

Contribute to BRENDA! Your enzyme data is important for BRENDA. Send us your paper, and we will do all the work to include your data into our database. [More...](#)

Please enter a search term

Enzyme, Ligand

contains

add search field

delete search field

start search

Text-based queries

- Full-text Search
- Advanced Search
- Enzyme & Disease

Structure-based queries

- Ligand Structure Search
- Metabolic Pathways
- Enzyme Structures

Explorer

- Enzyme Classification
- TaxTree
- Protein folding: CATH / SCOPe
- Ontologies

Visualization

- Word Maps
- Genomes
- Functional Parameter Statistics
- Metabolic Pathways

Prediction


- Membrane Helices
- Localization Prediction
- EnzymeDetector

Supporting & External

- BRENDA Tissue Ontology
- Biochemical Reactions
- MetaboMAPS

News

NEW Release online! - February 1, 2021  
Release 2021.1 online including 76 new and 623 updated enzyme classes.


for Release 2021.1

evaluate BRENDA!

Information

# BRENDA Tutorial

## BRENDA pathway maps

member of  
de NBI

elixir  
Core Data Resource

Release 2021.1 (January 2021)  
BRENDA professional

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Supporting & External

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- Biochemical Reactions
- MetabMaps

## BRENDA pathway maps

- overview on metabolic pathways and biochemical processes
- interactive and intuitive networks on metabolome levels with diverse functionalities
- visualization of enzyme and ligand information
- Mapping of individual experimental data

evaluate BRENDA!

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Please enter a search term

Enzyme, Ligand contains

[start search](#)

**Text-based search**

- Full-text Search
- Advanced Search
- Enzyme & PDB ID
- pH Optimum
- pH Range
- pH Stability
- pI Value
- Posttranslational Modification
- Product
- Purification (Commentary)
- Reaction
- Reaction Type
- Recommended Name
- Reference
- Renatured (Commentary)
- Specific Activity [micromol/min/mg]
- Storage Stability
- Substrate

**Visualization**

- Word Map
- Genomes
- Functional Statistics
- Metabolic

**News**


**NEW Release 2021**

**Explorer**

- Enzyme Classification
- TaxTree
- Protein folding: CATH / SCOPe
- Ontologies

**Supporting & External**

- BRENDA Tissue Ontology
- Biochemical Reactions
- MetaboMAPS

 for Release 2021.1

Enzyme classes.

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**UPDATE!**  
Release 2021.1 (January 2021)  
BRENDA professional

You can either search the BRENDA maps via ,Quick Search'....

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Please enter a search term

Enzyme, Ligand contains

[add search field](#) [delete search field](#) [start search](#)

[Text-based queries](#)

- Full-text Search
- Advanced Search
- Enzyme & Disease

[Structure-based queries](#)

- Ligand Structure Search
- Metabolic Pathways**
- Enzyme Structures

[Explorer](#)

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[Visualization](#)

- Word Maps
- Genomes
- Functional Parameter Statistics
- Metabolic Pathways**

[Prediction](#)


- Membrane Helices
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- EnzymeDetector

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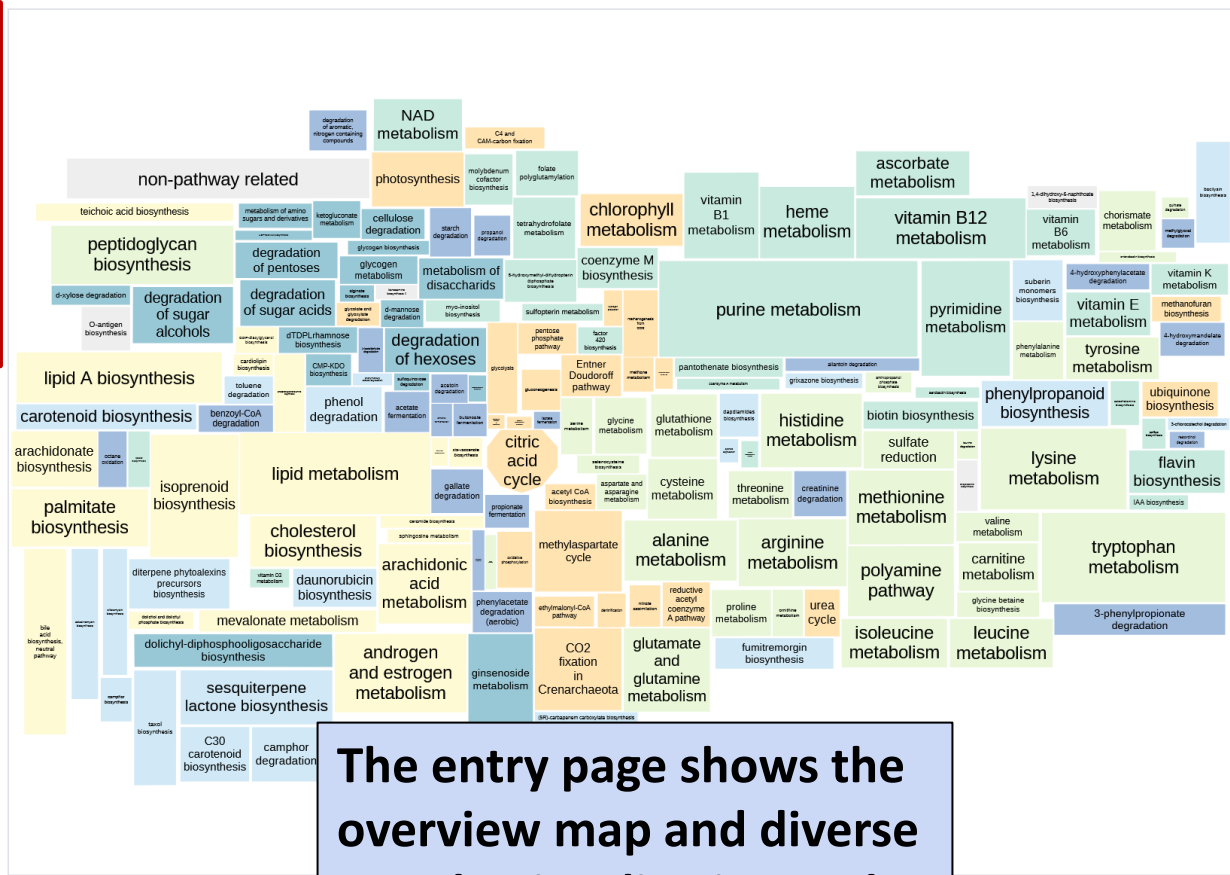
...or directly by clicking on  
,Metabolic Pathways‘.

> Search & Highlight

> Plot Your Dataset

> Download map as svg

Help Center view



Pathway Categories

Central and energy metabolism

Lipid metabolism

Amino acid metabolism

Nucleotide and cofactor metabolism

Carbohydrate metabolism

Fermentation and other catabolism

Xenobiotics and secondary metabolism

Other pathways


Show interpathway links


Show or hide cofactors on the map:


Toggle on zoom


The entry page shows the overview map and diverse search, visualization and download options.

▼ Search & Highlight

Search Pathway 


Search pathway 

Search Metabolite or Enzyme name 

Search node 

☐ exact search

Search Organism or Taxon

Search organism or taxon 

☒ in manually verified data

☐ in textmining data

☐ in Swiss-Prot

☐ in TrEMBL

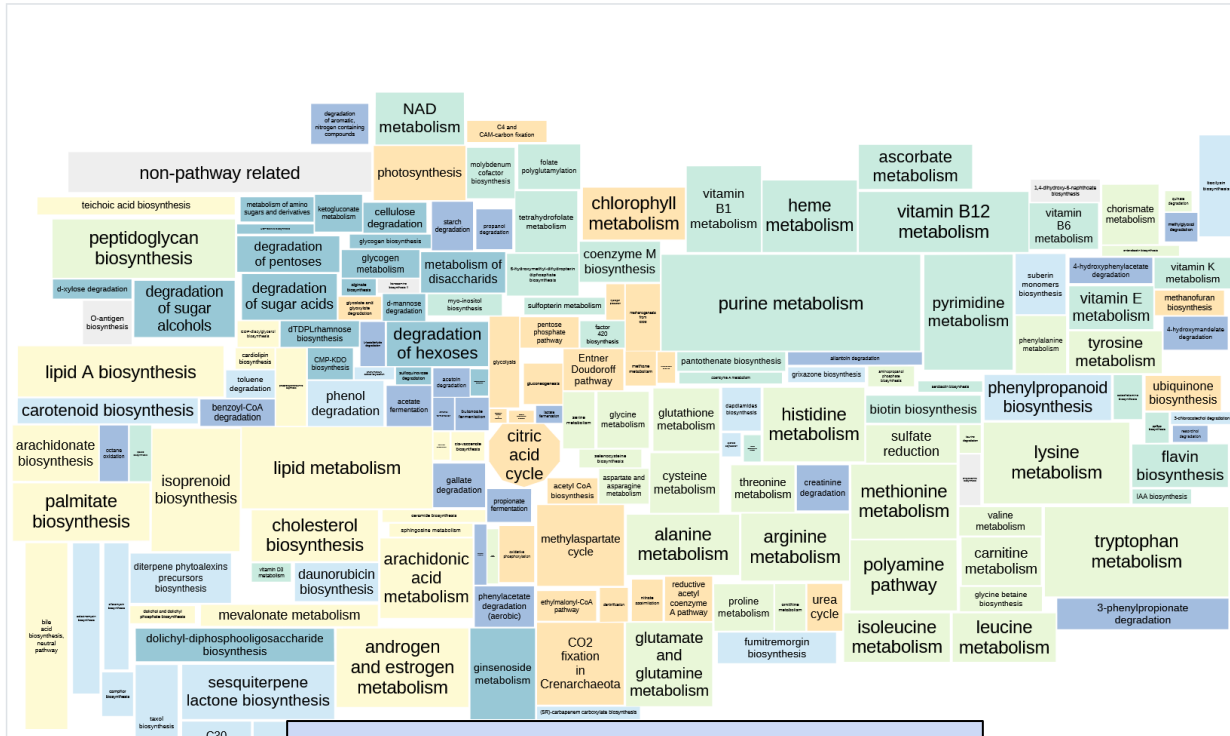
☐ visualize taxonomic information


Hide pathway categories

> Plot Your dataset

> Download map as svg

Help Center view



Pathway Categories 

Central and energy metabolism

Lipid metabolism

Amino acid metabolism

Nucleotide and cofactor metabolism

Carbohydrate metabolism


Fermentation and other catabolism

Xenobiotics and secondary metabolism

Other pathways

Show interpathway links


Show or hide cofactors on the map:

Toggle on zoom 

The overview map displays all pathways organized in 8 groups, depending on their metabolic roles.



