene)
Pah	GeneProduct	24616 (Entrez Gene)



Bibliography


1. Hazra A, Wu K, Kraft P, Fuchs CS, Giovannucci EL, and Hunter DJ. *Twenty-four non-metabolic pathway and risk of colorectal adenoma in the Nurses' Health Study*. *Cancer Epidemiology and Prevention Control*. doi:10.1093/carcin/bgm062 pmid:17389618. [PubMed](#) [HubMed](#) [dd0]



Wiki for biological pathways
Free and open pathway
resource
Share, curate and discuss!

Latest edits

Today

 [Cardiovascular Signaling \(Rattus norvegicus\)](#) by Thomas Kelder

12 March 2009

 [TNF-alpha/NF-kB Signaling Pathway \(Homo sapiens\)](#) by Alexander Pico

11 March 2009

 [Endochondral Ossification \(Homo sapiens\)](#) by Alla

Latest discussions

Today

 [Reverted to previous version \(1\)](#) by Thomas Kelder

12 March 2009

 [Connecting Edges \(1\)](#) by Alexander Pico

Statistics

- There are **1351** pathways
- Number of **pathways** (and unique genes) per species:

Anopheles gambiae:	24 (391)
Arabidopsis thaliana:	8 (82)
Bos taurus:	119 (3202)
Bacillus subtilis:	2 (14)
Caenorhabditis elegans:	39 (838)
Canis familiaris:	117 (3064)
Danio rerio:	105 (2726)
Drosophila melanogaster:	34 (587)
Equus caballus:	12 (214)
Gallus gallus:	102 (2410)
Homo sapiens:	198 (4339)
Mus musculus:	165 (4581)
Mycobacterium tuberculosis:	10 (104)
Oryza sativa:	4 (15)
Pan troglodytes:	120 (3060)
Rattus norvegicus:	152 (3836)
Saccharomyces cerevisiae:	129 (991)
Sus scrofa:	10 (106)
Zea mays:	1 (19)

- There are **1,250** registered users

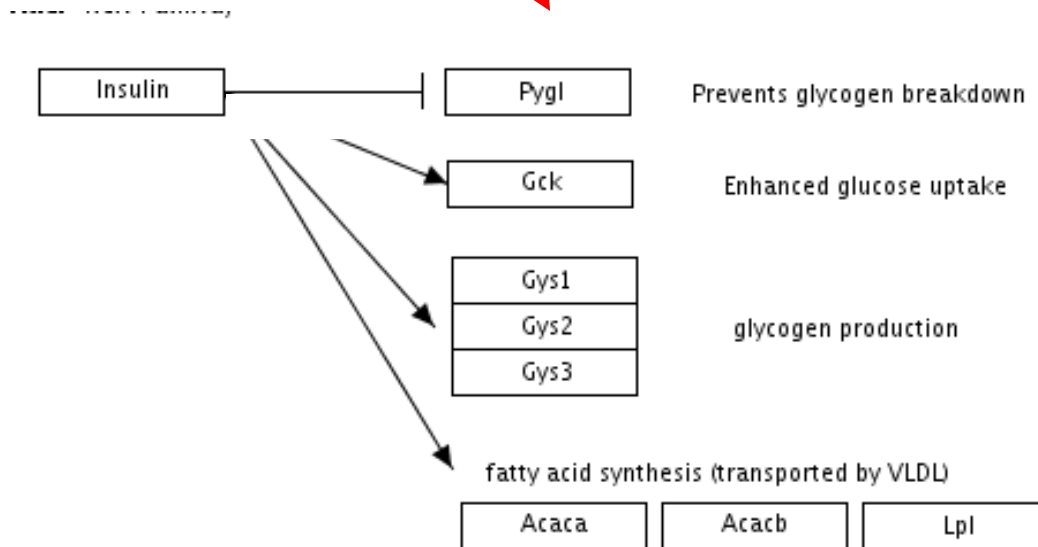


Organize knowledge

Open Pharmacological Space



Insulin inactivates liver phosphorylase, the principal enzyme that causes liver glycogen to split into glucose. This prevents breakdown of the glycogen that has been stored in the liver.





BETA

WIKIPATHWAYS
Pathways for the People

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- Contact us
- GenMAPP Portal
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- titles only

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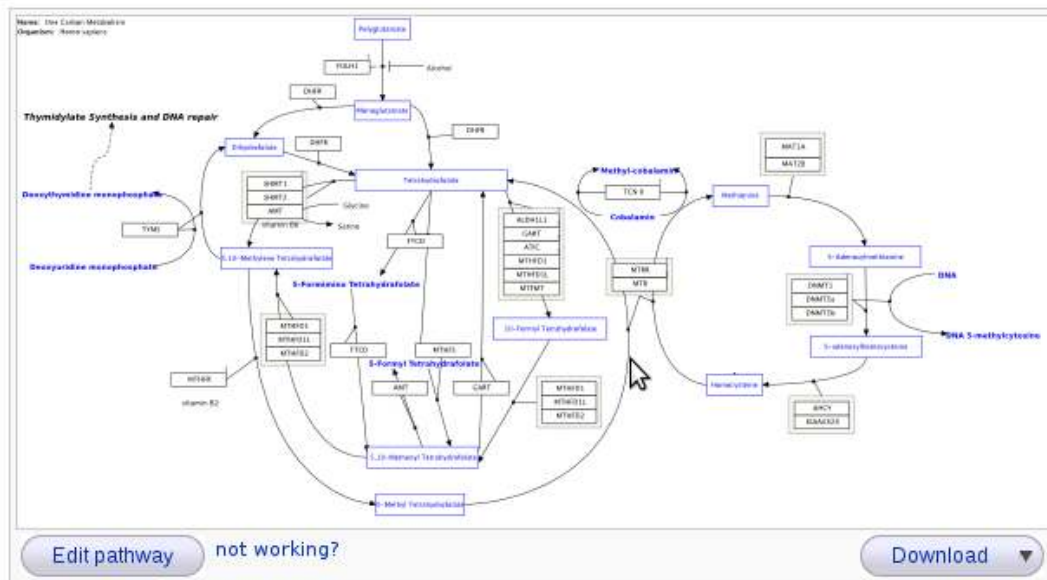
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- Related changes
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- Printable version

Thomas my talk my preferences my watchlist my contributions log out

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One Carbon Metabolism (Homo sapiens)

Michiel Adriaens, Frank, Thomas Kelder, Txr24, et al.



Contents [hide]

- 1 Curation Tags
- 2 Description
- 3 Bibliography
- 4 Categories
- 5 History
- 6 Pathway Info
 - 6.1 DataNodes

Description

This one-carbon metabolism pathway is centered around folate. Folate has two key carbon-carbon double bonds. Saturating one of them yields dihydrofolate (DHF) and adding an additional molecule of hydrogen across the second yields tetrahydrofolate (THF). The folate pathway is central to any study related to DNA methylation, dTMP synthesis or purine synthesis. Differential methylation (e.g. hypermethylation of tumor suppressors) as well as disturbances in nucleotide synthesis and repair, are associated with several forms of cancer. There are also indications that hypermethylation is involved in the progression of adenomas to cancer.

[edit](#)

Bibliography

1. Hazra A, Wu K, Kraft P, Fuchs CS, Giovannucci EL, Hunter DJ; *Twenty-four non-synonymous polymorphisms in the one-carbon metabolic pathway and risk of colorectal adenoma in the Nurses' Health Study.*; *Carcinogenesis*, 2007 - [PubMed](#)

Nature Precedings : doi:10.1038/npre.2011.6300.1 : Posted 30 Aug 2011



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One Carbon Metabolism (Homo sapiens)

WARNING: This page is 42 kilobytes long; some browsers may have problems editing pages approaching or longer than 32kb. Please consider breaking the page into smaller sections.



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Summary:

This is a minor edit Watch this page

[Editing help](#) (opens in new window)

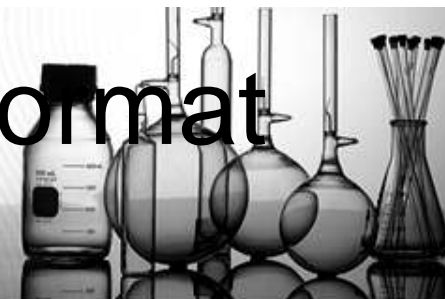
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- [Template:CheckAvailable](#) (protected)
- [Template:Help:LiteratureReferences](#) (protected)
- [Template:PathwayPage:Bottom](#) (protected)