## Search & Highlight

Search Pathway 

ca

cardiolipin biosynthesis  
carnitine metabolism  
carotenoid biosynthesis  
catecholamine biosynthesis

Search organism or taxon

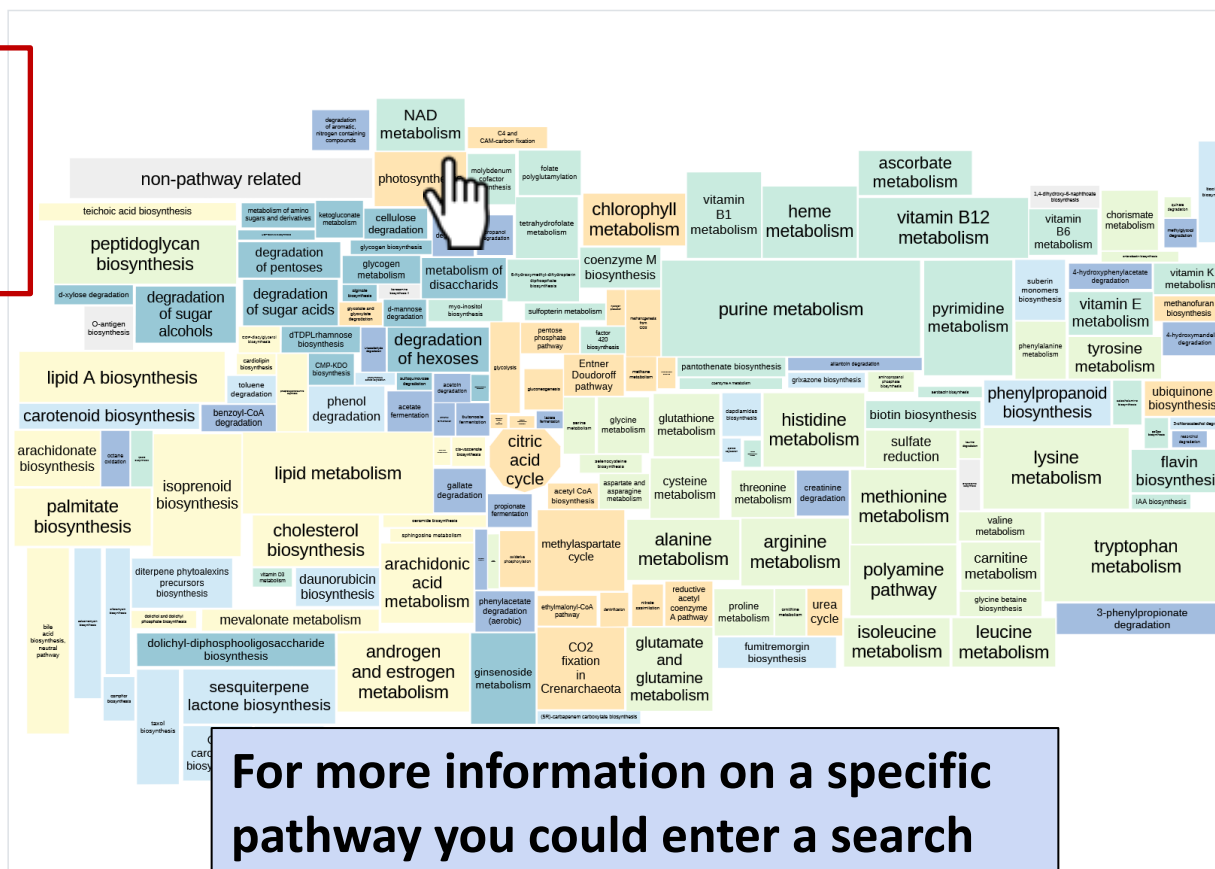
☒ in verified data  
☐ in testing data  
☐ in Swiss-Prot  
☐ in TrEMBL  
☐ visualize taxonomic information

Hide pathway categories

Plot Your Dataset

Download map as svg

Help Center view



## Pathway Categories

- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom





Search & Highlight

Search Pathway

Search Metabolite or Enzyme name

CoA

CoA

CoA disulfide reductase (1.8.1.14)

CoA transferase (2.8.3.5)

CoA-acylating aldehyde dehydrogenase (1.2.1.10)

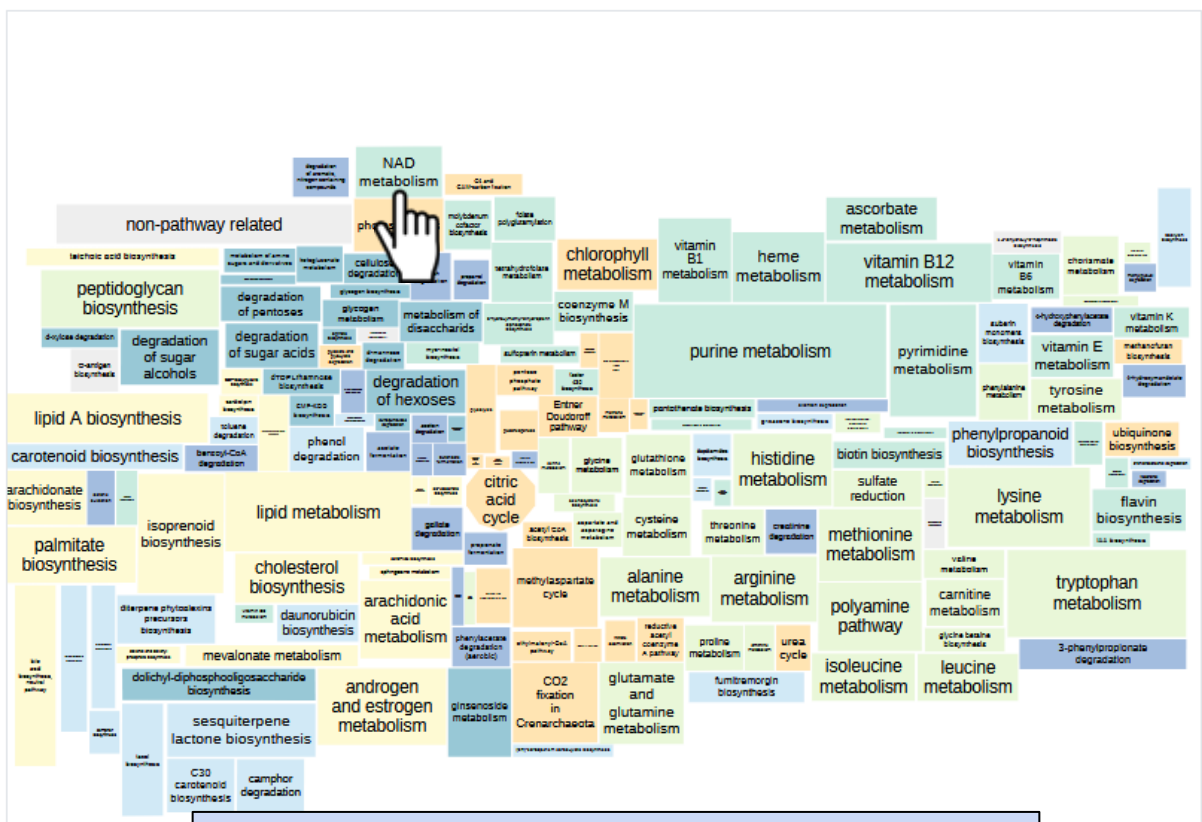
CoA-acylating aldehyde

Hide pathway categories

- Plot Your Dataset
- Download map as svg

Help

Center view



Pathway Categories


- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways


Show interpathway links


Show or hide cofactors on the map:

If you want to perform a „contains“ search in all metabolites or enzymes throughout all pathways, enter the name or a part of a name and use the ENTER key to start the search...