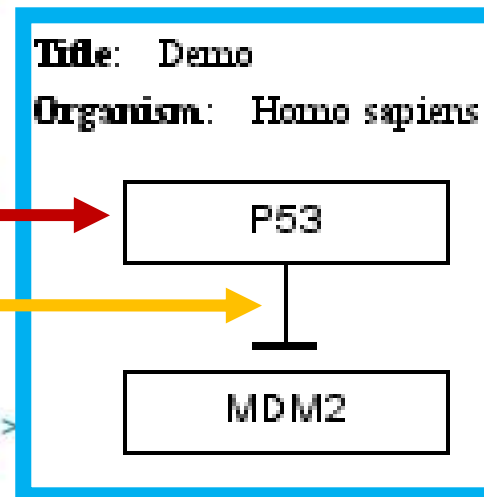


Working with the GPML format

Open Pharmacological Space



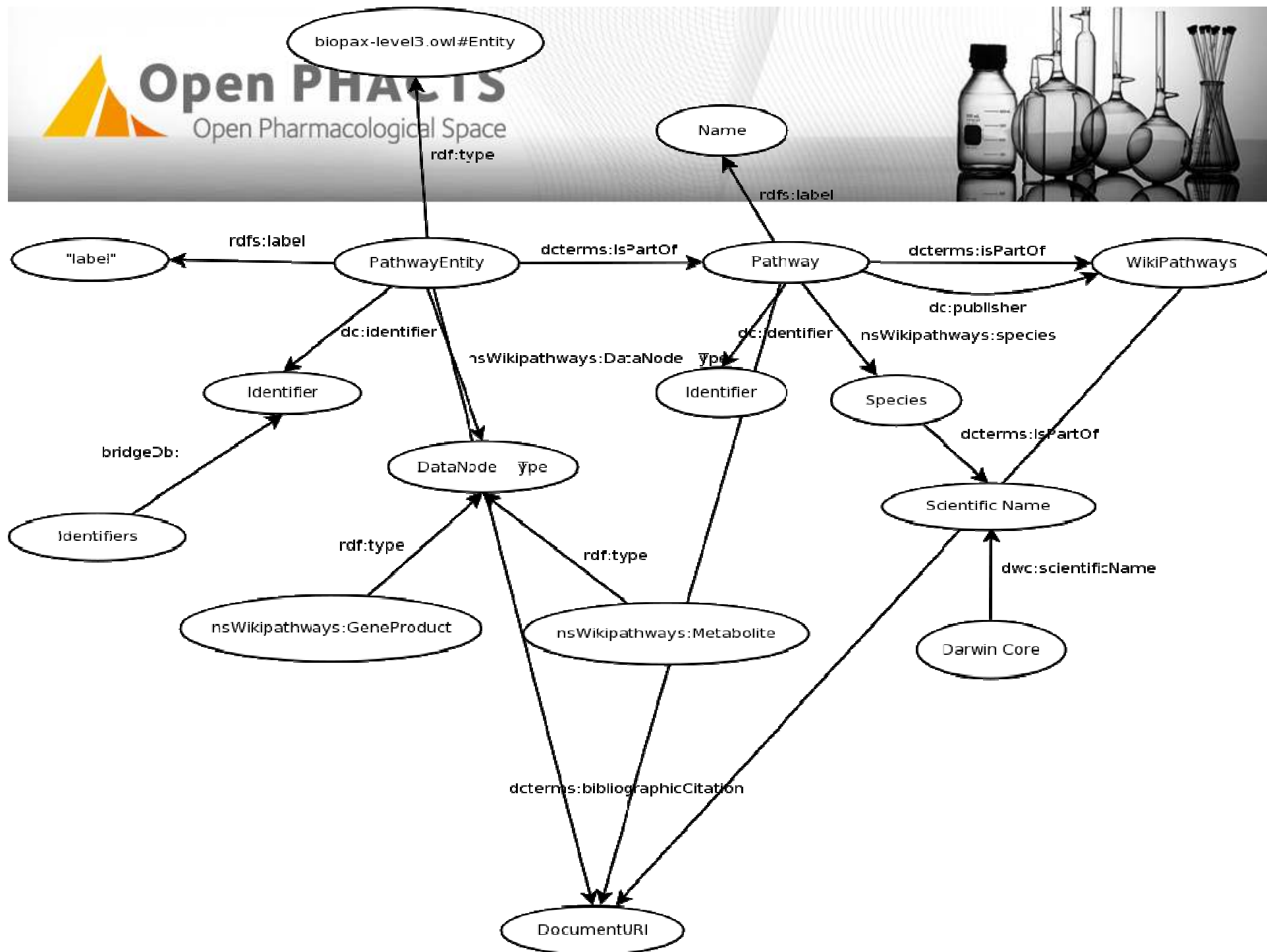
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Open PHACTS