▼ Search & Highlight

Search Pathway 


Search pathway 

Search Metabolite or Enzyme name 

CoA 

☐ exact search

Search Organism or Taxon

Search organism or tax 

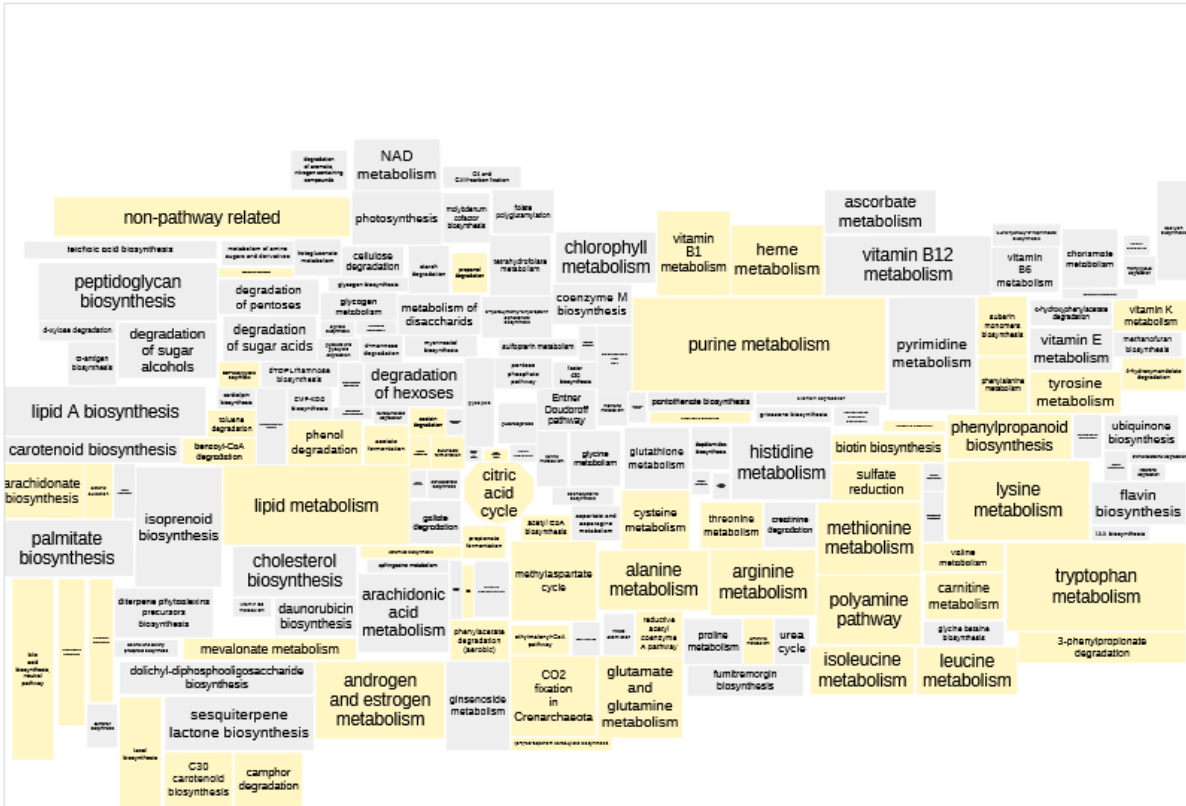
- ☒ in manually verified data
- ☐ in textmining data
- ☐ in Swiss-Prot
- ☐ in TrEMBL

Show pathway categories

► Plot Your Dataset

► Download map as svg


Help Center view



Reset map

Show interpathway links

Show or hide cofactors on the map:

Always show 

...and all pathways containing the metabolites or enzymes of interest are highlighted.

Search & Highlight

Search Pathway

Search pathway

Search Metabolite or Enzyme name

Search node

☐ exact search

Search Organism or Taxon

Nicoti

Nicotiana

Nicotiana acuminata

Nicotiana acuminata (Graham) Hook. (Nicotiana acuminata)

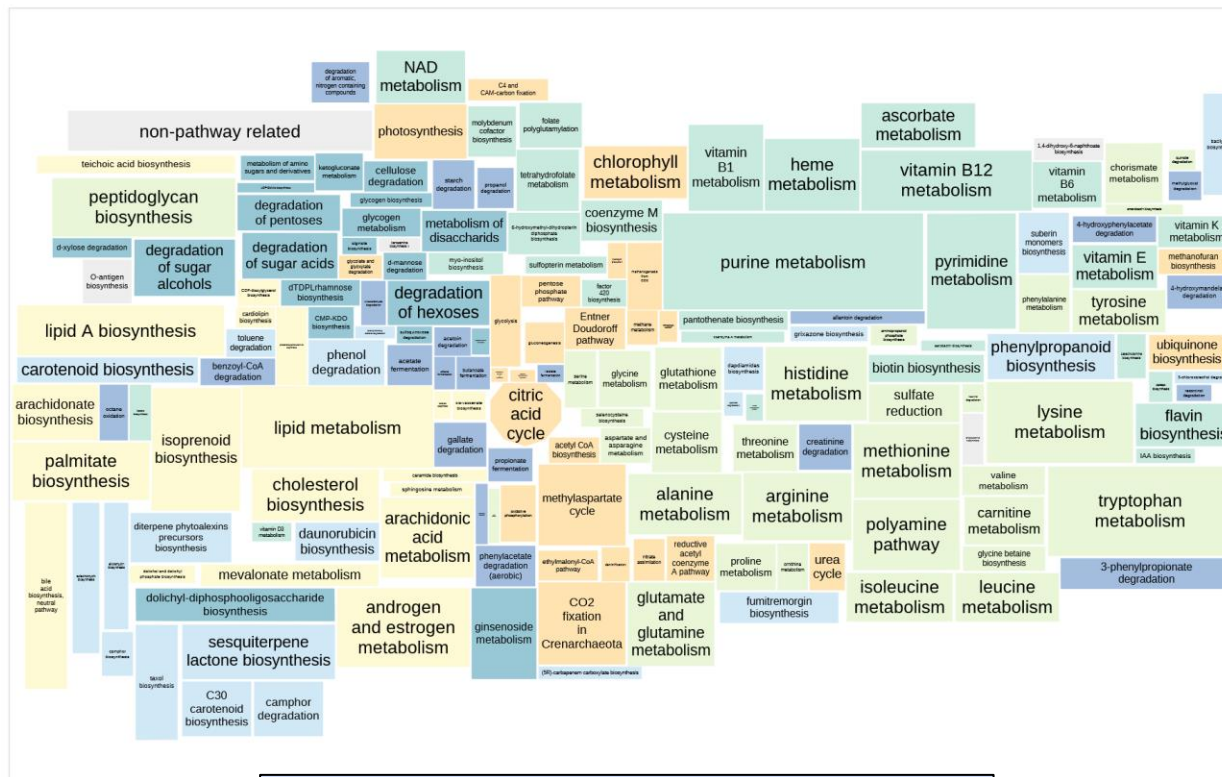
Nicotiana africana

Nicotiana africana Merxm. (Nicotiana africana)

Download map as svg

Help

Center view



Pathway Categories

Central and energy metabolism

Lipid metabolism

Amino acid metabolism

Nucleotide and cofactor metabolism

Carbohydrate metabolism

Fermentation and other catabolism

Xenobiotics and secondary metabolism

Other pathways

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom

If you search for an organism, the live search suggests a number of possible entries...



▼ Search & Highlight

Search Pathway

Search Metabolite or Enzyme name

☐ exact search

Search Organism or Taxon

☒ Nicotiana tabacum

☒ in manually verified data
☐ in textmining data
☐ in Swiss-Prot
☐ in TrEMBL
☐ visualize taxonomic information

Show pathway categories

> Plot Your Dataset

> Download map as svg

Help

Center view



Nicotiana tabacum

Reset map

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom

...all manually verified pathways  
for the organism are highlighted...

### Search & Highlight

Search Pathway

Search Metabolite or Enzyme name

☐ exact search

Search Organism or Taxon

☒ in manually verified data  
☒ in textmining data  
☒ in Swiss-Prot  
☒ in TrEMBL  
☐ visualize taxonomic information

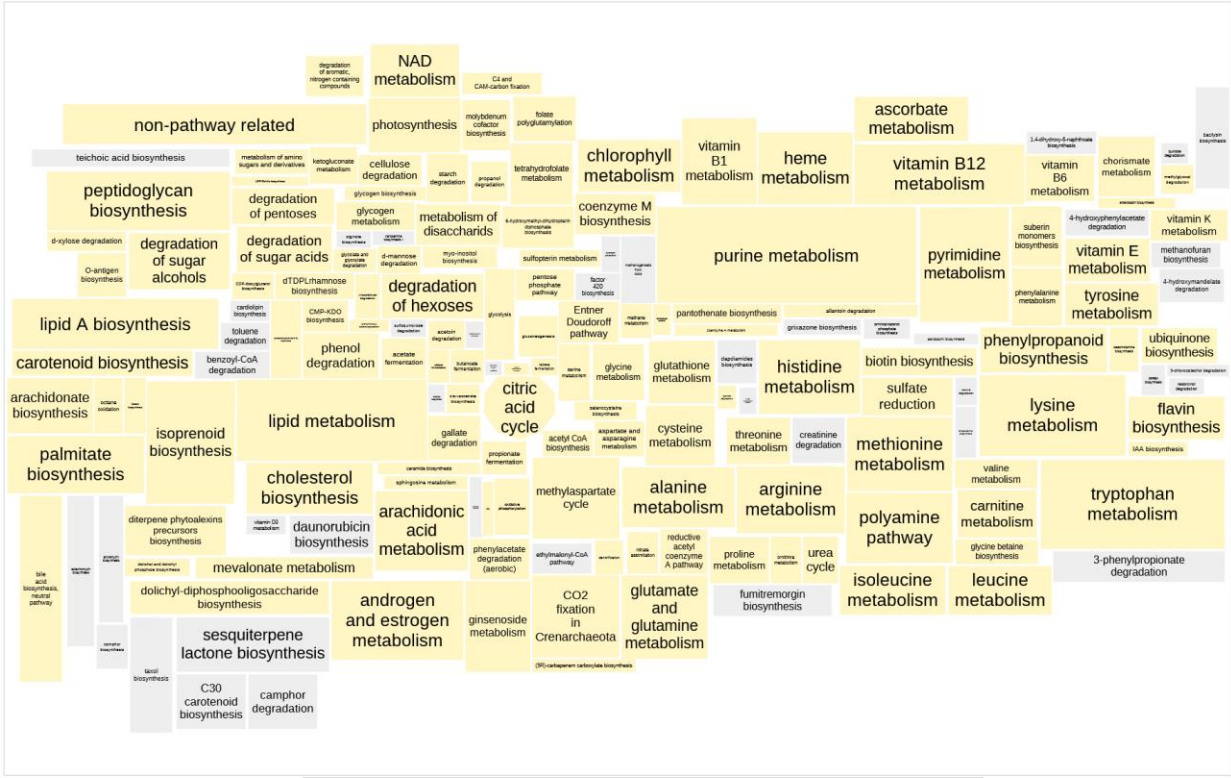
Show pathway categories

> Plot Your Dataset

> Download map as svg

Help

Center view



Nicotiana tabacum


Reset map


Show interpathway links


Show or hide cofactors on the map:

...if you wish to extend the results with text mining data or SwissProt, or TrEMBL data click the check boxes

▼ Search & Highlight


Search Pathway 

Search Metabolite or Enzyme name 

Search node 

☐ exact search

Search Organism or Taxon

Nicotiana tabacum 


☒ in manually verified data

☐ in textmining data

☐ in Swiss-Prot

☒ in TrEMBL

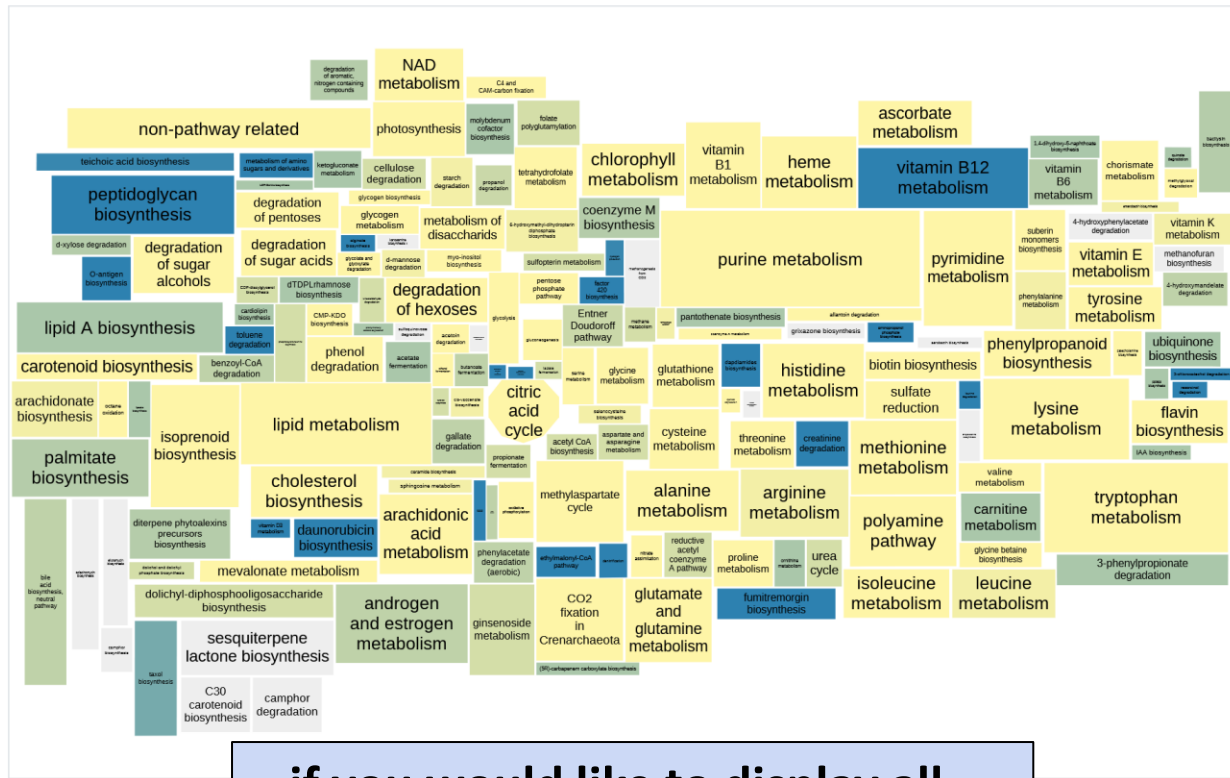
☒ visualize taxonomic information

Show pathway 

> Plot Your Dataset

> Download map as svg

Help Center view



Taxonomic information

- Eukaryota
- Viridiplantae
- Streptophyta
- Streptophytina
- Embryophyta
- Tracheophyta
- Euphyllophyta
- Spermatophyta
- Magnoliopsida
- Mesangiospermae
- eudicotyledons
- Gunneridae
- Pentapetales
- asterids
- lamiids
- Solanales
- Solanaceae
- Nicotianoideae
- Nicotianeae
- Nicotiana
- Nicotiana tabacum

Reset map

Show interpathway links

...if you would like to display all taxonomic levels, click on „visualize taxonomic information“

## Search & Highlight

Search Pathway

Search pathway

Search Metabolite or Enzyme name

4.1.1.39

☒ exact search

Search Organism or Taxon

Search organism or taxon

☒ in manually verified data

☐ in textmining data

☐ in Swiss-Prot

☐ in TrEMBL

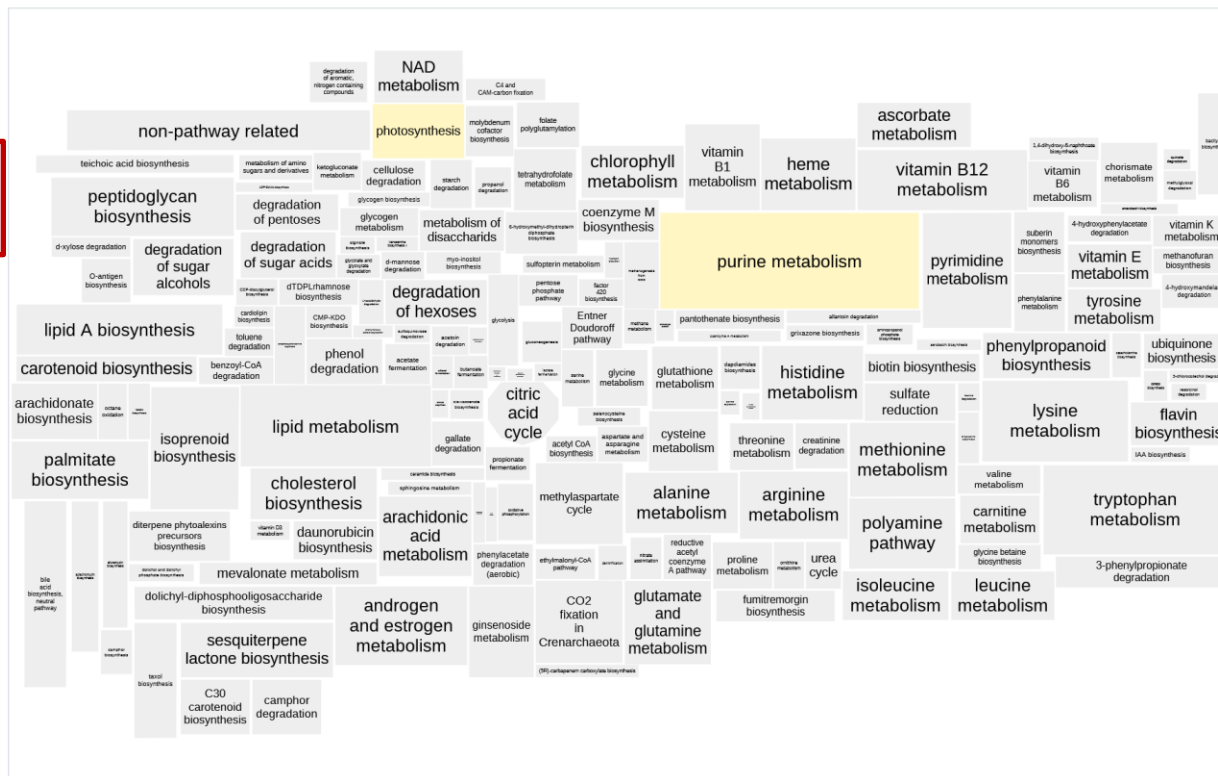
Show pathway categories

> Plot Your Dataset

> Download map as svg

Help

Center view



Reset map

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom


Enter a metabolite or an enzyme, i.e. 4.1.1.39, and all corresponding pathways are highlighted



▼ Search & Highlight

Search Pathway 

Search pathway

~~Search Metabolite Or Enzyme~~  
name 

4.1.1.39 x

☒ exact search

Search Organism or Taxon

Search organism or taxon

- ☒ in manually verified data
- ☐ in textmining data
- ☐ in Swiss-Prot
- ☐ in TrEMBL