Open Pharmacological Space





- ❖ Wikipathways
 - Is being described or cited in different pubmed articles
 - Contains open source data
- ❖ Pathway
 - Is part of WikiPathways
 - Has an identifier
 - Has a name
 - Describes a process in specific organism
 - Is being described or cited in different pubmed articles
- ❖ Pathway Entity
 - Is part of a pathway
 - Has an identifier
 - Has a name
 - Has a data type (gene, protein, chemical compound, etc)
 - Is being described or cited in different pubmed articles



- ✦ Wikipathways
 - Is being described or cited in different pubmed articles
 - Contains open source data

<<http://www.wikipathways.org>> <<http://purl.org/dc/terms/bibliographicCitation>>
<<http://www.ncbi.nlm.nih.gov/pubmed/18651794>> .

<<http://www.wikipathways.org>> <tbd> <tbd>



- ✦ Pathway
 - Is part of WikiPathways
 - Has an identifier
 - Has a name
 - Describes a process in specific organism
 - Is being described or cited in different pubmed articles

<<http://www.wikipathways.org/#/WP44>> <<http://purl.org/dc/terms/isPartOf>>
"http://www.wikipathways.org" .

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"WP44" .

<<http://www.wikipathways.org/#/WP44>> <<http://rs.tdwg.org/dwc/terms/scientificName>>
"Rattus norvegicus" .

<<http://www.wikipathways.org/#/WP44>> <<http://www.w3.org/2000/01/rdf-schema#label>>
"IL-5 Signaling Pathway" .

<<http://www.wikipathways.org/#/WP44>> <<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>> <<http://www.biopax.org/release/biopax-level3.owl#Pathway>> .

<<http://www.wikipathways.org/#/WP44>> <<http://www.wikipathways.org/#species>> "Rattus norvegicus" .