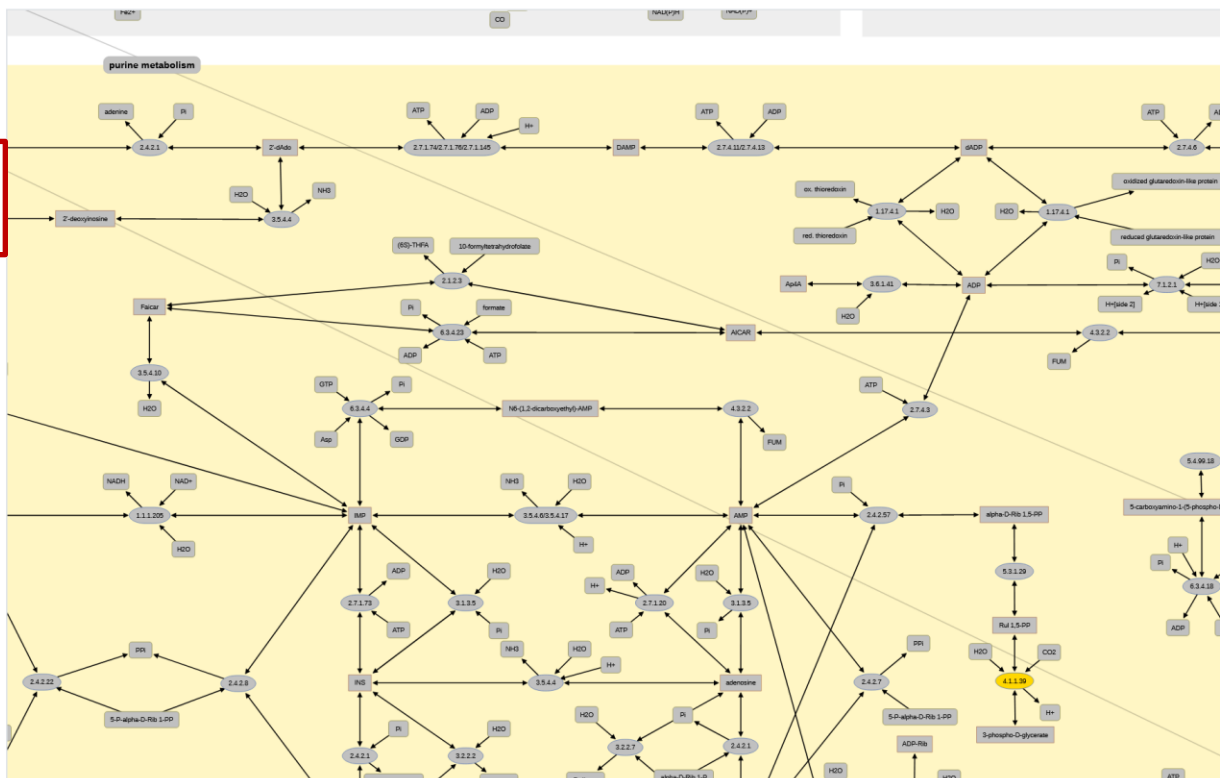
Show pathway categories

## ➤ Plot Your Dataset

➤ [Download map as svg](#)

Help Center view

Center view



Reset map

☐ Hide interpathway links

Show or hide cofactors on the map:

Toggle on zoom

☒ enzyme names / EC numbers


Enzymes in *cellulose degradation*:

- beta-glucosidase [B](#)
- cellobionic acid phosphorylase [B](#)
- cellobiose dehydrogenase (acceptor) [B](#)
- cellobiose phosphorylase [B](#)
- cellodextrin phosphorylase [B](#)
- cellulase [B](#)
- cellulose 1,4-beta-cellobiosidase (non-reducing end) [B](#)
- cellulose 1,4-beta-cellobiosidase (reducing end) [B](#)
- glucan 1,4-beta-glucosidase


**You can zoom in or out using the scroll wheel or via double click.**

**The ellipses represent the enzymes and the rectangles the metabolites.**

▼ Search & Highlight

Search Pathway 

Search pathway

Search Metabolite or Enzyme name 

4.1.1.39

☒ exact search

Search Organism or Taxon

Search organism or taxon

☒ in manually verified data  
☐ in textmining data  
☐ in Swiss-Prot  
☐ in TrEMBL

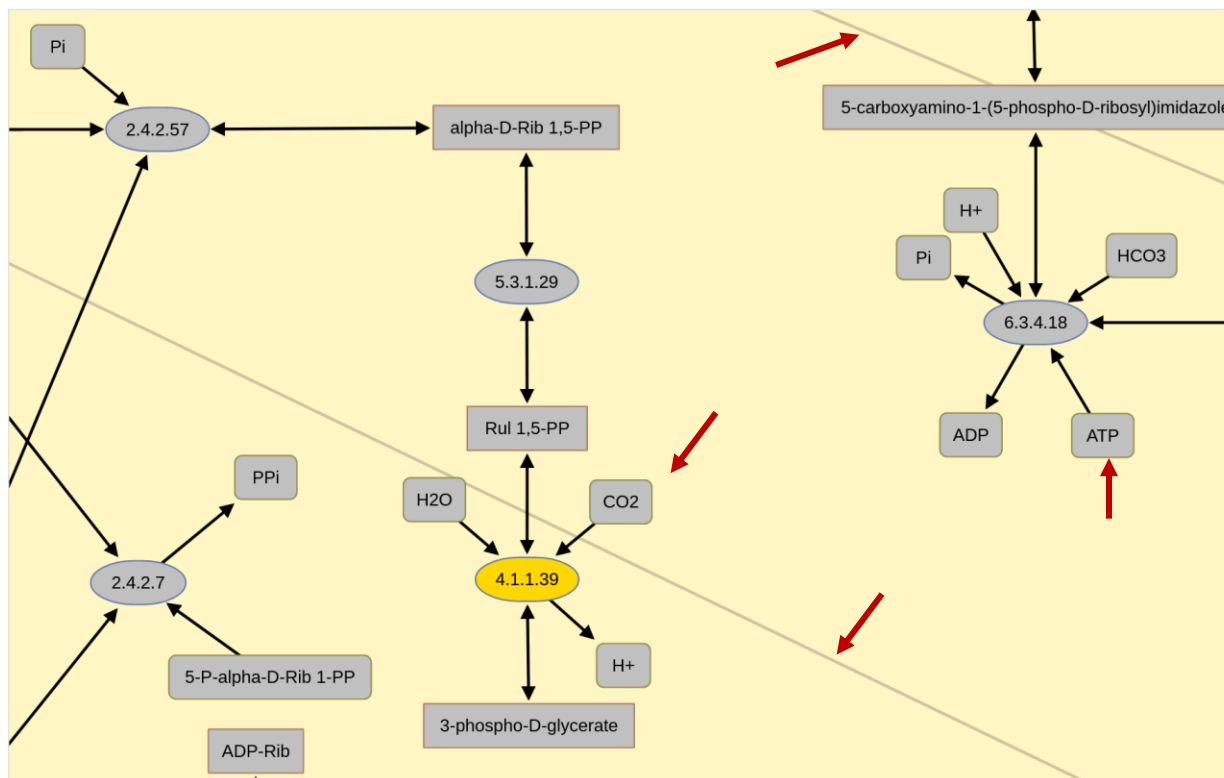
Show pathway categories

> Plot Your Dataset

> Download map as svg

Help

Center view



Reset map

Hide interpathway links

Show or hide cofactors on the map:

Toggle on zoom

☒ enzyme names / EC numbers

Enzymes in *cellulose degradation*:

- beta-glucosidase [B](#)
- cellobionic acid phosphorylase [B](#)
- cellobiose dehydrogenase (acceptor) [B](#)
- cellobiose phosphorylase [B](#)
- cellodextrin phosphorylase [B](#)
- cellulase [B](#)
- cellulose 1,4-beta-cellobiosidase (non-reducing end) [B](#)
- cellulose 1,4-beta-cellobiosidase (reducing end) [B](#)
- glucan 1,4-beta-glucosidase [B](#)

You can display the interpathway links and cofactors....

Search & Highlight

Search Pathway

Search pathway

Search Metabolite or Enzyme name

4.1.1.39

Search Organism or Taxon

Search organism or taxon

exact search

in manually verified data

in textmining data

in Swiss-Prot

in TrEMBL

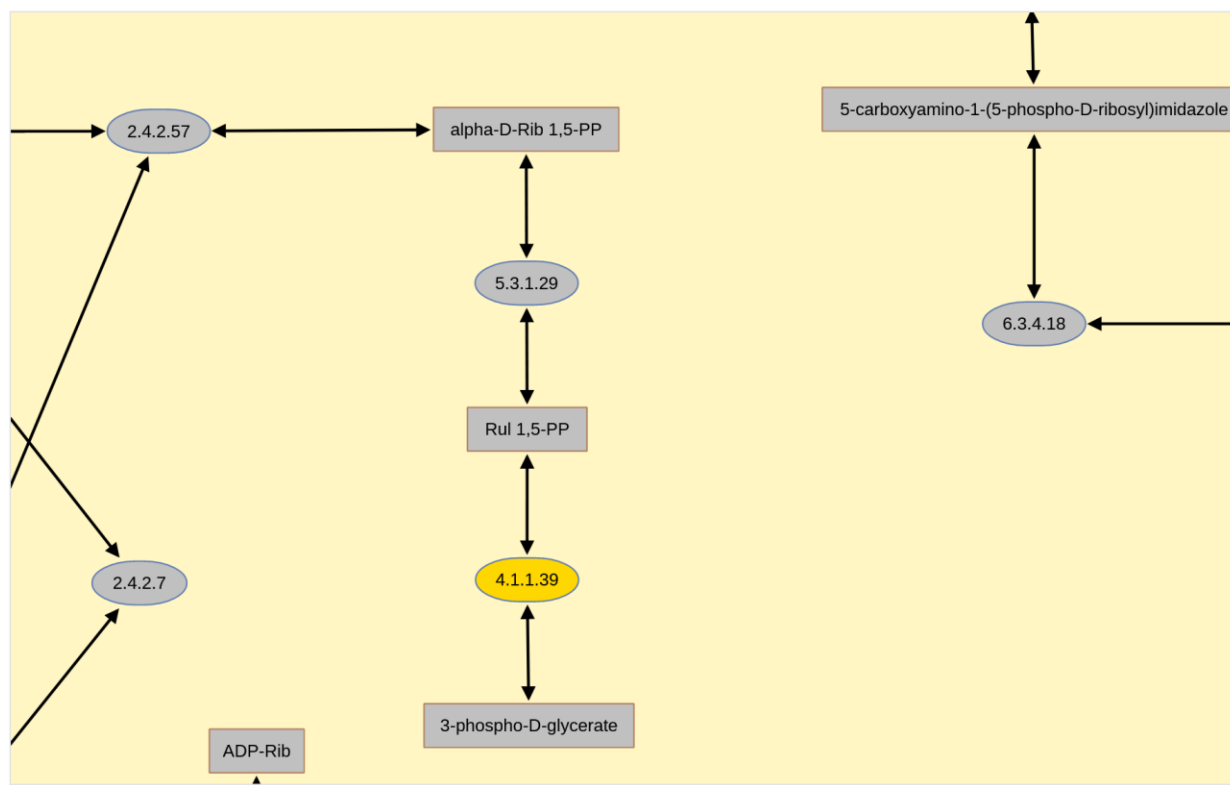
Show pathway categories

Plot Your Dataset

Download map as svg

Help

Center view



Reset map

Show interpathway links

Show or hide cofactors on the map:

Always hide

Toggle on zoom

Always show

Always hide

Enzymes in cellulose degradation:

- beta-glucosidase
- cellobionic acid phosphorylase
- cellobiose dehydrogenase (acceptor)
- cellobiose phosphorylase
- celloextrin phosphorylase
- cellulase
- cellulose 1,4-beta-cellobiosidase (non-reducing end)
- cellulose 1,4-beta-cellobiosidase (reducing end)
- glucan 1,4-beta-glucosidase

...or hide the interpathway links and cofactors

## Search & Highlight

Search Pathway

Search Metabolite or Enzyme name

☒ exact search

Search Organism or Taxon

☒ in manually verified data  
☐ in textmining data  
☐ in Swiss-Prot  
☐ in TrEMBL

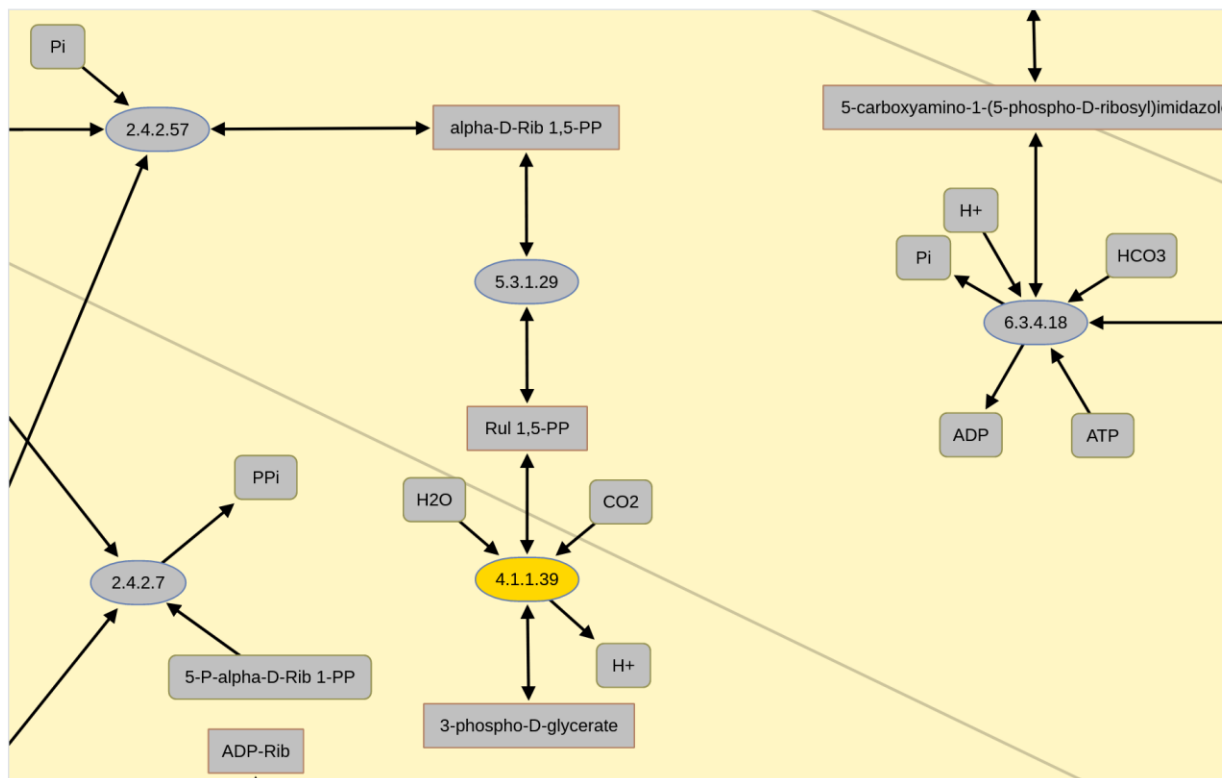
Show pathway categories

> Plot Your Dataset

> Download map as svg

Help

Center view



Reset map

Hide interpathway links

Show or hide cofactors on the map:

Toggle on zoom

☒ enzyme names / EC numbers

Enzymes in *cellulose degradation*:

- beta-glucosidase [B](#)
- cellobionic acid phosphorylase [B](#)
- cellobiose dehydrogenase (acceptor) [B](#)
- cellobiose phosphorylase [B](#)
- cellodextrin phosphorylase [B](#)
- cellulase [B](#)
- cellulose 1,4-beta-cellobiosidase (non-reducing end) [B](#)
- cellulose 1,4-beta-cellobiosidase (reducing end) [B](#)
- glucan 1,4-beta-glucosidase [B](#)

All enzymes of the chosen pathway are listed, and they are directly linked to the corresponding enzyme summary page in BRENDA

- celldextrin phosphorylase [B]
- cellulase [B]
- cellulose 1,4-beta-cellobiosidase (non-reducing end) [B]
- cellulose 1,4-beta-cellobiosidase (reducing end) [B]
- glucan 1,4-beta-glucosidase



go to...
HOME
Classic view

**BRENDA**  
1997 2019  
The Comprehensive Enzyme Information System

login
history
all enzymes
Technische Universität Braunschweig
Contact

Search & Highlight

Plot Your Dataset
Choose CSV file...
Browse

Identifier
☒ Metabolites
☐ EC numbers

Plot Type
☒ Circle indicators
☐ Label boxes
☐ Bar Chart

Styling
☒ highlight pathway

Min. color

Zero color

Max. color

☒ Hide NAs
Reset map

Download map as svg

Pathway Categories

Central and energy metabolism
Lipid metabolism
Amino acid metabolism
Nucleotide and cofactor metabolism
Carbohydrate metabolism
Fermentation and other catabolism
Xenobiotics and secondary metabolism
Other pathways

Show interpathway links

Show or hide cofactors on the map:

Always show

☒ enzyme names / EC numbers

Enzymes in *cellulose degradation*:

- beta-glucosidase [B](#)
- cellobionic acid phosphorylase [B](#)

You could use the BRENDA Pathways to plot your own experimental data, from i.e. proteomics, transcriptomics, or metabolomics analysis