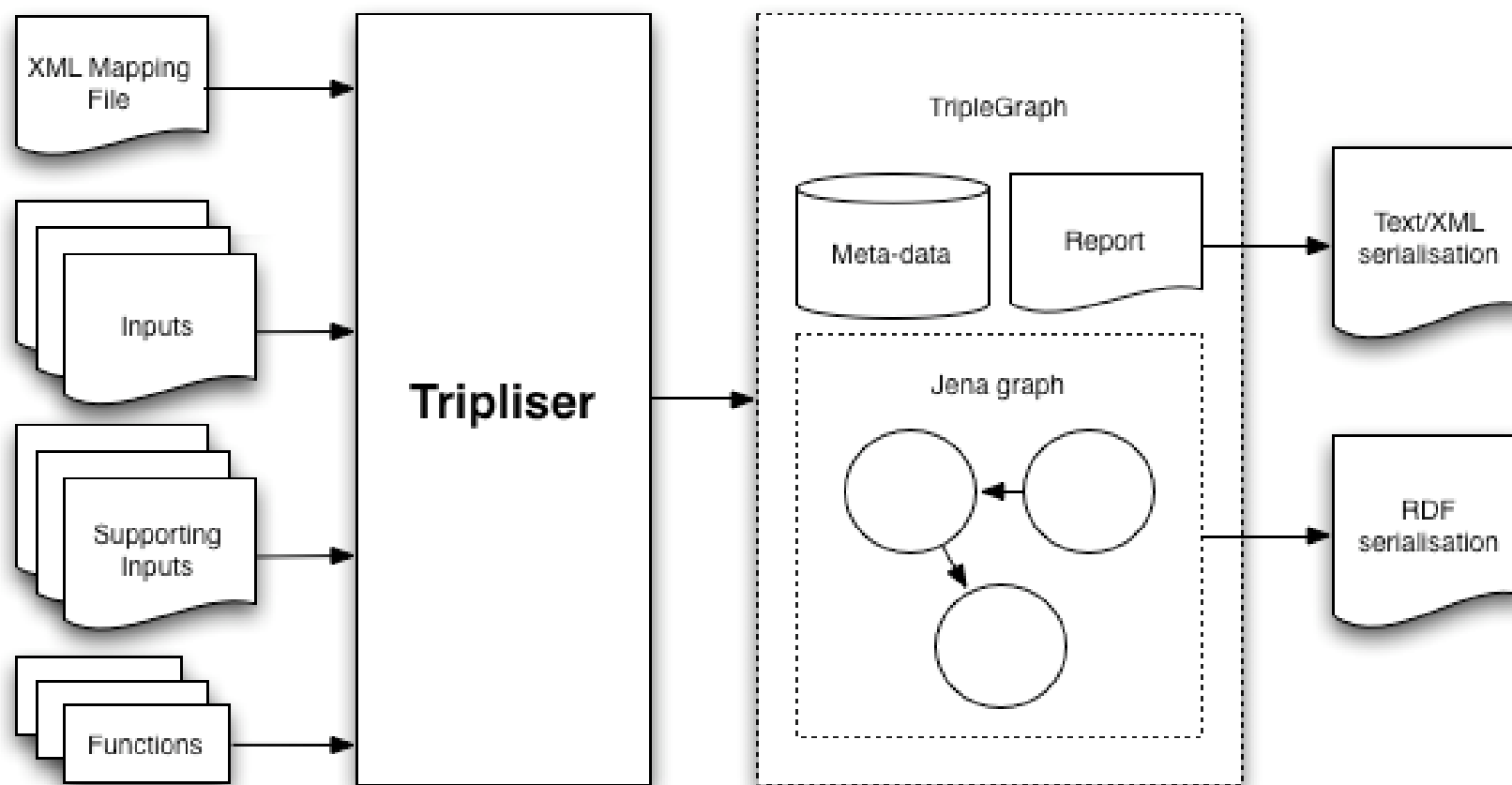
- ❖ Pathway Entity
 - Is part of a pathway
 - Has an identifier
 - Has a name
 - Has a data type (gene, protein, chemical compound, etc)
 - Is being described or cited in different pubmed articles

- ❖ RDF
 - `<http://www.wikipathways.org/#/WP44/Datanode/ef4>` `<http://purl.org/dc/terms/isPartOf>`
`<http://www.wikipathways.org/pathway/WP44>`
 - `<http://www.wikipathways.org/#/WP44/Datanode/cac>`
`<http://purl.org/dc/elements/1.1/identifier>` "81736" .
 - `<http://www.wikipathways.org/#/WP44/Line/c75d8>` `<http://www.w3.org/2000/01/rdf-schema#domain>` `<http://www.biopax.org/release/biopax-level3.owl#Interaction>` ..
 - `<http://www.wikipathways.org/#/WP44/Datanode/ef4>`
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 - `<http://www.wikipathways.org/#/WP1763/Line/g199>`
`<http://purl.org/dc/terms/bibliographicCitation>` `<http://www.ncbi.nlm.nih.gov/pubmed/19528230 >` .



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Open Pharmacological Space

Tripliser





Without owl file

```
String nsWikipathways =  
    "http://www.wikipathways.org/#";  
String nsGenmapp = "http://www.genmapp.org/#";  
String nsDwc = "http://rs.tdwg.org/dwc/terms/";
```

With owl file

```
java -classpath $CLASSPATH  
    jena.schemagen -i  
    http://www.biopax.org/release/biopax-  
level3.owl -o /tmp
```

Jena schemagen: namespaces



```

if (pwElm.getDataNodeType() == "Metabolite"){
    pathwayEntity.addProperty(RDF.type, Biopax_level3.);
}
if (pwElm.getDataNodeType().equals("Pathway")){
    System.out.println(pwElm.getDataNodeType());

    Resource interactingPathwayResource = model.create
interactingPathwayResource.addProperty(RDFS.domain
interactingPathwayResource.addProperty(RDFS.range,
interactingPathwayResource.addProperty(RDFS.range,
}

(pwElm.getObjectType().equals(ObjectType.LINE)){
    Resource pathwayLine = model
.createResource(nsWikipathways + "/" + wpIdentifier + "/Li
+ nwElm.getGraphId());

```