> Search & Highlight

> Plot Your Dataset

Choose CSV file... Browse

test\_ec\_m... Identifier

☒ Metabolites

☐ EC numbers

Plot Type

☒ Circle indicators

☐ Label names

☐ Bar Chart

Styling

☒ highlight pathway

☐ Min. color

☐ Zero color

☐ Max. color

☒ Hide NAs

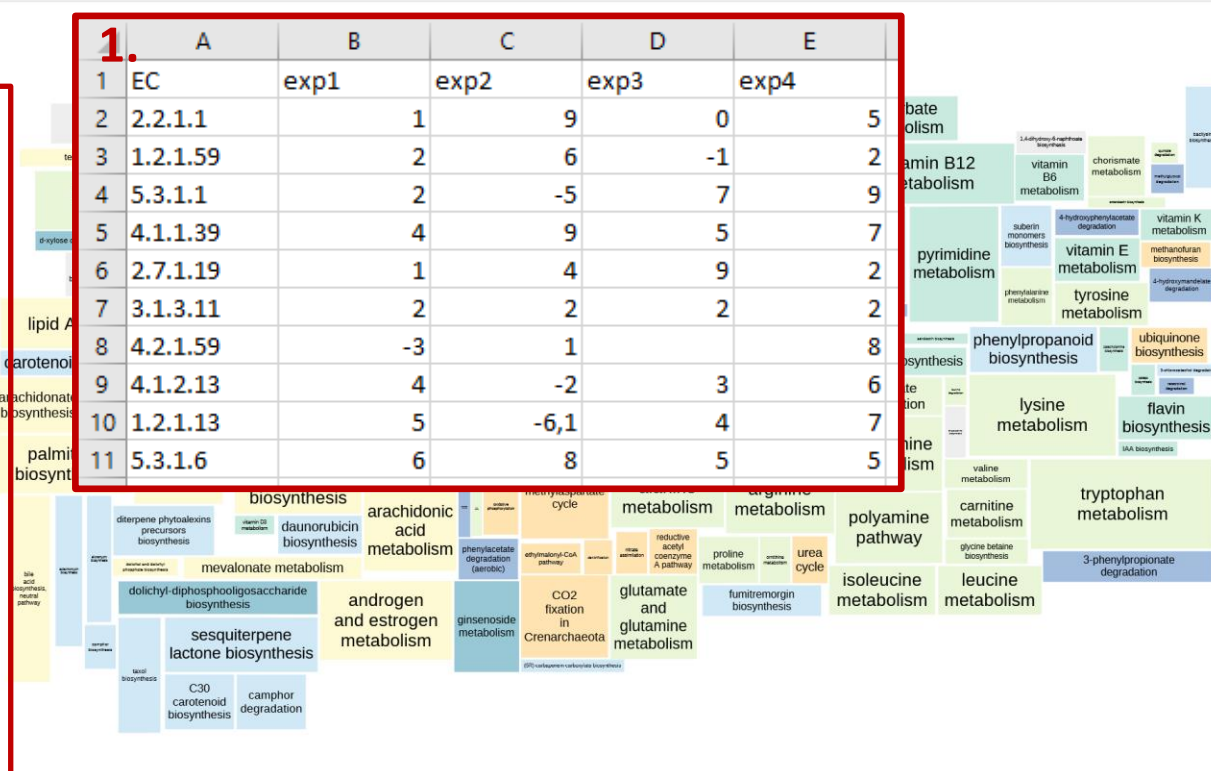
Plot data

Reset map

> Download map as svg

1.  
2.  
3.  
4.

1.	A	B	C	D	E
1	EC	exp1	exp2	exp3	exp4
2	2.2.1.1		1	9	0
3	1.2.1.59	2		6	-1
4	5.3.1.1	2		-5	7
5	4.1.1.39	4		9	5
6	2.7.1.19	1		4	9
7	3.1.3.11	2		2	2
8	4.2.1.59	-3		1	
9	4.1.2.13	4		-2	3
10	1.2.1.13	5		-6,1	4
11	5.3.1.6	6		8	5



Pathway Categories

- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways

Show interpathway links

Show or hide cofactors on the map:

Always show

☒ enzyme names / EC numbers

Enzymes in cellulose degradation:

- beta-glucosidase [B](#)
- cellobionic acid phosphorylase [B](#)

1. Upload your data
2. Choose the identifier
3. Select the plot type
4. Run „Plot data“



Search & Highlight

Plot Your Dataset

Choose CSV file...

Browse

test\_ec\_minus.csv

Identifier




- ☐ Metabolites
- ☒ EC numbers

Plot Type

- ☐ Circle indicators
- ☐ Label boxes
- ☒ Bar Chart

Styling

☒ highlight pathway

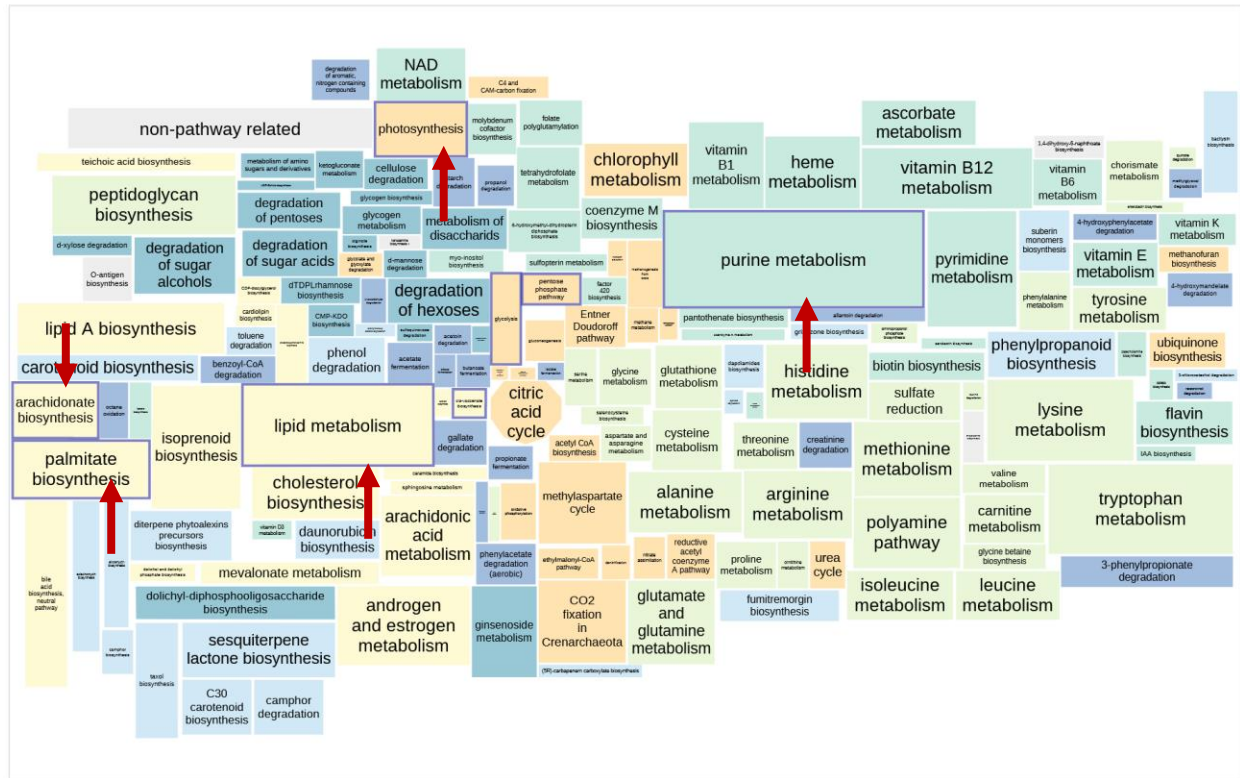
-  Min. color
-  Zero color
-  Max. color

☒ Hide NAs









Plot data

Reset map






Download map as svg



Pathway Categories

-  Central and energy metabolism
-  Lipid metabolism
-  Amino acid metabolism
-  Nucleotide and cofactor metabolism
-  Carbohydrate metabolism
-  Fermentation and other catabolism
-  Xenobiotics and secondary metabolism
-  Other pathways


test\_ec\_minus.csv

-  -5.0
-  -1.5
-  2.0
-  5.5
-  9.0

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom



Double click one the framed pathway to display the details.

➤ Search & Highlight

### ▼ Plot Your Dataset

Choose CSV file...

test\_ec\_minus.csv

Identifier

- ☐ Metabolites
- ☒ EC numbers

Plot Type

- ☐ Circle indicators
- ☐ Label boxes
- ☒ Bar Chart

## Styling

- ☒ highlight pathway

 Min. color

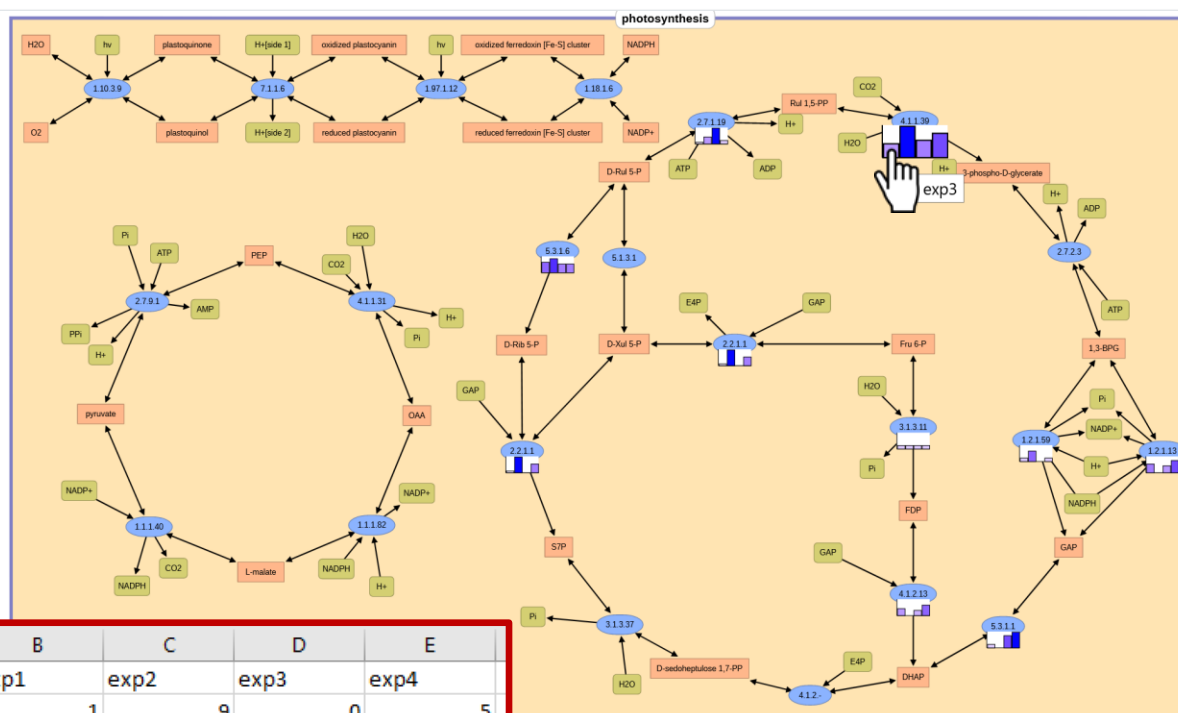
 Zero color

Max. color

☒ Hide NAs

Plot data    Reset map

> Download ma

Pathway Categories x

- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways

test ec minus.csv

■ -5.0

■ -1.5

2.0

5.5  
9.0

5.0

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom

	A	B	C	D	E
1	EC	exp1	exp2	exp3	exp4
2	2.2.1.1	1	9	0	5
3	1.2.1.59	2	6	-1	2
4	5.3.1.1	2	-5	7	9
5	4.1.1.39	4	9	5	7
6	2.7.1.19	1	4	9	2
7	3.1.3.11	2	2	2	2
8	4.2.1.59	-3	1		8
9	4.1.2.13	4	-2	3	6
10	1.2.1.13	5	-6,1	4	7
11	5.3.1.6	6	8	5	5

**Your data are directly plotted into the pathway.**

➤ Search & Highlight

## ➤ Plot Your Dataset

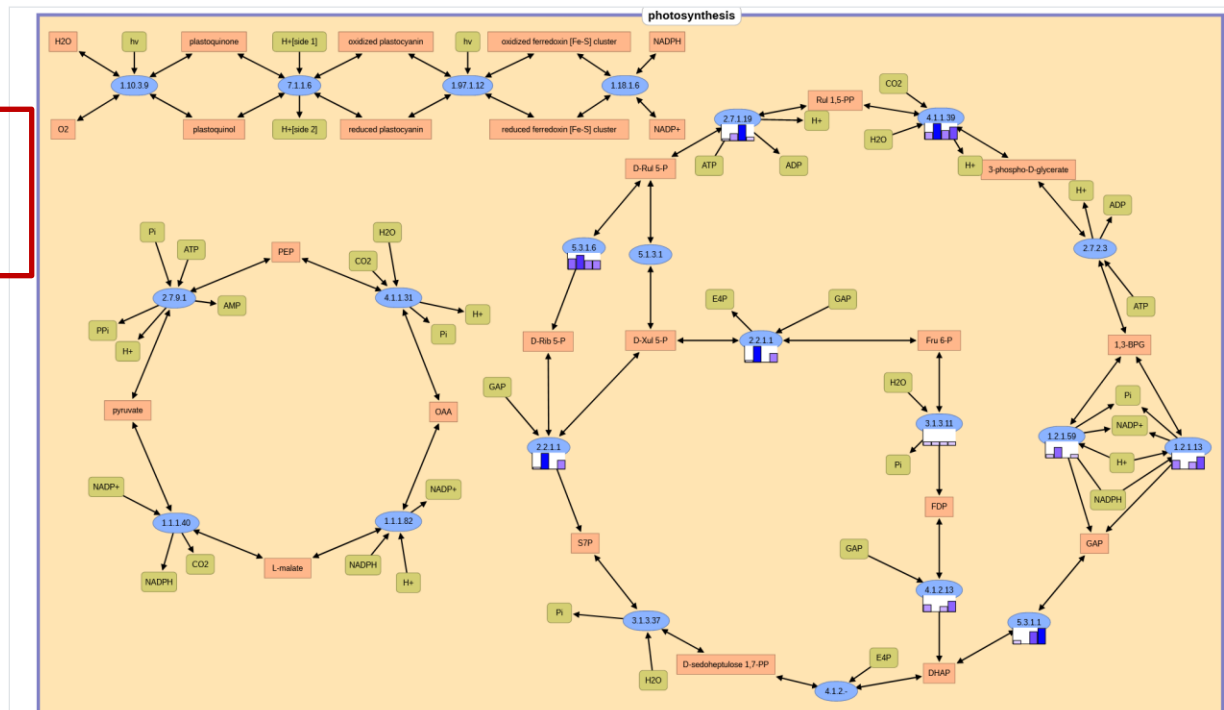
▼ Download map as svg

**You can specify which elements are visible on the downloaded map by the zoom level!**

Download selected PW

Help

Center view



Pathway Categories ×

- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways

test\_ec\_minus.csv

■ -5.0

 -1.5

2.0

5.5

9.0

Show interpathway links

Show or hide cofactors on the map:

[Toggle on zoom](#)

**If you wish to download your plotted pathway or any other one from the pathway map, select one and download it as \*.svg to continue processing in a graphical software.**

> Search & Highlight

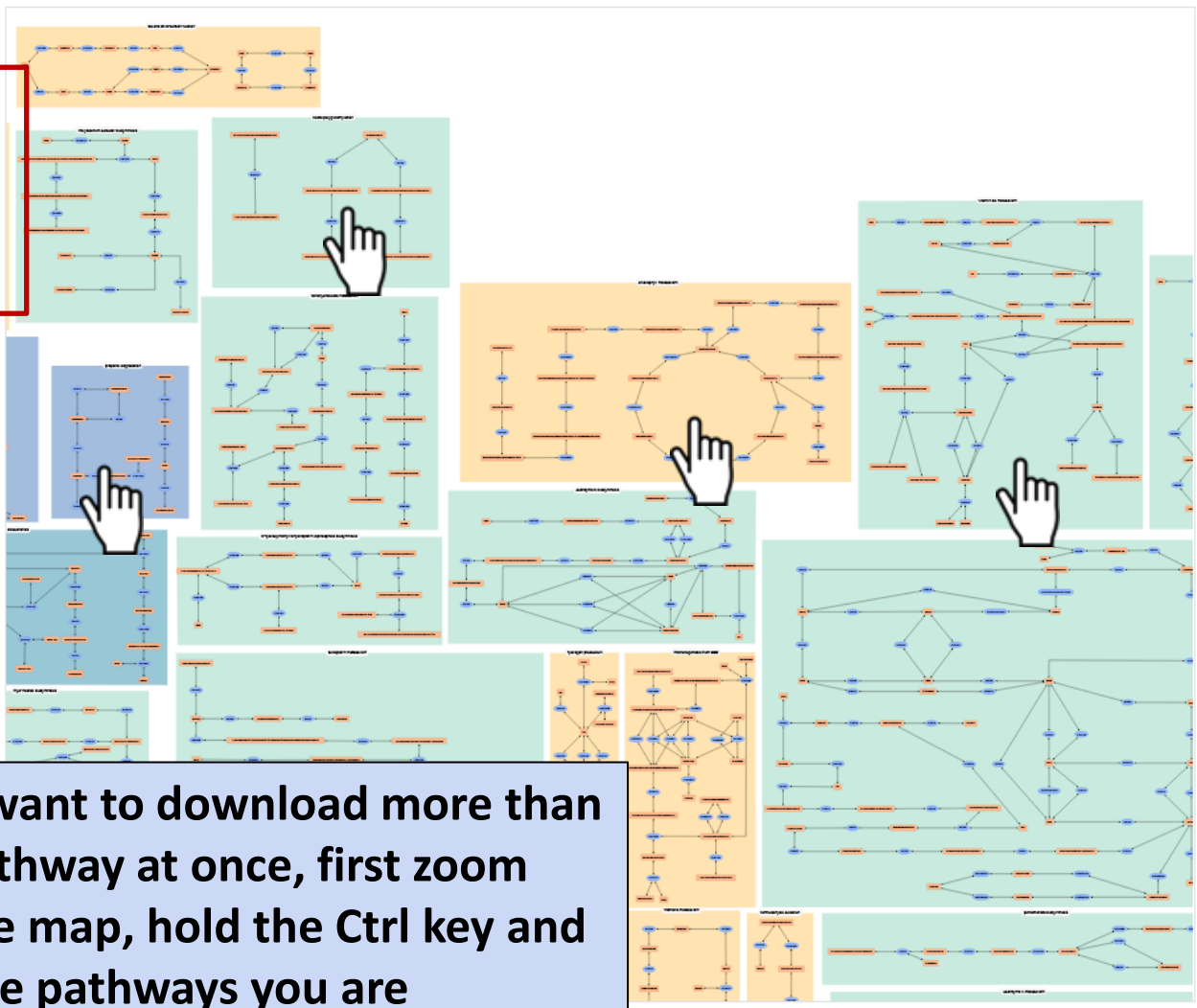
> Plot Your Dataset

▼ Download map as svg

You can specify which elements are visible on the downloaded map by the zoom level!

Download selected PW

Help Center view



Pathway Categories ×

- Central and energy metabolism
- Lipid metabolism
- Amino acid metabolism
- Nucleotide and cofactor metabolism
- Carbohydrate metabolism
- Fermentation and other catabolism
- Xenobiotics and secondary metabolism
- Other pathways

Show interpathway links

Show or hide cofactors on the map:

Toggle on zoom

If you want to download more than one pathway at once, first zoom into the map, hold the Ctrl key and click the pathways you are interested in, and download them.